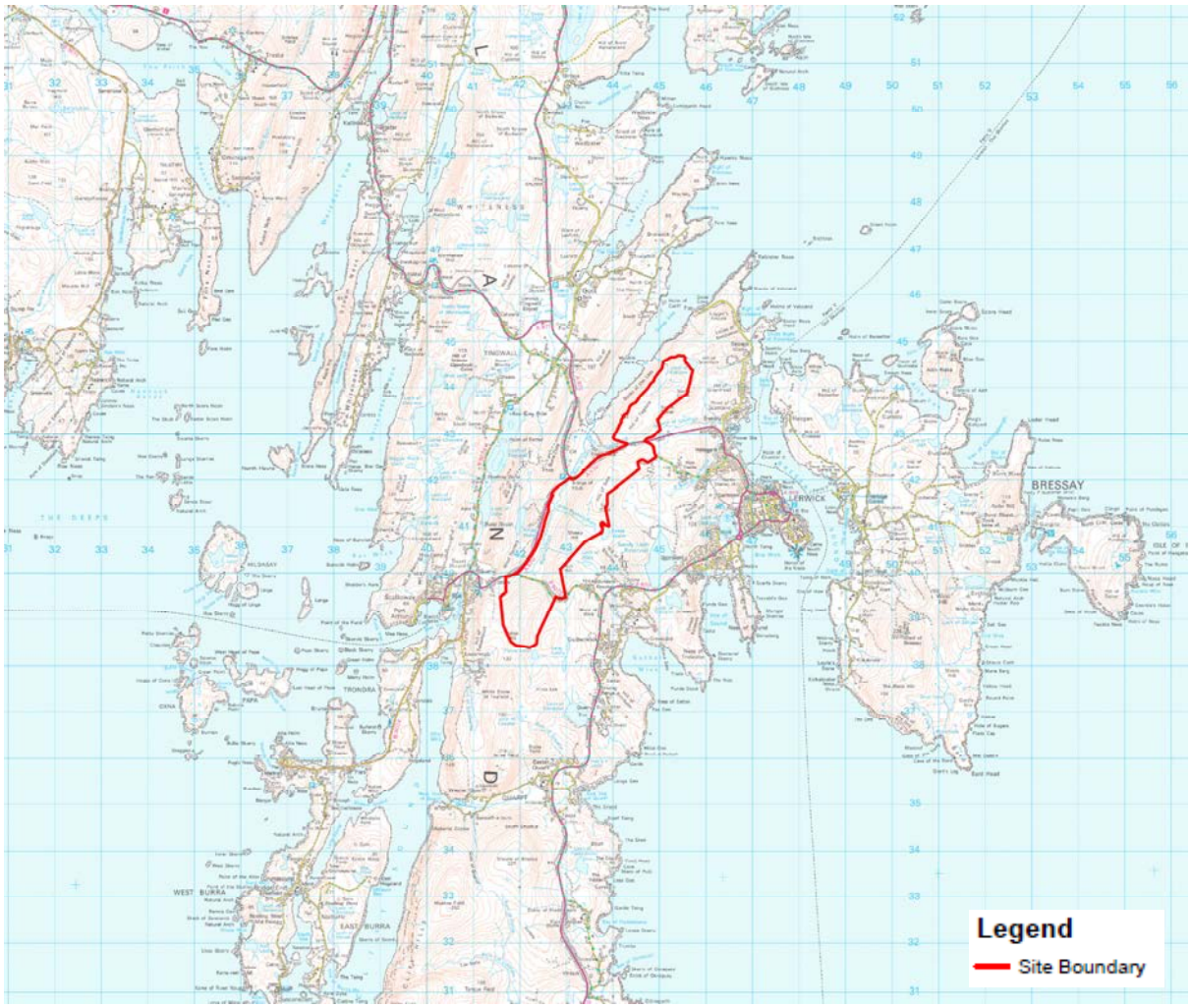
Contents

1 Introduction

Peel Wind Farms (No 1) Ltd. (the Applicant) is proposing to develop a 12 turbine wind farm with associated infrastructure to be known as Mossy Hill Wind Farm (the Proposed Development). The Proposed Development is located on Shetland Mainland between Lerwick and Scalloway within a site that covers approximately 605ha (the Site). The Site is located within the administrative area of Shetland Islands Council (SIC).

The centre point of the Site is located at HU 439 420. The centre of the Site is approximately 2.4km from the outskirts of Lerwick and approximately 4.2km from Lerwick Harbour. The outskirts of Scalloway are approximately 3.1km from the centre of the Site. The Site location is shown on Figure 1.1.

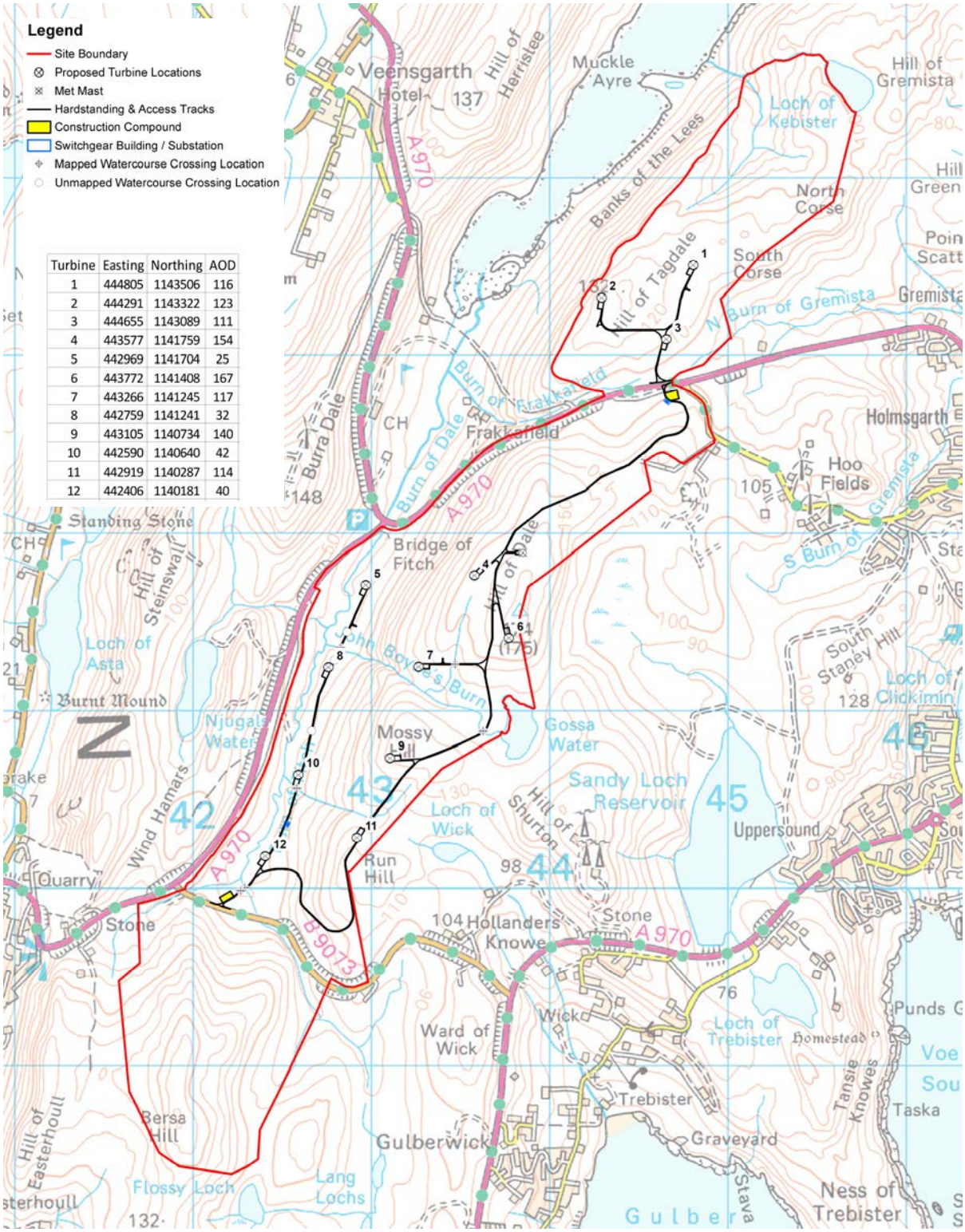
Figure 1.1: Site Location



The Site is situated within an area predominantly of undulating peat bog with the A970 crossing the Site and running adjacent to part of the western boundary. The B9073 crosses the southernmost section of the Site.

The Proposed Development has been subject to a thorough environmental assessment and design iteration process to ensure that the optimal design for the Site has been arrived at. The Proposed Development site layout is shown on Figure 1.2.

Figure 1.2: Proposed Site Layout



An Environmental Impact Assessment (EIA) of the Proposed Development has been carried out, as required by the Town and Country Planning (EIA) (Scotland) Regulations 2011. An Environmental Statement (ES) has been prepared in accordance with these regulations and accompanies the planning application. Schedule 4 of these regulations requires that a summary of the ES be provided in non-technical language. This document forms the Non-Technical Summary (NTS) to satisfy these requirements.

The ES and corresponding submission documentation have been prepared by TNEI Services Limited (TNEI) on behalf of the Applicant. Technical assessments have been undertaken by both TNEI and a number of specialist consultants:

- Alba Ecology Ltd. (Ecology and Ornithology);
- AO Archaeology Ltd. (Archaeology & Cultural Heritage);
- Aviatica Ltd. (Aviation);
- Axis PED Ltd. (Landscape & Visual);
- gCAP Ltd.;
- Shetland Amenity Trust (Ornithology);
- TNEI Services Ltd (Engineering and Infrastructure Design, Noise, Shadow Flicker, Carbon Balance, Peat and Soils, Geology, Hydrology and Hydrogeology, Radio-communications and Telecommunications, Socio-economics); and
- WYG (Traffic and Transport).

The ES includes a description of the proposal, the Site and its design. It summarises the findings of a comprehensive study of the likely environmental effects of the Proposed Development on its surrounding environment. In cases where likely adverse effects have been identified, measures to avoid, reduce or remedy these are described.

This NTS provides an overview for interested parties to understand the predicted significant effects of the Proposed Development without having to refer to the ES. This NTS contains a description of the Proposed Development, consideration of the likely environmental effects and details the measures taken to prevent and reduce these effects to acceptable levels.

1.1 Access to Submission and the ES

The NTS is available on the dedicated project website http://www.peelenergy.co.uk/mossy-hill/ and electronic copies of the main ES volumes can be supplied on request.

Printed copies of the Environmental Statement may be purchased at the cost of printing (including post and packing) by contacting TNEI. For inquiries regarding information or additional printing, please contact Jason McGray at TNEI Services Ltd, on 0191 211 1400 or jason.mcgray@tneigroup.com.

Copies of the Non-Technical Summary and the Environmental Statement are available for public consultation during normal office hours at:

Shetland Island Council

8 North Ness Business Park

Mitchell's Road

Lerwick

Shetland

ZE1 0LZ

Hard copies are also via the following community councils:

- Lerwick;
- Scalloway;
- Tingwall, Whiteness and Weisdale; and
- Gulberwick, Quarff and Cunningsburgh.

2 Key Facts

Developer/Applicant: Peel Wind Farms (No 1) Ltd.

The Site: The Proposed Development is located on Shetland Mainland between Lerwick and Scalloway within a site that covers approximately 605ha.

Number of Wind Turbines Proposed: 12.

Rated Generating Output of the Wind Farm: Up to 50 MegaWatts (MW).

Dimensions of Wind Turbines: A maximum blade tip height of up to approximately 145m, hub height of approximately 78m and maximum rotor diameter of approximately 133m.

Access Tracks: Approximately 9.3km of access tracks. Access tracks would be constructed of crushed stone with areas of floating road and a width of 4.5m.

Construction Period: The construction programme, including onsite construction works when most activities would take place, would last approximately 24 months.

Life Span: A likely 25-year operational period (in addition to a 24 month construction period). Before the end of the operational period the Proposed Development operations would be reviewed, taking into account issues including technological advances and the views of the relevant consultees and stakeholders, with the option for then decommissioning, re-powering or extending the life of the Proposed Development.

Employment: The majority of directly created jobs, between 10 and 20 full time equivalent (FTE), would arise during the construction phase of the Proposed Development. Whilst tendering for construction works would be open to the general construction market, the Applicant would look to use as many local contractors as possible. Accordingly, it is not possible to state how many of those FTE jobs would be local to the area. In addition, between 19 and 38 jobs are predicted to be indirectly created servicing the construction process.

Vehicle Movements: The number of daily loads would vary considerably over the construction period with the highest numbers being during month 9, where there would be an average of 66 Heavy Goods Vehicles (HGVs) per day.

Grid Connection: A new High Voltage Direct Current (HVDC) link (subsea cable) between Shetland and the Scottish Mainland is to be constructed which would enable the grid connection for the Proposed Development. The grid connection itself would be subject to a separate application process undertaken by the Distribution Network Operator. The details and detailed assessment of the grid connection would be included in this separate application should the Proposed Development be granted planning permission.

3 The Benefits of the Proposed Development

The Proposed Development would provide significant benefits at local and national levels. It would:

- Contribute to Shetland's own secure supply of energy, reducing the reliance on imported fossil fuels that feed the existing power stations;
- Make a positive contribution to the Scottish Government target of achieving a 66% reduction in carbon emissions by 2032[1];
- Reduce greenhouse gas emissions by harnessing power from the wind, equating to potential carbon dioxide (CO_2) savings of approximately between 57,862 and 118,507 tonnes of carbon dioxide equivalent (tCO_2e) over its anticipated 25 year lifetime and with a carbon payback period of approximately between 0.8 and 2.3 years[2];
- Support the onshore wind industry which in 2016 employed around 8,000 people across Scotland[3];
- Generate additional construction contracts that would provide jobs, training and skills development during the construction period. Where possible, contracts would be awarded to local companies, directly supporting the local economy on Shetland through construction jobs and training opportunities; and
- Create opportunities for indirect economic benefits through local sourcing of materials and services and increased trade associated with the construction workforce.

3.1 Renewable Energy Development

It is widely accepted that a reduction in CO_2 emissions is required in order to tackle the global issue of man-made climate change. Changes in the climate are becoming increasingly evident and are known to impact upon the weather, sea levels, wildlife species and their habitats and ecosystems.

The UK government has signed up to a number of international agreements and has a legally binding obligation to increase its share of renewables in our energy mix to 15% by 2020 in order to tackle climate change. In addition to these UK targets, the Scottish Government has adopted a target for the amount of Scotland's electricity consumption produced by renewable energy in 2020 to be 100% with the longer-term target of reducing carbon emissions by 66% by 2032.

In the UK, capturing the wind's natural energy is the most proven form of renewable energy generation. Therefore, wind energy provides the most efficient opportunity for reducing CO_2 emissions from our electricity use, contributing positively to the international and national targets that have been set.

Scotland has the greatest wind resource in Europe. Capturing this to provide indigenous green energy, whilst continuing research into energy efficiency and other renewable sources, is a logical step forward.

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[1] The Scottish Government (2018) Climate Change Plan: The Third Report on Proposals and Policies 2018 – 2032

[2] Calculations have been made using the Scottish Government's Windfarm Carbon Assessment Tool (the carbon calculator) which requires data ranges to be input to consider the minimum and maximum impacts on carbon balance that are associated with the Proposed Development.

[3] UK Environmental Accounts: Low Carbon and Renewable Energy Economy Survey: 2016 final estimates. Available at: https://www.ons.gov.uk/economy/environmentalaccounts/bulletins/finalestimates/2016

The Proposed Development would provide a secure, reliable energy supply in line with the UK and Scottish Government's national energy targets. The expected total carbon payback time of the Proposed Development, based on carbon losses from turbine manufacture, construction of foundations, excavation and drainage of peat and other related activities and calculated using the Scottish Government's carbon calculator tool between 0.8 and 2.3 years. Following which, all the electricity produced would be carbon neutral for the remainder of its likely 25-year operational life.

4 Mossy Hill Wind Farm

As outlined above, the Scottish Government has set ambitious targets for renewable energy generation. New infrastructure and generating facilities are required in order to meet these targets. Such infrastructure has to be placed where the required natural resources are abundant and where there are no technical or environmental constraints to development.

The Site was selected because of a number of factors including:

- Excellent wind resource;
- Good access from both the A970 and B9073 (also providing options for the export of power to the final point of connection along or adjacent to these roads);
- There being no designations within 500m and sufficient buffers achievable from all environmental designations; including the South West Mainland National Scenic Area (NSA), the Lochs of Tingwall and Astram Site of Special Scientific Interest (SSSI) and the East Coast Mainland proposed Special Protection Area (pSPA).
- A location which, through discussions with SIC, is within an area generally supportive of this form of development; and
- The relatively low number of residential properties in close proximity to the Site.

4.1 Design Process

The locations of wind turbines and the layout of infrastructure connecting them have been considered carefully throughout the EIA and through an iterative design process where the design evolved as understanding grew of a wide range of constraints and influencing factors including:

- Landscape and visual impacts;
- Impacts on cultural heritage and archaeology;
- Ornithological interests;
- Ecological interests;
- Soils and peat;
- Carbon balance;
- Local geology, hydrology and hydrogeology;
- Noise impacts;
- Access requirements;
- Impacts on traffic and transport routes;
- Shadow flicker;
- Telecommunications and radiocommunications in the vicinity of the Site;
- Aviation interests; and
- Impacts on socio-economics and tourism.

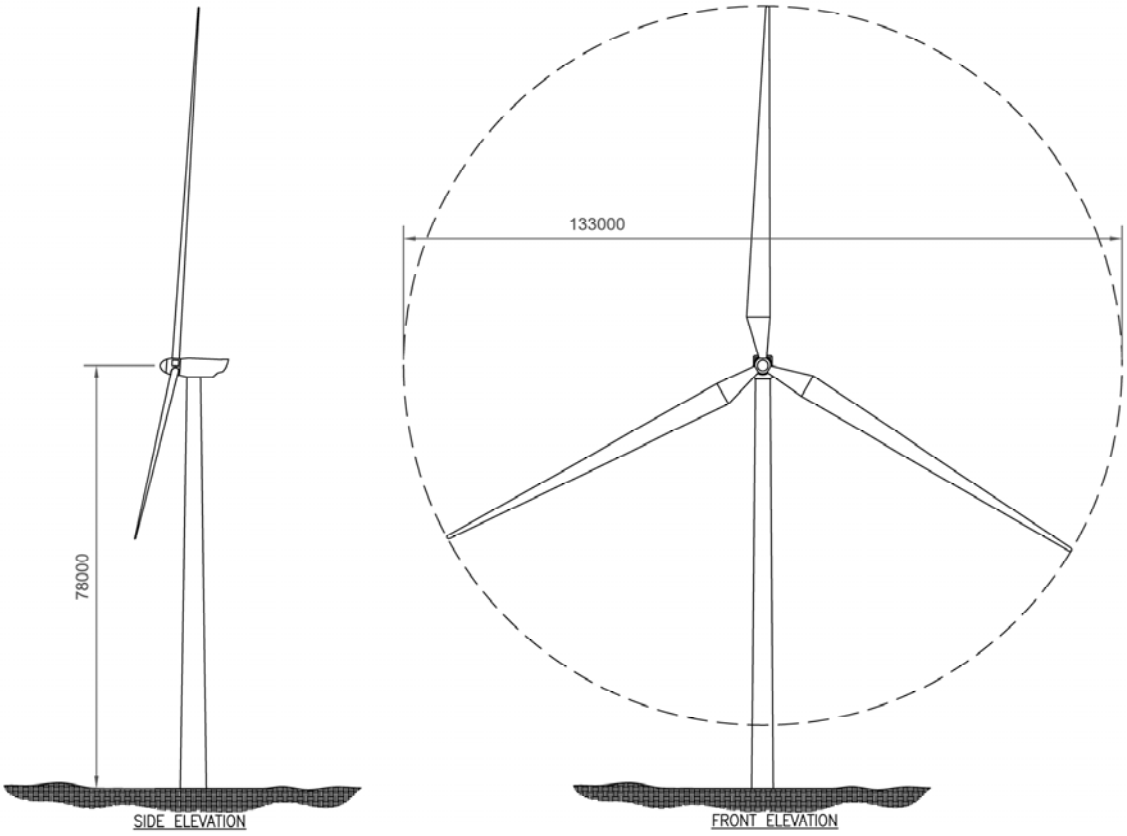
Environmental constraints and design input were provided by the environmental and technical team and a number of layouts produced prior to the final optimal layout of the 12 wind turbines. This process has been informed by site assessments and feedback during stakeholder consultation.

4.2 The Proposed Development

The Proposed Development (as shown on Figure 1.2) would consist of:

- 12 wind turbines (Figure 4.1) each with three blades, with a maximum blade tip of 145m, a likely rotor diameter of 133m and likely hub height of 78m;
- Wind turbine foundations with approximate dimensions of 25m in diameter and to an approximate depth (depending on ground conditions) of 3m;
- Areas of hardstanding providing crane pads and laydown areas at each wind turbine location (approximately 28m x 45m);
- External transformer unit at the base of each wind turbine;
- Two temporary construction compounds, one measuring approximately 50m × 50m, and a second measuring 70m × 35m;
- Two substation compounds, each measuring approximately 20m × 12m;
- Access tracks and turning heads with an overall length of approximately 9.3km and an average width of 4.5m along with associated verges and drainage;
- Three site access points, two from the A970 and one from the B9073;
- An 80m high meteorological mast;
- Eight watercourse crossings; and
- A scheme of ecological mitigation and habitat enhancement.

Figure 4.1: Typical Wind Turbine with Measurements (mm)



4.3 Planning Policy

The planning policy context for the Proposed Development at both a national and a local level is reported in full within ES Chapter 5: Planning Policy Context.

In 2018 the Climate Change Plan[7] set out how Scotland can deliver a 66% emissions reduction, relative to the 1990 baseline during the period 2018-2032. It states that *'we will continue to need to find room for large scale infrastructure such as wind and solar farms, as well as more locally based equipment'*.

The 2017 Scottish Energy Strategy (SES)[5] sets renewable energy targets for 2030 and 2050, recognising that renewable energy technologies including onshore wind will have a key role to play in helping to achieve these targets. National planning policy continues to support the principle of wind energy development, subject to the consideration of environmental criteria. The Proposed Development is located within a Group 2 area of the Scottish Planning Policy (SPP) spatial strategy which is an area where wind farms may be appropriate subject to consideration of a number of environmental criteria.

The emphasis on the need to develop onshore wind energy is included in the Scottish Government's Onshore Wind Policy[6].

The Development Plan for the Proposed Development comprises the Shetland Islands Local Development Plan (LDP) (2014) which is supportive of the principle of wind energy development. The LDP policies require developers to demonstrate that wind energy development proposals would not have unacceptable impacts on people, the natural and water environment, landscape, or the historic, built or cultural environment of Shetland.

Overall, there is strong policy support for the principle of renewable energy development at all policy levels, subject to the satisfaction of a number of planning and environmental considerations which are considered in detail throughout the ES. A Planning Statement also accompanies the application to assess compliance of the Proposed Development with all relevant policies.

[4] The Scottish Government (2018) Climate Change Plan: The Third Report on Proposals and Policies 2018–2032

[5] The Scottish Government (2017) Scottish Energy Strategy

[6] The Scottish Government (2017) Onshore Wind Policy Statement

5 Environmental Impact Assessment (EIA)

5.1 EIA Process

The EIA process involves collation and analysis of information regarding the likely significant environmental effects of a development and provides an opportunity to 'design out' adverse effects wherever possible. Where adverse effects cannot be designed out, mitigation measures can be proposed to avoid, compensate or reduce significant environmental effects to an acceptable level. EIA is therefore an iterative process, rather than a one-off appraisal, which allows feedback from stakeholder consultation and the results from baseline studies to be fed into the design process of the Proposed Development. A team of impartial environmental specialists undertook each of the technical assessments as listed above.

5.2 Scoping and Consultation

A detailed EIA Scoping and consultation process was carried out in order to:

- Ensure that consultees were informed of the proposal and provided with an opportunity to comment at an early stage in the EIA process;
- Obtain baseline information regarding existing environmental conditions;
- Establish key environmental issues and identify potential impacts to be considered during the EIA;
- Identify those issues which are likely to require more detailed study and those that do not require further assessment; and
- Provide a means of confirming the most appropriate methods of assessment.

A Scoping Response from SIC in June 2017 providing input from statutory and other key consultees was received on 2 June 2017.

A programme of community engagement has also been undertaken to liaise with and inform local people about the Proposed Development. This included a series of public exhibitions to introduce the project and gather feedback from interested parties that would be considered throughout the EIA and design process.

Further details of the public consultation programme undertaken for the Proposed Development, and information gathered during this process, is detailed within the Pre-Application Consultation (PAC) Report submitted as part of the application.

5.3 Landscape and Visual Impact Assessment

A Landscape and Visual Impact Assessment (LVIA) has been undertaken by qualified landscape architects and Chartered Members of the Landscape Institute (CMLI) at Axis PED to identify the landscape and visual effects that would result from the Proposed Development. A desk study and field surveys have been undertaken and baseline conditions of the Site were considered in terms of designations, landscape character, visibility, residential visual amenity and cumulative effects.

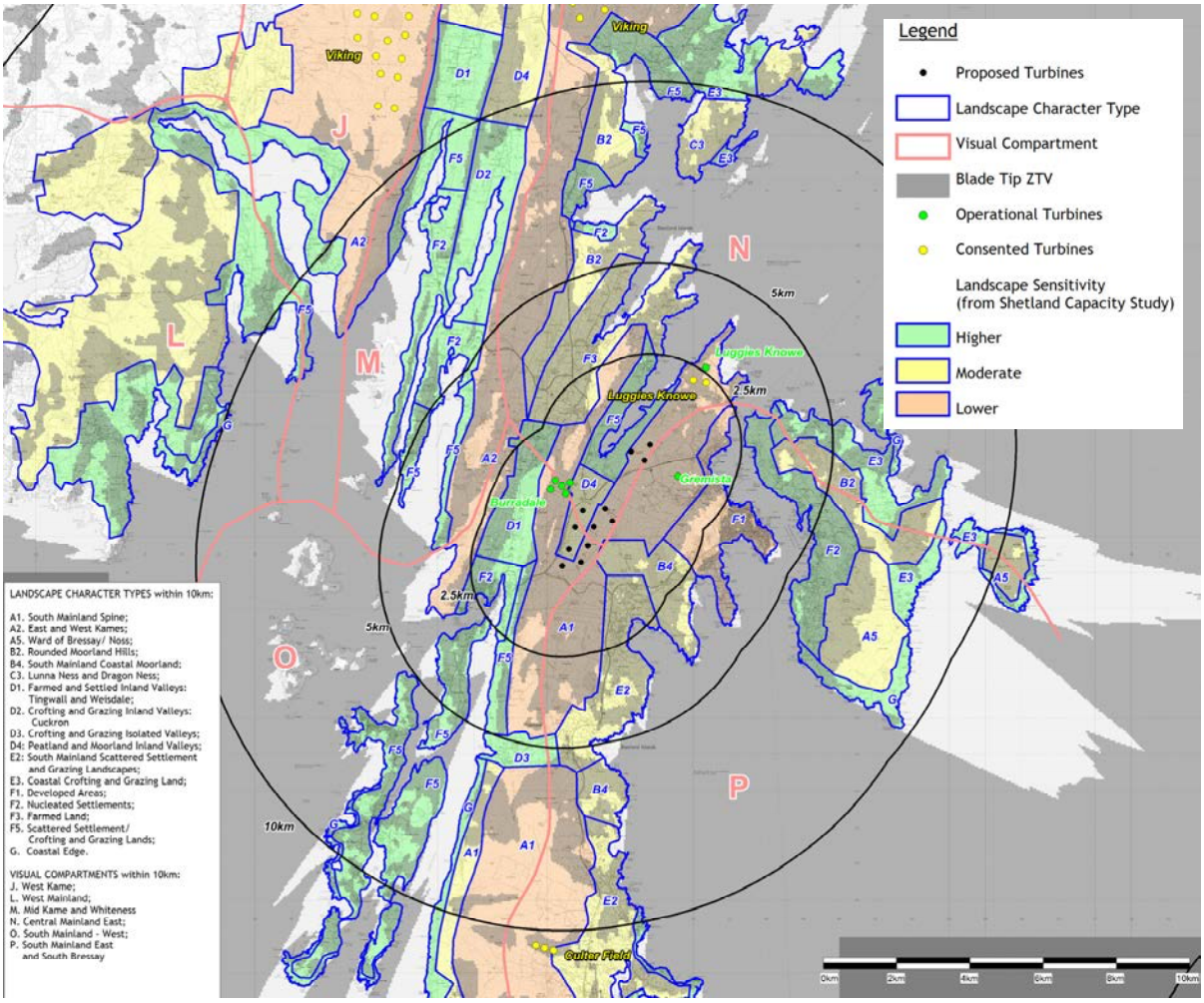
The assessment has found that effects of the special qualities of landscape designations would be limited in nature and extent and would not be significant.

The Shetland NSA is located within 10km and whilst the Proposed Development would be visible from some locations within the NSA, the change in view that would occur would have little influence upon the special qualities of the NSA as a whole, or the South West Mainland area more specifically. The

proposed wind turbines would be evident in landward views out of the NSA, in a similar fashion to the existing Burradale wind farm, but with a greater degree of prominence from some locations. However, such views do not form a key part of the special qualities of the NSA which are concerned largely with coastal influences, with historic features, or with perceptual qualities of remoteness and wildness associated with the rugged coastal landscape. The Proposed Development would not materially affect either the statutory purposes or the special qualities of the NSA and no significant effects on this landscape designation would occur.

The Proposed Development would result in significant effects on the landscape character of four landscape character areas, namely: the northern part of landscape character areas A1: South Mainland Spine North; the whole of landscape character areas D4: Peatland and Moorland Inland Valleys (Burn Dale); the southern part of landscape character area F5: Scattered Settlement/Crofting and Grazing Lands (Dales Voe), and the north-western part of landscape character areas B4: South Mainland Coastal Moorland (Figure 5.1). In these areas the proposed wind turbines and associated access tracks would become a defining characteristic due to their scale and extent. In these areas a wind farm landscape would be created including access tracks, substation buildings and the wind turbines themselves. In other landscape character areas, the effects are not considered significant due to either the robustness of their underlying characteristics and/or the limited extent of visibility and the context of existing views and how these contribute to the key characteristic and sense of place.

Figure 5.1: Landscape Character Areas



With input from stakeholders, the assessment identified 23 key viewpoints where the effects experienced would be representative of those within the Study Area. The assessment has been undertaken based on all of the views available from a specific location and considering what is the main focus of these views. It is considered that at nine of the viewpoint locations people would experience significant visual effects because of the Proposed Development. At the other 14 viewpoints visual effects would not be significant either because the proposed wind turbines would be minor background features in expansive and panoramic vistas, would be seen in a man-made context and/or would be located away from the main focus of the views that are available from a particular location.

The design process sought to minimise the number of residential properties within 1.5km of the proposed wind turbines and as a result there are only 10 properties within that range. Whilst a number of these properties would experience significant visual effects as a result of the Proposed Development, the effects upon residential visual amenity would not be so overwhelming as to make any of the properties an unacceptable place to live. Beyond these properties, some localised significant effects would be experienced within the surrounding settlements but with many views heavily screened by topography and built form.

Similarly, there would be some localised significant effects on users of footpaths, cycleways and the road network in the vicinity of the proposed wind turbines. This particularly applies to the roads that cross the Site. Again, such views would often be screened by topography and would be constantly changing as the viewer travelled along the routes.

Significant cumulative landscape and visual effects would be limited to a localised area of uplands to the north-west of the Site where the Viking Scheme would be prominent and the wind turbines at Luggies Knowe, Gremista, Mossy Hill and Burradale would also be prominent but in the opposite direction.

5.4 Cultural Heritage and Archaeology

An assessment has been undertaken by AOC Archaeology to identify the archaeological and cultural effects of the Proposed Development. It reports on the likely direct and indirect effects on archaeological features and heritage assets resulting from the construction, operation and decommissioning of the Proposed Development.

20 heritage features of potentially prehistoric to modern date have been identified within the Site (Figure 5.2). The Proposed Development has been designed, where possible, to avoid direct impacts upon known heritage features. One direct impact on a known heritage features is anticipated on possible peripheral remains associated with a possible artificial mound on the banks of the Burn of the Gills, however this would not be a significant effect.

The presence of extensive peat cover across the Site indicates the potential for historic environmental evidence to be contained within and underlying the peat. Additionally, remains of prehistoric to post-medieval date in and around the Site indicate the potential for sub-surface archaeological deposits and features to exist.

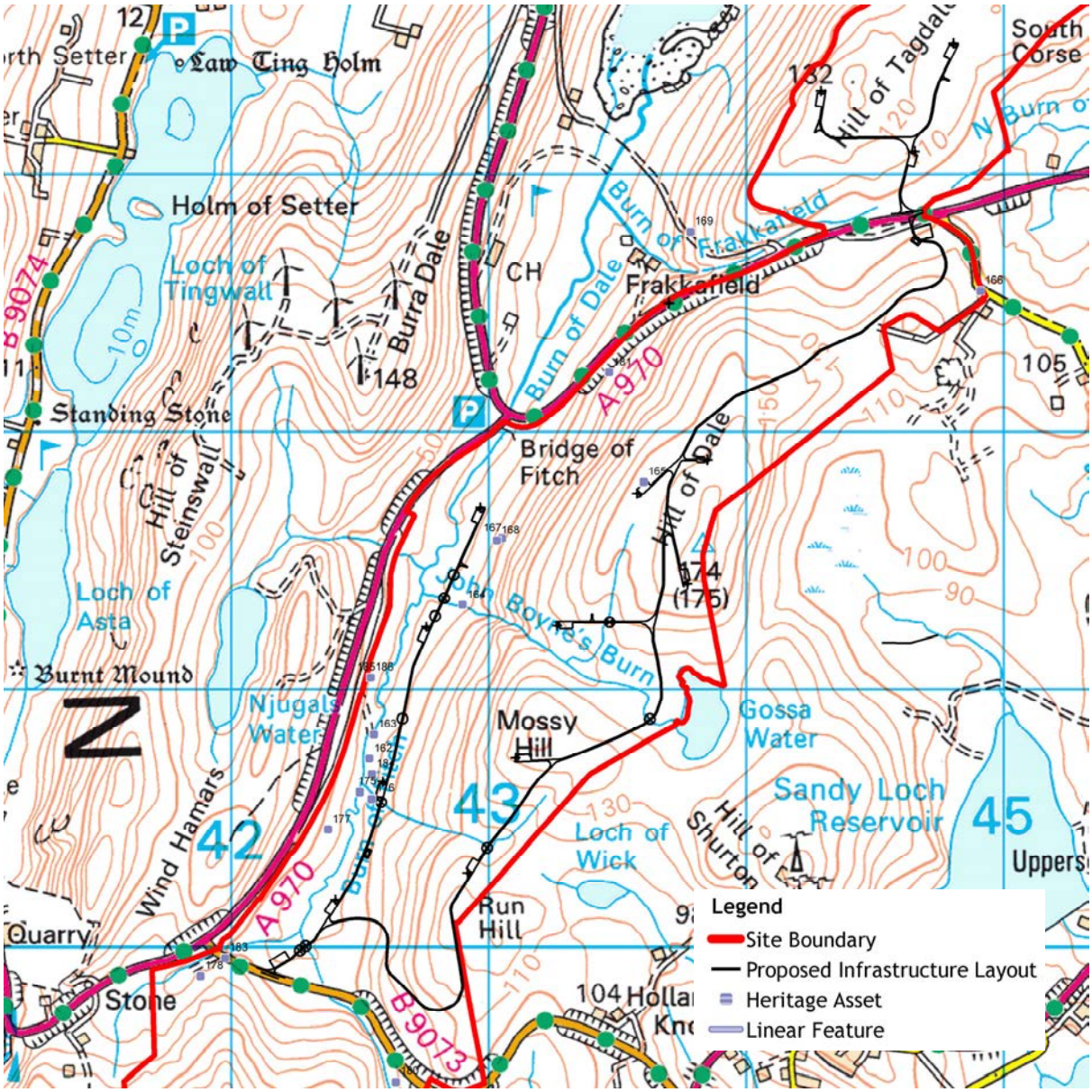
All known heritage features within 50m of the Proposed Development (working areas) would be fenced off with a visible buffer under archaeological supervision prior to the start of the construction phase in order to avoid accidental damage by heavy plant movement.

Given the potential for presently unknown archaeological remains, in particular of prehistoric and post-medieval date, to survive within the Site, a programme of archaeological works to investigate and mitigate against the possibility of uncovering unknown remains would be undertaken. The predominance of peat within the Site means that archaeological features may be buried by peat

growth, and therefore undetectable by survey. To mitigate against previously unrecorded features being impacted upon during the construction phase, an archaeological watching brief would be undertaken on a representative proportion of ground-breaking works. Details of mitigation would be agreed in consultation with Shetland Amenity Trust (SAT) through a Written Scheme of Investigation.

Operational effects on the settings of 61 designated heritage assets have been considered in detail as part of this assessment and no significant operational effects have been identified. Additionally no significant cumulative effects with other operational, consented or proposed wind farms were identified.

Figure 5.2: Heritage Assets within the Site



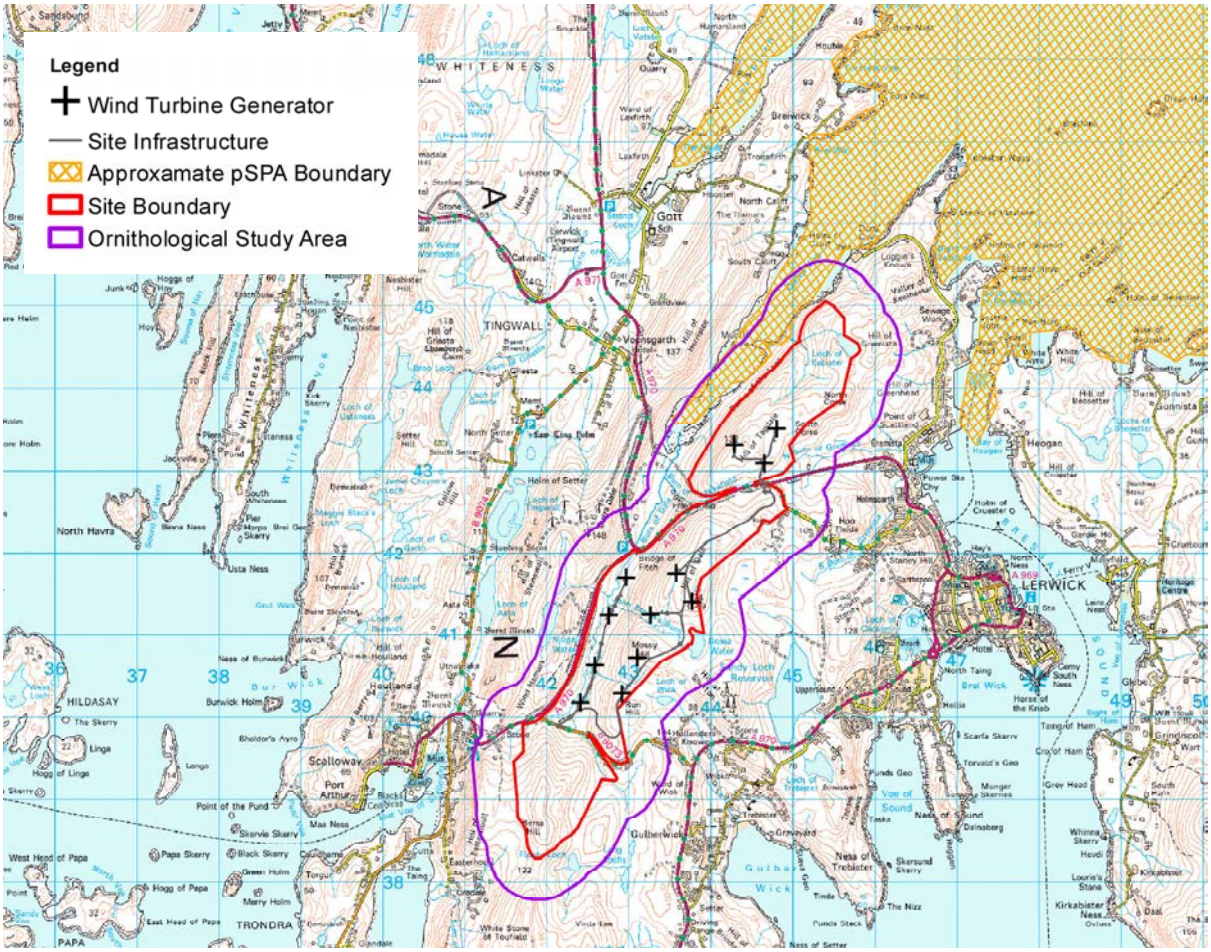
5.5 Ornithology

An ornithological assessment has been undertaken by Alba Ecology Ltd. which has extensive experience of the assessment of wind farm developments. In total 48 bird species were recorded within the Study Area during targeted ornithological surveys between 2012 and 2017, using standard survey methodologies. The ornithological assessment identified nine potentially important bird

species regularly using the Study Area. These were: red-throated diver, merlin, golden plover, curlew, lapwing, Arctic skua, great skua, great black-backed gull and herring gull.

There are no areas designated for their ornithological interest within the Site, but the East Coast Mainland pSPA is situated to the north and north-west of the Site (Figure 5.3). No land-take or habitat loss would occur within the pSPA. No disturbance to breeding red-throated divers within the pSPA would be likely to take place. Wind turbine locations were specifically selected to avoid any regularly used pSPA red throated diver flight corridors. Having considered the potential impacts of the Proposed Development on the qualifying species of the East Coast Mainland pSPA and based on evidence collected, it was concluded that there would be no likely significant effects on the red-throated diver qualifying feature or designated site integrity.

Figure 5.3: The East Coast Mainland pSPA



Potential impacts were also considered on nine wider countryside species (which included red-throated divers from outside the pSPA). No likely significant adverse ornithological residual effects were predicted, but some likely non-significant adverse effects were predicted, i.e.:

- The potential death of between one and two red-throated divers as a result of collision during the lifetime of the Proposed Development;
- The potential loss of up to two pairs of golden plover as a result of construction and operational disturbance during the lifetime of the Proposed Development;
- The potential loss of two pairs of curlew as a result of construction and operational disturbance and one curlew killed by collision risk approximately every two years during the lifetime of the Proposed Development;

- The potential loss of up to one pair of Arctic skuas as a result of construction and operational disturbance during the lifetime of the Proposed Development;
- The potential death of two-three great skuas as a result of collision during the lifetime of the Proposed Development;
- The potential death of 458 great black-backed gulls as a result of collision during the lifetime of the Proposed Development; and
- The potential death of 243 herring gulls as a result of collision during the lifetime of the Proposed Development.

None of the likely effects listed above are judged to be significant, i.e. there would be no detectable regional population level effects and so the Shetland Natural Heritage Zone (NHZ) populations of the species would not be adversely affected. No significant residual effects on designated sites or any wider countryside bird species are predicted and so no specific mitigation is required to offset predicted significant effects. Nevertheless, mitigation measures and biodiversity enhancement measures are proposed and this includes blanket bog/peatland restoration and native broadleaved woodland creation.

5.6 Ecology

An assessment of the potential effects of the Proposed Development on the ecology of the Site and the surrounding ecological Study Area, during both construction and operation, has been undertaken by Alba Ecology Ltd.

The ecological surveys included a desk study of historical information sources and a series of targeted field surveys of potentially important and/or legally protected ecological receptors:

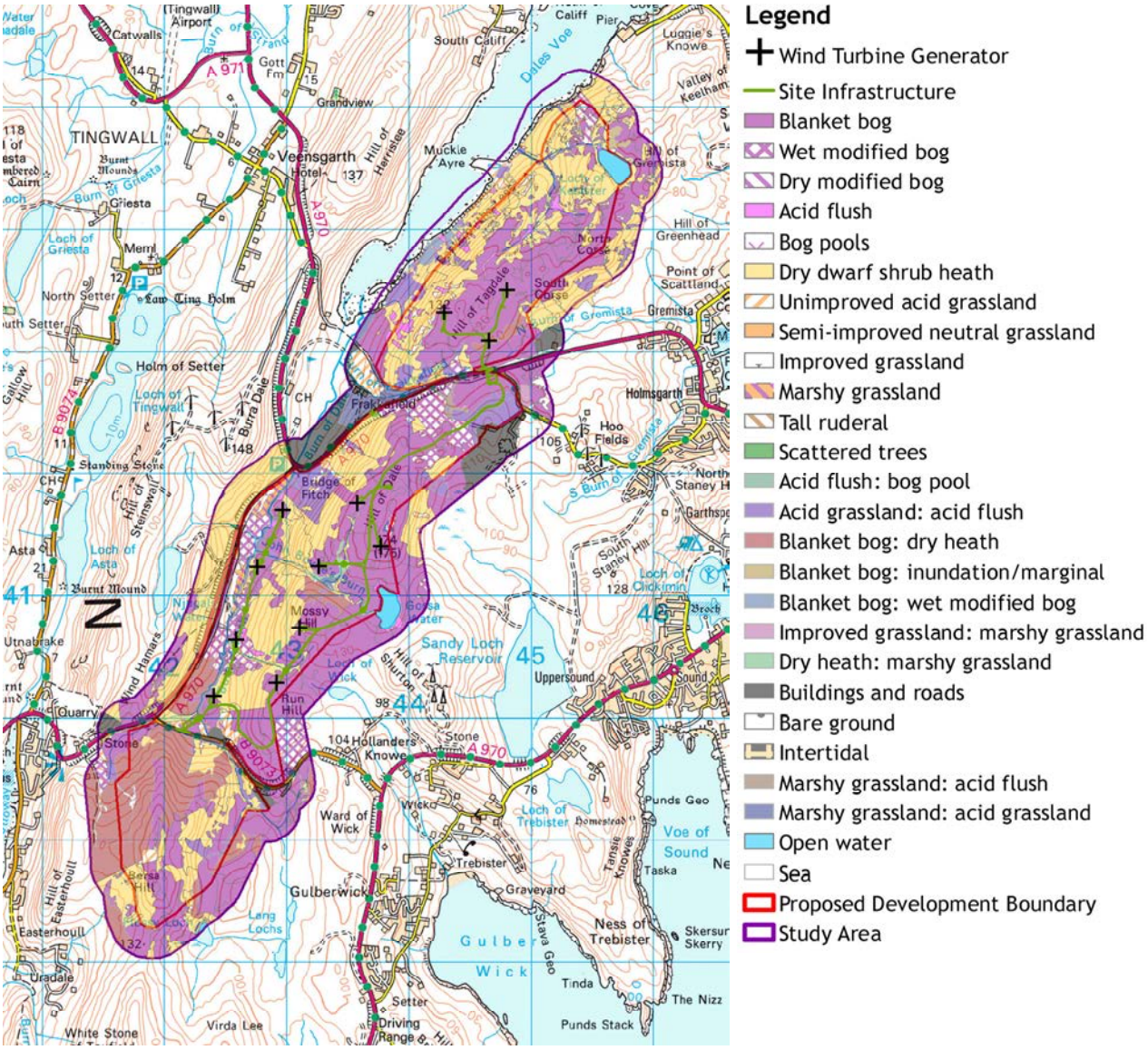
- Phase 1 habitat survey;
- National Vegetation Classification (NVC) survey;
- Groundwater Dependent Terrestrial Ecosystem (GWDTE) survey;
- Protected terrestrial mammal survey;
- Freshwater pearl mussel survey;
- Fish survey; and
- Aquatic macro-invertebrate survey.

The important ecological receptors likely to be affected by the Proposed Development were identified as otter, fish and habitats.

No otter field signs were recorded within the Study Area during surveys in July 2016. The otter surveys were repeated in 2017 and a limited number of signs were recorded. The survey evidence suggests that the development footprint, whilst occasionally used by otters for foraging, is not important for resting, foraging or breeding.

A total of 16 Phase 1 Habitats, with an additional 11 mosaics were identified and described within the Study Area (Figure 5.4). Blanket bog was the most common habitat, making up 37% of the Study Area. The quality of the blanket bog was variable with the better quality blanket bog habitat found in wetter areas, often near lochans but there were also areas of highly degraded bog, resulting in larger areas of exposed peat and large haggs. Dry dwarf shrub heath made up a further 29% of the Study Area. Much of the dry dwarf shrub heath was species poor, often overwhelmingly dominated by ling heather with grasses only growing sparsely through the ling heather. Other habitats present included acid flush, unimproved acid grassland, wet modified bog and improved grassland.

Figure 5.4: Phase 1 Habitats within the Site



Productive salmonid habitat was identified during fish habitat surveys mostly in the Burn of Dale and Burn of Fitch. Suitable spawning habitats for trout and salmon were widespread in these burns. These small streams are considered unlikely to support salmon populations but appeared well suited to sea/brown trout.

Assuming important mitigation measures are implemented, no significant effects on otters, fish or habitats are predicted. Important mitigation measures include:

- That there are no insurmountable physical barriers to otter and fish movements in watercourse crossings;
- There are detailed pollution prevention measures, including contingency plans;
- Pre-construction surveys would be conducted for otters prior to construction commencing; and
- Best practice techniques of vegetation and habitat reinstatement would be adopted and implemented in areas of disturbed vegetation, such as track sides.

The Outline Habitat Management Plan (OHMP) details a series of habitat enhancement schemes which, if implemented, would result in many positive outcomes for the ecology in the Study Area, including peatland restoration and native woodland restoration.

This assessment does not predict any likely significant ecological residual effects associated with the Mossy Hill Wind Farm.

5.7 Soils and Peat

Wind farm development has the potential to impact upon soils and peat through stripping them away and possible destabilisation during the construction process. Topic specific guidance has been produced by key stakeholders including Scottish Natural Heritage (SNH), the Scottish Environmental Protection Agency (SEPA) and Scottish Renewables (SR). Guidance and good practice aims to minimise impacts by minimising the volume of soils and peat being disturbed and ensuring that the reuse of peat is effective and appropriate.

An assessment of the likely effects of the Proposed Development on the soils and peat environment at the Site has been undertaken by TNEI, based on peat surveys undertaken by SAT under the direction of TNEI. These investigations include peat probing and peat coring exercises to identify soil and peat depths, structures and characteristics (Figure 5.5 and Figure 5.6). Findings were fed back into the design process so that infrastructure locations could avoid areas of deep peat as far as possible.#

Figure 5.5: Interpolated Peat Depths (North)

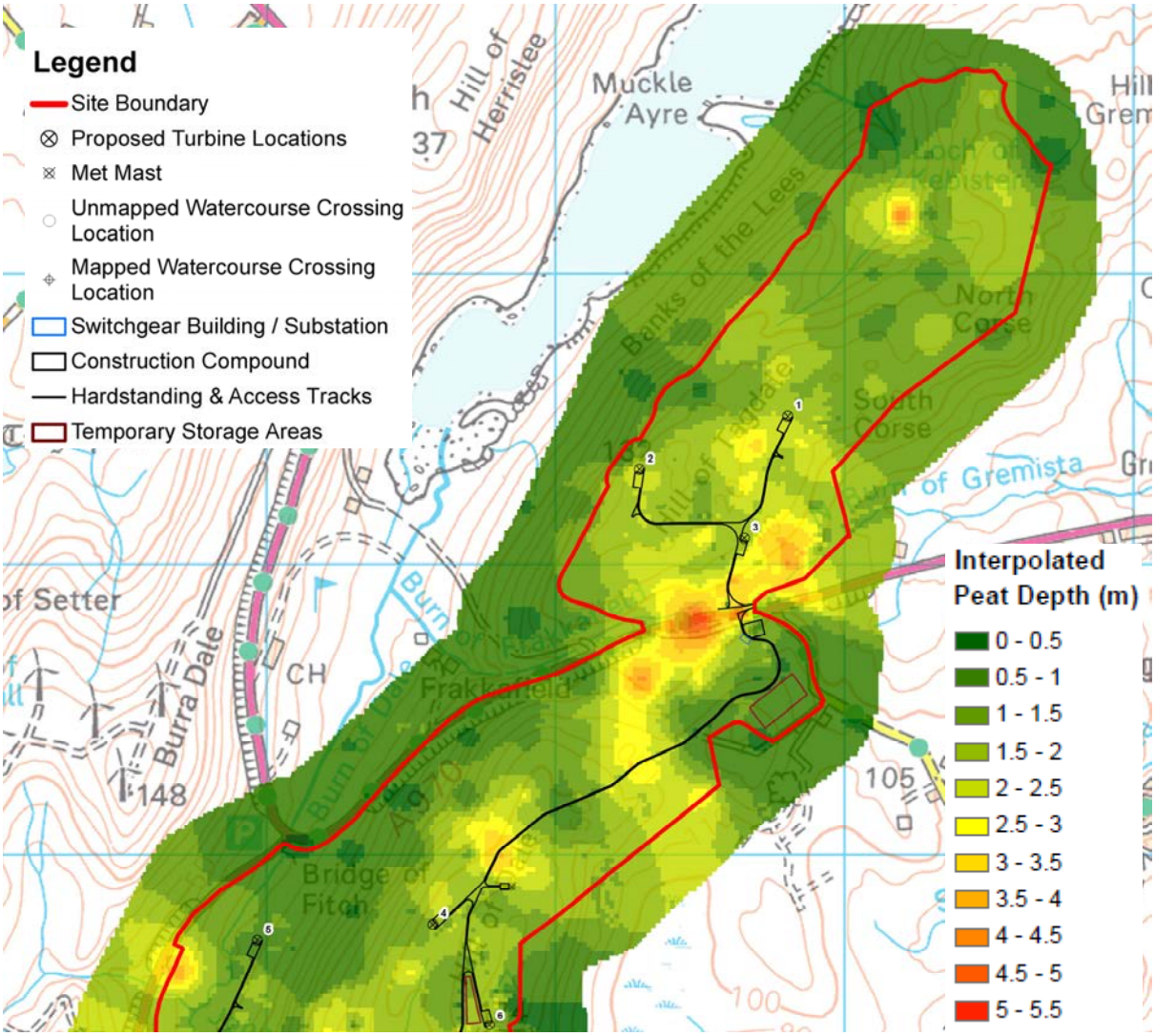
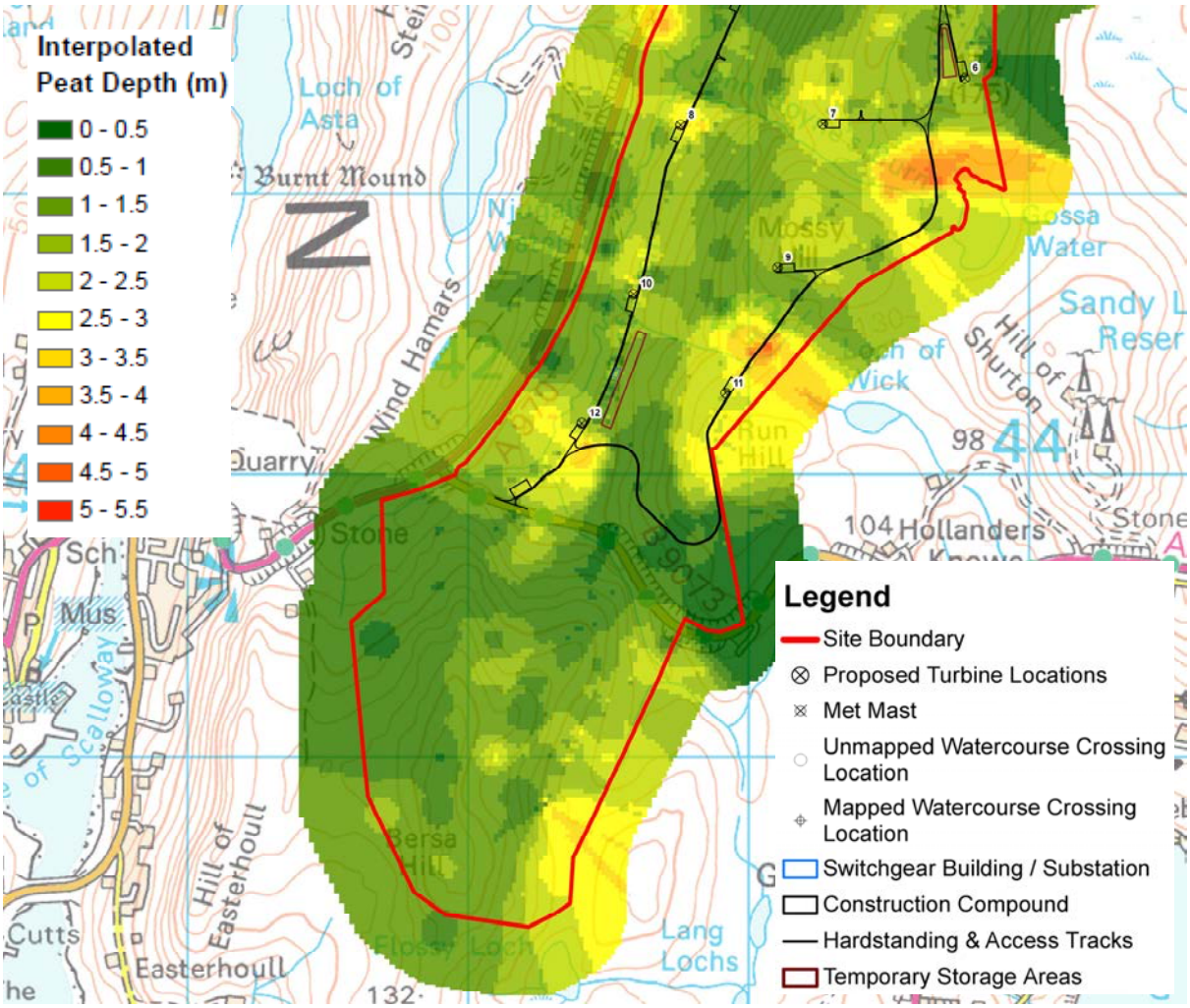


Figure 5.6: Interpolated Peat Depths (South)



Data gathered has enabled assessment of the volumes and types of soils and peat that would be disturbed during the construction process and of how much of those materials can immediately be reinstated once infrastructure elements, such as wind turbine foundations and access tracks, have been installed. The assessment has considered the effects relating to disturbance of peat and soils, peat balance within the Site and peat slide risks.

Without the adoption of mitigation measures, moderate/minor and not significant effects relating to disturbance of soils and peat would occur during the construction process. Mitigation measures would consist of good construction practice as part of provision of, and adherence to, a Peat Management Plan (PMP). As a result, residual effects would be minor and not significant.

The balance of materials considering peat and soil removal during construction and the amounts that can be used for reinstatement around construction works would be negative with around 50,900m^3 of surplus peat generated. This represents a major and significant effect. Mitigation would be in the form of re-use of peat within the Site to restore areas degraded through historical and current land practices. The assessment has established that there are sufficient restoration opportunities within the Site so that all of the excess peat could be utilised. As a result residual effects would be moderate/minor and not significant.

Prior to the adoption of any mitigation, peat slide risk would result in localised areas (one wind turbine location and one stretch of access track) where risk would be moderate and therefore effects would be major/moderate and significant. Elsewhere peat slide risks would be low. Mitigation would be through adoption and adherence to the PMP alongside an updated Peat Slide Risk Assessment (PSRA)

and would include typical good practice construction methods in line with current guidance. As a result residual effects would be moderate/minor and not significant.

There would be no significant effects during the operational phase and minor positive and not significant effects during decommissioning when further reinstatement would occur.

5.8 Climate Change and Carbon Balance

An assessment of the effects of the Proposed Development on climate change and carbon balance has been undertaken by TNEI.

Energy generation from fossil fuels has a major influence on man-made climate change. Decarbonising our energy networks, primarily through the generation of power from renewable sources, is key to limiting the predicted effects of climate change.

Wind energy projects, particularly when located in areas of peatland and carbon rich soils, have the potential to disturb soils and peat during construction leading the release of CO_2 and other greenhouse gases (GHGs). The embedded carbon emissions that result from the manufacture of wind turbines and construction of a wind farm have also been considered. The Scottish Government provides a carbon calculator tool specifically developed to assess the carbon balance of onshore wind energy developments. This tool has been populated with data collected throughout the EIA process or from external publications and studies.

The calculations predict that the Proposed Development would lead to an overall net reduction in GHG emissions of between 57,862 and 118,507 tCO_2e over a likely 25 operational lifetime. The predicted emissions payback time would be between 0.8 and 2.3 years.

The Proposed Development would result in an overall positive significant effect on climate change and carbon balance through the generation of renewable power over an expected 25 year operational lifetime that would displace tradition fossil fuel burning generation.

5.9 Geology, Hydrology and Hydrogeology

The likely effects of the construction, operation and eventual decommissioning of the Proposed Development on the geological, hydrological and hydrogeological environment has been assessed by TNEI. The assessment has included desk based and site studies and included onsite ground investigations that were undertaken by SAT.

Scoping responses from consultees provided guidance on expected scope and methodology and identified potentially sensitive receptors including the Sandy Loch Reservoir Drinking Water Protection Area (DWPA), potentially GWDTE, Private Water Supplies (PWS), watercourses and waterbodies (Figure 5.7) and East Mainland Coast, Shetland pSPA. Geological effects have subsequently been scoped out of the assessment due to the lack of likely impacts.

Figure 5.7: Burn of Dale, Example of Watercourse Crossing the Site

The assessment has found that without the adoption of effective mitigation measures, there would be likely adverse significant effects during the construction phase of development on surface water, water within the peat bog and the PWS adjacent to the Site at Frakkafield. Therefore, mitigation is proposed that would follow best practice and guidance and be agreed through a Construction Environmental Management Plan (CEMP) and PMP prior to commencement of works. The delivery of these measures would be monitored throughout the construction process by the Site Manager and Ecological Clerk of Works (ECoW) and by collecting water quality data. As a result there would be no significant residual effects on any hydrological or hydrogeological receptors.

During the operational phase there would be fewer impacts but with fewer and more localised adverse significant effects predicted, in the absence of mitigation, on surface water, water in peat and on the PWS at Frakkafield. Similar mitigation measures as those that would be adopted during construction are proposed and as a result there would be no significant residual effects during operations.

Adverse effects during decommissioning are likely to be similar to those during construction. With the implementation of appropriate mitigation measures there would be no residual significant effects. Longer term, following decommissioning and reinstatement of the Site, there would be positive effects as a result of increased connectivity for water within the peat bog as well as a reduction in runoff rates as impermeable materials are removed.

Overall, throughout the life of the Proposed Development and with the implementation of effective mitigation measures, there would be no significant effects on the water environment.

5.10 Noise

Wind farms can have short term noise impacts on the local environment during their construction and decommissioning phases and a long term impact of a different nature during the operational phase. A noise assessment has been undertaken by TNEI to determine the likely noise effects from the construction, operational and decommissioning phases of the Proposed Development.

Predicted construction and decommissioning noise levels compared with the criteria outlined in BS5228-1: 2009+A1:2014 ‘Code of practice for noise and vibration control on construction and open developments - Noise’ indicate that construction and decommissioning noise levels are within

acceptable levels at all receptors for all construction and decommissioning phases. Construction and decommissioning noise are therefore predicted to be not significant.

A background noise survey (Figure 5.8) was undertaken at nine receptors located in proximity to the Proposed Development. The baseline noise data collected was analysed in conjunction with on site measured wind speed data and noise limits were derived in accordance with relevant guidance; ETSU-R-97 'The Assessment and Rating of Noise from Wind Farms' and the Institute of Acoustics 'A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise' (IOA GPG).

Figure 5.8: Example Background Noise Survey at an Operational Wind Farm

Predicted cumulative operational noise levels indicate that for noise sensitive receptors neighbouring the Proposed Development, cumulative wind turbine noise (which considers noise predictions from all operational, consented and proposed wind farms and the Proposed Development) would meet the Total Noise Limits derived in accordance with ETSU-R-97 and would result in no significant effects.

The Total Noise Limit is applicable to all operational, consented and proposed wind farms in the area so Site Specific Noise Limits also have been derived to control the specific noise from the Proposed Development. In accordance with the guidance in the IOA GPG the Site Specific Noise Limits have been derived with due regard to cumulative noise by accounting for the proportion of the Total Noise Limits which is potentially being used by other nearby developments. The Site Specific Noise Limits are therefore set equal to the Total Noise Limits minus a cautious prediction of noise from all other nearby developments.

Predicted operational noise levels from the Proposed Development indicate that for noise sensitive receptors neighbouring the Proposed Development, wind turbine noise from the Proposed Development would meet the Site Specific Noise Limits subject to some mode management of the wind turbines during certain wind conditions when modelling a candidate turbine, the Nordex N131, and would therefore result in no significant effects. The use of Site Specific Noise Limits would ensure that the developments in the area could operate concurrently whilst ensure that total cumulative noise would meet the Total ETSU-R-97 limits and would also ensure that the Proposed Developments individual contribution could be measured and enforced.

The Nordex wind turbine model was chosen as it is considered to be representative of the type of wind turbine that could be installed at the Site. However, there are a number of wind turbine makes and models that may be suitable for the Proposed Development. Should the Proposed Development receive planning permission, the final choice of wind turbine would be subject to a competitive tendering process. The final choice of wind turbine would, however, have to meet the noise limits determined and contained within any condition imposed.

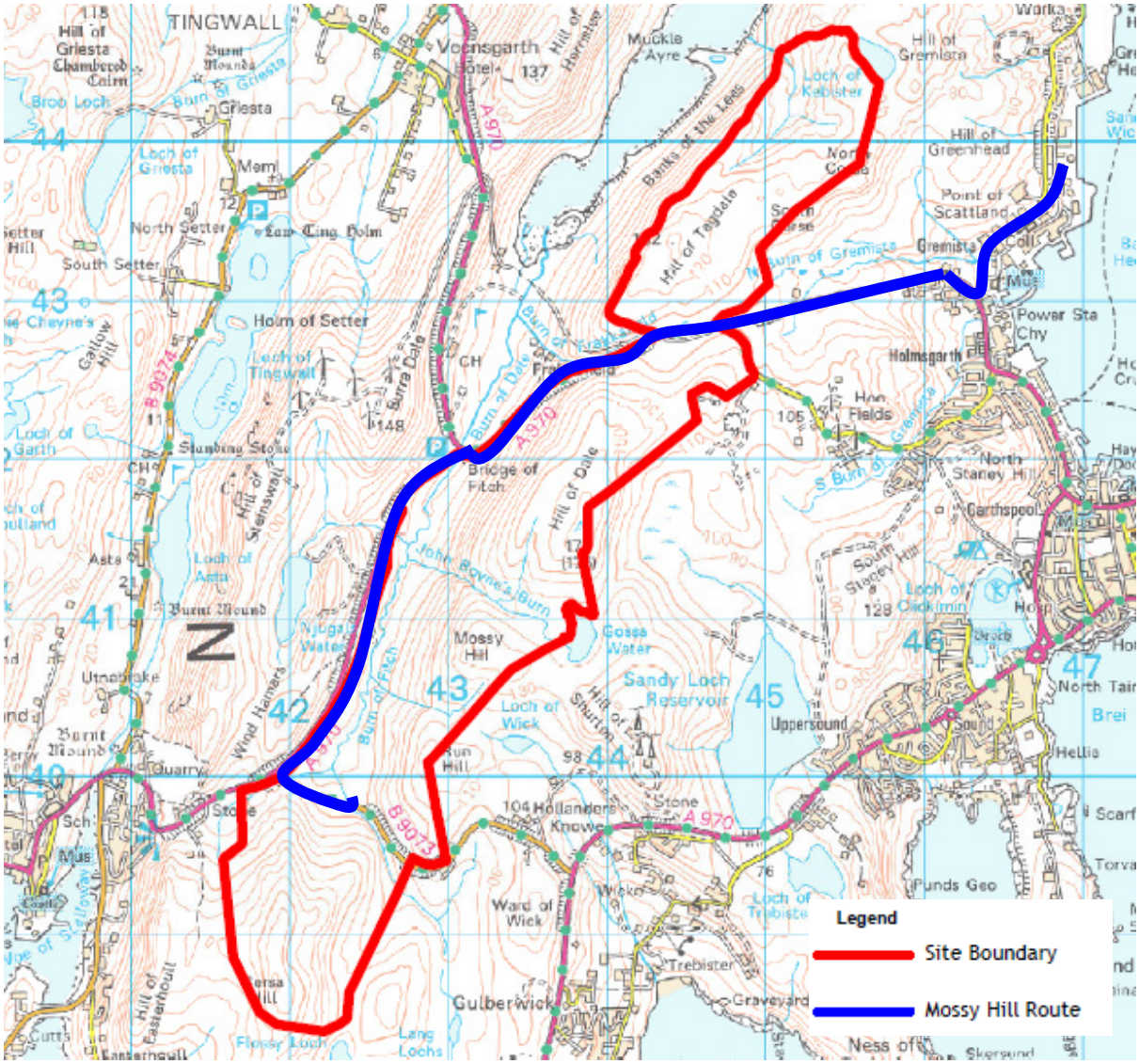
At some locations, under some wind conditions and for a certain proportion of the time, operational wind farm noise may be audible. However, it would be at an acceptable level in relation to the ETSU-R-97 guidelines.

5.11 Access, Traffic and Transport

An assessment of the potential impacts on access, traffic and transport as a result of the Proposed Development has been undertaken by WYG.

It is proposed that access to the Site would be taken from two new junctions with the north and south sides of the A970 west of Ladies Drive and one new junction with the north side of the B9073 approximately 400m east of its western junction with the A970 (Figure 5.9).

Figure 5.9: Access Route to Site from Port of Entry



The road network is not observed to be under any capacity pressures and is constructed to accommodate the movement of all vehicle classes.

With the exception of the wind turbine elements, the vast majority of traffic would be normal construction plant and most would arrive on site on low loader transporters. The wind turbine elements would arrive on specialist transport vehicles (Figure 5.10 and Figure 5.11). A large scale self-propelled crane and supporting ballast vehicles would be used to erect the wind turbines.

Figure 5.10: AIL Vehicle Delivering a Wind Turbine Blade

Figure 5.11: AIL Vehicle Delivering a Wind Turbine Tower Section

The nearest suitable port of entry is Lerwick Greenhead Base. Components would exit the port and continue along Gremista Road to the A970, turn right to follow the A970 to the first Site access or continue on to turn left at the A970 junction at Bridge of Fitch, turn left onto the B9073 and then turn into the Site (Figure 5.9). To accommodate the movement of abnormal indivisible loads (AILs), traffic management consisting of provision of load bearing surface to accommodate overrun, road widening, and street furniture removal would be required at several locations along the route.

The highest level of traffic generation would be associated with the construction phase. An assessment of the likely trip generation concluded that the highest flow of traffic would occur during month 9. This equates to approximately 94 movements per day (i.e. 47 inbound and 47 outbound trips). It is estimated that during this peak period, there would be an average of 66 HGV movements

per day with a further 28 car and light van movements to transport construction workers to and from the Site. Traffic flows would fall off substantially over the remainder of the construction period.

Traffic generated during operation would be limited to around 2 vehicles per week for maintenance purposes. Also, there may be occasional abnormal load movements to deliver replacement components in the unlikely event of a major failure. At the end of the operational lifetime of the wind turbines, they would be decommissioned and the Site reinstated in accordance with previously agreed details. This would involve similar access requirements as the construction phase though the number of HGV movements would be reduced as it is unlikely that the cast in-situ wind turbine foundations would be removed.

The likely effect of these levels of traffic on the road network is not significant when compared with the link capacities.

An assessment was made of the likely effects of construction traffic on the various roads making up the construction routes to the Site. HGV traffic levels are not projected to increase above the Institute of Environmental Management and Assessment (IEMA) significance guidance level of 30% on any of the roads. The highest level anticipated is on the B9073 on which the uplift in HGV traffic is estimated to be 11.1%.

In real terms, the additional number of HGV movements per hour averages less than six within this peak month of construction activity. There would be no significant effects.

The assessment has identified significant effects on cyclists utilising the A970 through loss of amenity and additional accident and safety risks.

A number of mitigation measures are proposed, many of which would be delivered through a Construction Traffic Management Plan (CTMP). With the adoption of these measures, the assessment concludes that there would be no significant effects on traffic and transport receptors.

5.12 Shadow Flicker

Under certain combinations of geographical position, time of day and year, the sun may pass behind the rotor and cast a shadow over neighbouring buildings' windows. When the blades rotate and the shadow passes a window, the shadow appears to flick on and off; this effect is known as shadow flicker.

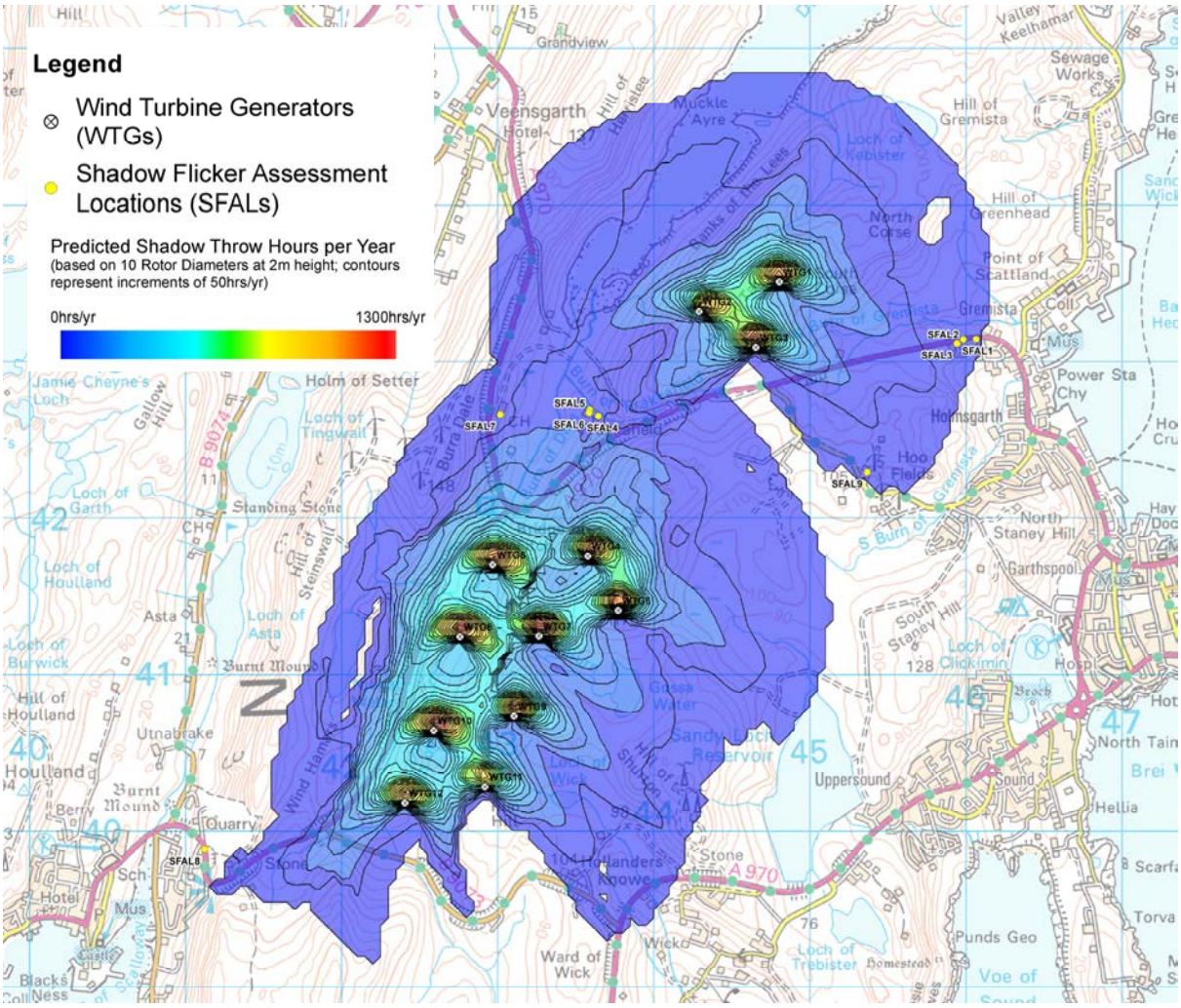
A shadow flicker assessment has been undertaken by TNEI to consider the likely effects of the Proposed Development taking into account the maximum wind turbine design envelope. An assessment area of 1,330m around each wind turbine was considered (based on a Study Area of 10 × 133m rotor diameter) and nine receptors were identified within the area potentially susceptible to shadow flicker. There are no UK guidelines which quantify what exposure levels of shadow flicker are acceptable or what constitutes a significant level of effect.

Under worst case conditions, the maximum theoretical occurrence of shadow flicker amounts to 78.1 hours per year and a maximum of 1.47 hours per day which is experienced at Frakkafield B – Shadow Flicker Assessment Location (SFAL6) (Figure 5.12).

It should be noted that these are the theoretical maximum number of shadow flicker hours and do not take into account weather conditions (i.e. when there is no sun or when there is partial cloud cover), local visual obstructions (such as trees, hedges or other structures), wind turbine orientation and wind turbine operation. In reality, the amount of time when shadow flicker would occur would be less than that predicted. An assessment has also been undertaken to estimate the likely number of shadow flicker hours considering typical sunshine hours for the area. This suggests a likely occurrence of shadow flicker of 19.8 hours per year at that property.

Due to limitations in the modelling process, other factors which would impact on the amount of shadow flicker (such as wind direction and the proportion of daylight hours during which wind turbines operate) experienced at a receptor have not been incorporated into these calculations; these factors would further reduce the amount of shadow flicker experienced at each receptor. Notwithstanding the limitations in the modelling it is considered that shadow flicker is likely to occur at several receptors and that as a result, the effect from shadow flicker is predicted to be significant.

Figure 5.12: Shadow Throw Contour Plot with SFALs



Cumulative shadow flicker resulting from the operation of the Proposed Development and other commercial scale turbines (with a height to tip of 50m or more) has been investigated. One property (SFAL7 – Shetland Golf Club) (Figure 5.12) has been identified which is theoretically susceptible to shadow flicker from the Proposed Development and the operational Burradale Wind Farm. Whilst periods of shadow flicker are predicted to occur at different times the cumulative impact would result in an increase in the number of hours of shadow flicker predicted at SFAL7. The predicted effects of cumulative shadow flicker are therefore significant.

Mitigation in the form of a shadow flicker control system is available which can be used to prevent the occurrence of shadow flicker. Implementation of a control system to mitigate all theoretical shadow flicker is considered to be unnecessary as shadow flicker may not result in a loss of amenity (if for example shadow flicker occurs at a commercial property outside of the hours of occupation or in a bedroom during the middle of the day).

Where required, the control scheme would shut down specific wind turbines during times and under conditions when shadow flicker is predicted to occur; the result of this would be that no residual effects would be experienced. Accordingly, the effect from shadow flicker would be not significant.

5.13 Telecommunications and Radio-Communications

Wind farm developments have the potential to impact upon telecommunications and radio-communications in the surrounding area. Wind turbines can interfere with electromagnetic transmissions in two ways; by emitting an electromagnetic signal itself or by interfering with other electromagnetic signals. An assessment of the potential effects has been undertaken by TNEI, based on consultation and surveys undertaken by multiple consultees.

5.13.1 Radio-Communications

Assessment has been based on identification of links that operate within the Site and surrounding area, followed by extensive consultation. This has enabled buffer zones to be applied to identified radio links so that scheme design could avoid impacting upon them. As a result, no effects are likely on those links operating in the micro-wave frequency range.

Consultation with the Joint Radio Company (JRC) identified that there are also two ultra high frequency (UHF) links which it manages and that are likely to be impacted upon during operation of the Proposed Development. The JRC is undertaking an ongoing mitigation study, working with the link operator, that will identify available options to avoid any impacts on the operation of those links. Following adoption of those measures there would be no effects on UHF links.

5.13.2 Telecommunications

Television services currently in operation in the UK are either Digital Terrestrial Television (DTT) or satellite services.

By their nature the delivery of satellite television services would not be impacted upon by the operation of wind turbines unless they were located in very close proximity to properties. This is not the case and there would be no effects on satellite TV services.

Desk based assessment and field surveys have established the baseline situation within a 10km Study Area with regard to DTT services across Shetland Mainland. The Study Area is serviced by a main transmitter at Bressay, that provides services to properties to the east of the Proposed Development, and by a relay transmitter at Scalloway that provides services to properties to the west.

Field surveys recorded current signal strength and quality as well as the current preferences of where properties within the Study Area receive their DTT signals from. Modelling was then analysed to establish if any properties would experience disruption to signal as a result of the Proposed Development.

The assessment concluded that there are no properties that are reliant on signals that cross the Site. Therefore there would be no effects of DTT reception as a result of the Proposed Development.

5.14 Aviation Interests

Wind energy developments have the potential to impact on aviation interests either by creating a physical obstruction or by being visible to radar systems so that the safe provision of air traffic control services is affected. Aviation receptors have been identified through the EIA Scoping process and desk based study of the current baseline.

Initial consultation responses identified three key issues:

- Routing implications for flights between Tingwall Airport and Fair Isle under certain weather conditions (around 10% of flights on that route);
- Implications for the future design and implementation of Area Navigation (RNAV) approaches utilising Global Navigation Satellite Systems (GNSS) at Tingwall Airport; and
- Likely impacts on the recently installed Ministry of Defence (MOD) air defence radar at Saxa Vord.

All other stakeholders confirmed that they have no concerns over impacts of the Proposed Development on their aviation operations.

To address these key issues, assessment and support with consultation was provided by specialist aviation experts Aviatica Limited and gCAP Limited. A desk based study modelled both alternative routing options considering downwind turbulence from existing and proposed wind turbines and the implications for a future GPS based (RNAV) approach system at Tingwall. Findings of the study took into account Civil Aviation Authority guidance and feedback provided by Airtask pilots in relation to baseline conditions.

The study identified viable alternative routing options flights into and out of Tingwall Airport. Findings were shared with Tingwall Airport and Airtask, as operators of flights to Fair Isle. Following discussion and exploration of options, both have confirmed that they are happy that the suggested mitigation measures are viable. Therefore, with the adoption of the identified mitigation measures there would be no residual effects on Tingwall Airport.

The study also established that, for future approach systems, the presence of the Proposed Development would not prevent the future development of RNAV instrument approach procedures or have any effect on the use of those procedures by the two main potential users.

Consultation with the MOD regarding the air defence radar at Saxa Vord is ongoing. Should mitigation measures be required, these would be agreed prior to development beginning and could be secured via an appropriately worded planning condition. If required, the adoption of mitigation measures would result in there being no residual effects on the air defence radar at Saxa Vord.

5.15 Socio-Economics and Tourism

An assessment has been undertaken of the socio-economic effects of the Proposed Development, including effects on tourism and recreational activities (Figure 5.13). This has involved quantitative and qualitative assessment based on a range of publically available data and drawing on experience of similar developments. The assessment has focussed on:

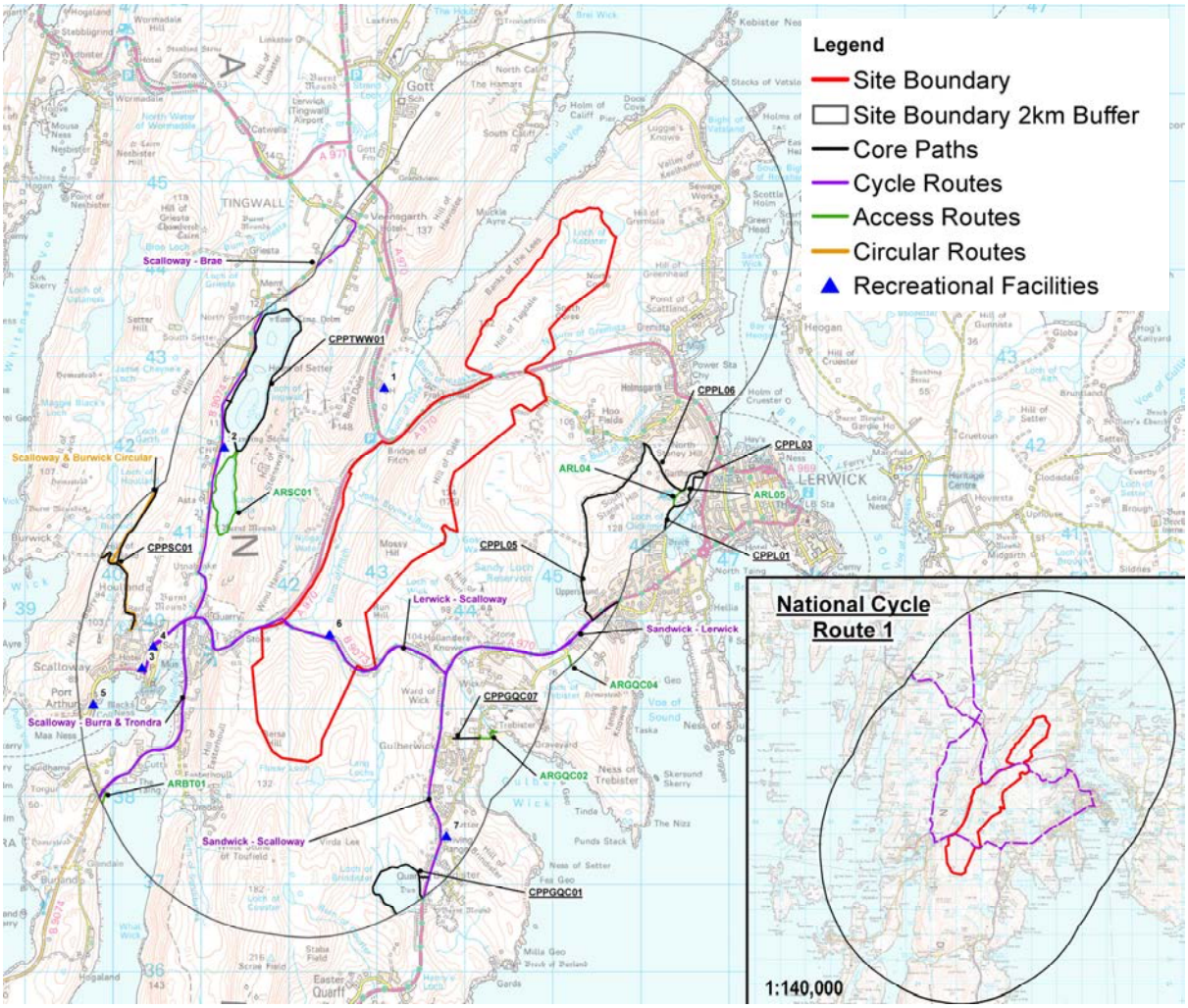
- Direct employment generation;
- Indirect employment generation and impacts on the local economy;
- Induced employment generation (non-basic jobs created/supported);
- Energy security; and
- Impacts on tourism and recreation.

Shetland has an economically active and skilled workforce with a high percentage of construction workers. It has good capacity to provide labour for construction and maintenance of the Proposed Development. The population of Shetland has been steadily increasing more quickly than the national average due to both longer life expectancy and in migration.

Shetland has a well-established tourist industry with a total visitor spend of approximately £16 million in 2012 – 2013 and sustainable tourism accounting for around 10% of total employment. This is a

little higher than the national average. Studies have concluded that tourism and recreation activities are generally of low sensitivity to the impacts of wind farm development. However, some premises or activities in close proximity to wind farms and where the location or activity draws visitors as a result of valuable landscape, views or heritage assets are likely to be more sensitive.

Figure 5.13: Recreational Activities within 2km of Proposed Development



In relation to energy security, Shetland does not have an electrical connection to the Scottish Mainland and is reliant on import of fuels to feed an ageing diesel power station at Lerwick and a generator at Sullom Voe which feeds a proportion of its power into the grid system and is fuelled by oil and liquefied gas. As a result Shetland has high sensitivity to changes in electrical generation.

The assessment has found that the greatest effects on employment and the economy during the construction phase with between 10 and 20 direct FTE jobs being created and a further 19 to 38 indirect jobs. An increase in direct Gross Value Added (GVA) would be experienced of between around £444,000 and £888,000 with a further indirect GVA of between £888,000 and £1,777,000. These would represent a significant effect.

During operation of the wind farm fewer jobs would be created and these would equate to between two and four direct FTE jobs and a further three to 6 indirect FTE jobs. The direct added value to the economy would between around £140,000 and £280,000 direct GVA and around a further £170,000 to £336,000 of indirect GVA. Due to the levels of employment, there would be no significant effects on population.

A number of localised significant effects on tourism and recreational activities are predicted. All relate to the visual presence of the Proposed Development and have been mitigated as far as possible during

the design process. Some significant cumulative effects are likely in line with the assessment within the LVIA and located to the north-west of the Proposed Development due to the interaction between the wind turbines in and around Central Mainland and the consented Viking Wind Farm.

The Proposed Development would also result in positive significant effects on energy security over its proposed 25 to 30 year lifespan. Cumulatively with other schemes there would be no significant effects on energy security.

5.16 Health and Safety

Health and safety effects have been considered. The greatest number of risks to health and safety would occur during the construction and decommissioning phases. The wind energy industry in the UK has an excellent health and safety record and there is a suite of policy and best practice guidance that safeguards the general public and those working in the industry. The Proposed Development would adhere to all relevant guidance throughout the development process and as a result the risks of health and safety incidents would be minimised. There would be no significant effects.

Ice build up on wind turbine blades represents a specific risk during operation of a wind farm. This can either be through ice throw, where ice fragments are thrown from moving blades, or ice shear, where ice falls directly downward from static blades.

Ice throw could occur within an area within a radius of 316.5m around the proposed wind turbine locations (Seifert, 2003). This small area of incidence, which predominantly takes in open peatland that is infrequently accessed, makes the risks associated with ice shear or ice throw very small. To further reduce risks, the wind turbines would be fitted with control systems that detect build up of ice and cease operations until this has been cleared. As a result, the probability of ice shear or ice throw affecting human health is very low and there would be no significant effects.

5.17 In-Combination Effects

In-combination effects occur where a receptor is impacted upon by the same development in two or more ways. The consideration of in-combination effects is inherent in some assessments. For example, disturbance of birds as a result of a wind farm development considers its visual presence, noise and shadow throw. Other combinations of effects require additional separate assessment.

For the Proposed Development an assessment has been undertaken of the in-combination effects on residential amenity experienced by those properties in close proximity to the Site (Figure 5.14). No likely significant in-combination effects would occur during construction and decommissioning phases and so detailed assessment of those has not been carried out. During operation, the combination of effects on residential amenity has been considered. This has taken into account noise, visual impacts and shadow flicker. Radio-communications and telecommunication impacts have not been considered as the assessment of those has identified no likely effects.

6 Conclusion

The predicted likely environmental effects associated with the installation of the Proposed Development have been carefully considered throughout the design of the Mossy Hill Wind Farm proposal. The evolution of the Proposed Development has, wherever possible, taken into account the views of the statutory consultees, local community and their representatives, as well as the views of other interested parties.

The Proposed Development, which has emerged from the EIA and design iteration process, has ensured that the associated environmental effects have been minimised wherever possible. Particular care has been taken in relation to sensitive receptors regarding landscape and visual, ornithological and noise impacts, whilst retaining a development of a commercially viable scale.

The EIA undertaken for the project has demonstrated that all likely significant environmental effects have been considered and that identified effects have been minimised as far as possible. Where appropriate and achievable, mitigation, enhancement and monitoring measures are proposed, all of which could be secured through conditions to any planning approval.