Olgrinmore Wind Turbines

Environmental Appraisal

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Text

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lomondenergy
REALISING RENEWABLE ENERGY OPPORTUNITIES

PREFACE

This Environmental Appraisal accompanies the application by Lomond Energy Ltd to Highland Council to construct and operate two wind turbines on land at Olgrinmore near Scotscalder Station, Caithness.

This Environmental Appraisal has been prepared by Arcus Renewable Energy Consulting Ltd on behalf of Lomond Energy and comprises the following:

- Environmental Appraisal Volume 1
- Environmental Appraisal Volume 2: Figures
- Environmental Appraisal Volume 3: Technical Appendices

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EXECUTIVE SUMMARY

Introduction

Lomond Energy Ltd, in partnership with the site landowner and Ardnamurchan based Windsearch Ltd, is proposing to develop a local scale onshore wind development of two turbines at Olgrinmore, approximately 1.5 km south of Scotscalder Station, Caithness. An application for planning permission, accompanied by this Environmental Appraisal (EA) is being made under The Town and Country Planning (Scotland) Act 1997 to Highland Council. The development will consist of two wind turbines with associated infrastructure and have an installed capacity of up to 5 MW. The candidate turbine will measure approximately 59m to hub height with rotor blades of up to 82m diameter. Whilst different wind turbine manufacturers offer a range of 'standard' dimensions within this size envelope, the total height of the turbines would not exceed 100m to blade tip.

Context for Development

There are strong legislative and policy drivers for renewable energy development in Scotland. The Scottish Government has recently set an increased target of supplying 50% of Scotland's electricity demand from renewable sources by 2020, and an interim milestone of 31% by 2011.

The Olgrinmore Wind Turbines will have a positive effect through the saving of greenhouse gas and other polluting emissions. During the course of every year of its 25 year operational life, the electricity generated by the wind turbines could typically displace 8068 tonnes of CO_2 from entering the atmosphere assuming the fuel mix remains as it is currently. Based on an estimated average annual household electricity consumption of 5684 kWh[1], the Olgrinmore wind turbines would provide electricity for up to approximately 2311 households.

Environmental Appraisal

In response to a request for a screening opinion under the Environmental Impact Assessment (Scotland) Regulations 1999 and Circular 15/1999, the Scottish Executive confirmed that an Environmental Impact Assessment for the proposal would not be required.

Together with post-application public consultation, this Environmental Appraisal (EA) is intended to provide Highland Council with sufficient environmental information to allow the planning application to be registered and determined.

The following subject areas are addressed in this EA and the main findings are summarised under the headings below:

- Landscape and visual effects
- Ecology
- Ornithology
- Hydrology and hydrogeology
- Cultural heritage
- Noise
- Existing infrastructure including aviation and telecommunications
- Shadow flicker
- Miscellaneous Issues

[1] Based on a wind farm of 5MW (assuming a capacity factor of 30%) and an average electricity consumption in Highland in 2005 of 5,684 kWH per customer (BERR, "Regional and Local Authority Electricity Consumption Statistics", 2006 www.berr.gov.uk/energy/statistics/regional/regional-local-electricity/page36213.html) the number of homes supplied is calculated as 2311. It should be noted that the number of homes supplied may vary depending on site wind speeds and household electricity consumption.

Landscape and Visual

The appraisal of effects on the landscape and visual resource has demonstrated that the proposed Olgrinmore wind turbines will have localised significant effects on landscape character and views from the close vicinity of the site. Whilst these effects are assessed to be significant, resulting in material alteration to the localised landscape and visual resource, the proposed development is considered to be acceptable in the broader context, with acceptability being an expression of the overall accommodation of the wind turbines into the wider landscape and visual resource.

The acceptability of this proposal is due to both the small size of the proposed development and the landscape and visual context in which it will be located, and the choice of size of wind turbines which is consisistent with other recently approved or operating wind turbine developments nearby. This is a small group of wind turbines and generally, the fewer turbines there are in a development, the lower its landscape and visual impact will be as it will introduce fewer new features into the landscape and visual resource. In all views, the wind turbines occupy a limited extent of the skyline, leaving a wide expanse of the landscape unaffected. In more distant views, the turbines constitute minor components and will often be barely discernible in the wide open landscape setting of the study area.

The landscape setting of the wind farm site itself is also important. The site lies within a landscape of massive scale and relatively uniform character that has a capacity to accommodate the turbines without scale comparisons which would be at variance with the landscape and visual resource. Many views across the study area to the site are panoramic, and in this context, the two turbines affect a very limited proportion of the full view available.

These aspects of the proposed development; the number of turbines in the development and the landscape and landform of the setting combine to make the development acceptable in broad landscape and visual terms despite the presence of the localised and limited significant effects that will occur in close proximity to the site.

Ecology

An assessment of the likely effects of the proposal on habitats and wildlife has been made. The habitats on the site comprise: Plantation Forestry, Marshy Grassland, Wet Heath and Blanket Bog, much of the western side of the site is covered by peat, therefore the decision was made to move the turbines as far east as possible whilst avoiding other constraints to minimise disruption to the peatland habitat, in addition it is proposed to fell 1-1.5ha of the plantation forestry in order compensate for any loss of peatland habitat. Following this mitigation no significant effects are predicted.

The effect of the turbines on protected mammals has also been considered. No significant effects have been predicted at either the construction phase or the operational phase.

Ornithology

An appraisal on the potential impact of the proposal upon birds has been made using historical records, data held by the RSPB and other organisations and bird surveys carried out in 2006 and 2008.

Twenty-nine target species were recorded during the vantage point watches. The species recorded were typical of those expected in this region of Caithness, including divers, geese ducks, birds of prey, waders, and other species. Collision risk modelling has also been undertaken.

There are three main ways in which birds can be affected by wind turbine developments:

- Disturbance effects where birds are displaced from an area or their normal activities are disrupted;
- Death through collision with turbine blades; and
- Direct habitat loss through construction of infrastructure.

Following proposed mitigation measures which include timing of construction work and further monitoring no significant effects are predicted.

Hydrology And Hydrogeology

Consideration has been given to the effects of the wind turbines on the hydrology and hydrogeology of the site.

The development lies within the catchment area of the Burn of Olgrinberg which flows eastward towards the River Thurso. There is also one main, unnamed, surface watercourse that runs along the western section of the site and is identified as a tributary of Burn of Olgrinberg. The Black Loch waterbody lies 100m north of the application boundary.

The British Geological Survey Digital Mapping shows that the site contains areas of peat stretching from the western to the central section of the site. The volume of peat affected is likely to be low given the small scale of the development and therefore, a peat slide risk assessment is not considered necessary.

Potentially significant impacts on hydrology have been avoided through environmental protection measures incorporated into the project design and through the adoption of best practice measures during construction. Best Practice will be followed in all aspects of construction and operation, specifically through a Pollution Prevention Plan (PPP). Method statements will also be applied, which will follow the principles laid out in relevant Scottish Environmental Protection Agency Pollution Prevention Guidelines (PPGs).

With the proposed mitigation measures, the potential effects of the windfarm on hydrology and hydrogeology are considered to be not significant.

Cultural Heritage

An appraisal of the potential impact of the proposed development upon cultural heritage resources both within and outwith the site boundary has been undertaken.

There only relevant recorded archaeological or cultural features within the study area boundary of the site itself is Appat Hill Cairn (SMR reference no 13630) shown as lying on the southern border of the site. No significant direct effects are anticipated upon the archaeological features within the site, although some mitigation is proposed to ensure that the potential for buried remains to be encountered is addressed, and that other features within the site boundary are protected from accidental encroachment during construction.

Three effects of minor significance are anticipated upon the settings of Listed Buildings, all within Westerdale. The appraisal has identified potential impacts upon the settings of 15 Scheduled Ancient Monuments, but these are considered "minor". Similarly there are potential impacts upon the settings of 16 non-scheduled but nationally important features, but these are assessed as being of "minor" significance.

Noise

An assessment of noise resulting from the construction, operation and decommissioning phases of the windfarm has been carried out.

Noise during construction and decommissioning will be managed through the use of best practice to ensure that effects are minimised as far as is reasonably practicable.

Operational noise has been assessed in accordance with relevant guidelines and in consultation with Highland Council. A noise survey has been carried out at nearby properties to establish current noise levels in the area and to set limits for the proposed windfarm using the appropriate guidelines. The noise levels likely to occur at nearby properties under worst-case conditions have been predicted and assessed against these limits. All predicted noise levels are lower than the limits and overall, the effects are considered to be not significant.

Aviation And Existing Infrastructure

Television and Telecommunication

Wind turbines and other structures have the potential to create interference with television and telecommunication transmissions. The proposed Olgrinmore turbines lie within an area under Ofcom's jurisdiction with responsibility for ensuring the integrity of Re-Broadcast Links with Arqiva. Arqiva states that the development is unlikely to affect any UHF Re-Broadcast feeds and hence do not object.

JRC has identified 8 links in the vicinity of the site development area. It is not anticipated that the turbines will affect any of the links identified by the JRC. JRC have indicated that a maximum micro-siting of 50m would be required to ensure their links are not affected.

Aviation

The only civil airport within 30 km is Wick Airport, which is 27 km (direction) of the proposed development. The Airport Operator has confirmed that it has no objection to the proposed turbine positions and height.

The Ministry of Defence (MoD) Defence Estates has also confirmed it has no objection to the proposal.

Utilities

A 33kV power line has been identified by Scottish and Southern Energy in the eastern part of the site that is 0.6km from the closest turbine. Suitable safeguarding distances have been incorporated into the project design to avoid any risks to health and safety. The wind turbines will be connected to this power line in order to export their generated power via an on-site control and metering building.

Access and Traffic

A strategic review of the traffic movements resulting from the construction, operation and decommissioning phases of the wind turbines has been undertaken.

The proposed access point for the Olgrinmore Wind Turbines will be at the eastern boundary of the site, from the B870 via the existing track at Olgrinmore Moss, which is approximately 1.6 km south of Scotscalder train station.

The traffic assessment concludes that there will be a temporary, significant increase in HGV traffic levels on the B870. These increases are associated with only the construction phase of the Olgrinmore Wind Turbines and not the operational phase and will occur over a period of 9 months, with the greatest increase felt during the first three months.

In accordance with EIA significance criteria, the increase in overall volume is considered to be significant due to the current low levels of traffic on these roads. The greatest concentration of traffic will be associated with the site personnel entering and exiting the site.

The proposed mitigation measures to minimise the short term significant effects during construction include a traffic management plan which would be agreed in consultation with the Highlands Council, Scottish Executive and the police.

Traffic generated during the operation and maintenance of the wind turbines would be minimal and would not result in any significant effects. The levels of traffic associated with the decommissioning will be lower than those during construction and therefore will not be significant.

Shadow Flicker

Shadow flicker is the term used to describe the effect that occurs when the shadow of a wind turbine blade passing a narrow opening (usually a window) appears to quickly turn on and off as blades pass the opening in succession resulting in a flicker. The likelihood and the

duration of this occurring depends upon certain combinations of relative sun, turbine and window locations, turbine orientation, times of day, days of the year and weather conditions.

Properties within a distance of ten rotor diameters (900m) and 130 degrees either side of north (the 'shadow flicker study area') have the potential to be affected. Three properties were identified for further analysis and theoretical specific times and durations of flicker effects calculated.

The assessment concludes that mitigation will not be required given the short duration of effects predicted, the small number of potentially affected properties, and the likelihood of effect reduction through other factors.

Miscellaneous Issues

The investment in Olgrinmore Wind Turbines has the potential to generate a range of economic and social beneficial effects such as opportunities for local businesses to supply materials and skills, and jobs during the construction of the wind turbines. In addition it is proposed to establish a community fund, with a particular emphasis on supporting local environmental and educational projects in connection with the natural environment and cultural heritage of the area.

The construction of the wind turbines will not have a direct effect on any recreational or tourist facilities. Surveys of public attitudes to windfarms provide no clear evidence to suggest that the presence of windfarms in an area has any adverse impact on local tourism. The construction of the development would lead only to a limited loss of grazing land and is considered to be non-significant.

The turbines at Olgrinmore have been sited to avoid the areas of deep peat located in the western part of the site. Best practice construction methods such as construction of floated roads, reinstatement of peat areas and habitat enhancement plans will be employed to help minimise peatland degradation and CO_2 emissions. According to the Scottish Executive's report[2], the calculation for CO_2 emissions payback time for peat will be 2.4 to 4.9 years which is lesser compared to the average 25 year old life of the windfarm.

Any health and safety risks will be addressed through normal construction and operational procedures. All relevant Health and Safety legislation will be adhered to. The implementation of current best practice and technology will be used so as to minimise any health and safety risks.

Sensors and protection equipment will be fitted to turbines and operational procedures followed to mitigate any safety risks associated with extreme weather.

[2] Calculating Carbon Savings from Wind Farms on Scottish Peat Lands – A New Approach June 2008. University of Aberdeen, Macaulay Land Use Research Institute, funded by the Scottish Government.

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ENVIRONMENTAL APPRAISAL VOLUME 1

A full list of accompanying figures is provided within Environmental Appraisal Volume 2: Figures.

Technical Appendices referenced in Chapters contained within this Volume may be found in Environmental Statement Volume 3.

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1 INTRODUCTION

1.1 The Proposed Development

Lomond Energy Limited in partnership with the site landowner and Ardnamurchan based Windsearch Ltd. ("the Developers") are proposing a local scale onshore wind development consisting of two turbines at Olgrinmore, approximately 1.5km south of Scotscalder Station, Caithness. The location of the site is shown in Figure 1.1.

The installed capacity of the development will be up to 5 MW, depending on the capacity of the wind turbines used, which could satisfy the electricity needs of approximately 2,300 homes[1].

The development will consist of 2 wind turbines, with associated infrastructure including access track, control building and underground power cables. An anemometer will also be erected to monitor wind speed. The development will be subject to the grant of planning permission by Highland Council.

The turbines will generate electricity for 25 years after which time they will be removed. Alternatively, the life of the development may be extended subject to further environmental studies and new consents.

Arcus Renewable Energy Consulting Ltd ("Arcus"), in conjunction with a range of other specialist consultants has compiled an Environmental Appraisal (EA) of the proposals which accompanies the planning application to Highland Council.

It is expected that the turbines will be connected to the electricity grid on site for which a connection offer has been made by Scottish Hydro Electricity.

1.2 The Developer

The project is being developed jointly by Lomond Energy, Windsearch and the locally based site owner. Lomond Energy is taking the lead role and acting as applicant.

Lomond Energy is an independent family run company established in 2003 and based in Loch Lomond and the Trossachs National Park. It specialises in the development of small scale wind farms, recognising that such projects have an important a part to play not only in tackling climate change, but also in bringing much needed economic development to rural communities. It currently has four projects under development in Scotland, plus a further project approved in early 2008 located in South Lanarkshire which is due to start construction in Spring 2009.

Windsearch is an Ardnamurchan based wind project developer focussed on community based and small wind energy schemes in the Highlands and Islands.

1.3 The Environmental Appraisal and Appropriate Assessment

The Environmental Appraisal (EA) accompanies the planning application, following a Screening Opinion made by the Scottish Executive ruling that this development did not warrant a formal Environmental Impact Assessment under the Environmental Impact Assessment (Scotland) Regulations 1999.

The Scottish Ministers acknowledge that the proposed development falls within the description given under Schedule 2 of the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 1999 ("The EIA Regulations") but are of the opinion that this two turbine wind development would not have a significant impact on the environment by virtue of its nature, size, location or potential impact.

In reaching this decision the Scottish Ministers have noted that the site lies close to an SSSI/SAC/SPA and a Scheduled Ancient Monument and have requested that an Appropriate Assessment be carried out investigating the effects of the wind turbines on these areas.

[1] British Wind Energy Association (BWEA), Calculations for Wind Energy Statistics www.bwea.com/edu/calcs.html

As the installed capacity of the proposed development is less than 50MW an application for planning permission is being made under the Town and Country Planning (Scotland) Act 1997 to the local planning authority (Highland Council), accompanied by the Environmental Information comprising the following documents:

- Volume I: Text (this document), which reports the findings of the Environmental Appraisal;
- Volume II: Figures, which presents all accompanying figures and visualisations;

Where appropriate, technical reports for individual assessments have also been compiled. These are clearly referenced within each topic area and are available on request from Arcus.

1.4 The Project Team

The Environmental Appraisal has been compiled by Arcus Renewable Energy Consulting Ltd (Arcus), with technical input from a range of specialist consultants. Table 1.1 below identifies the team members and their responsibilities.

Table 1.1 Project Team

Area of Expertise	Organisation
Planning	Arcus
Socio Economics	Arcus
Landscape and Visual	EDAW
Ecology	Arcus
Ornithology	NDR Environmental Services and Arcus
Hydrology and Hydrogeology	Arcus
Archaeology and Cultural Heritage	Arcus
Noise	Arcus
Existing Infrastructure	Arcus
Shadow Flicker and Reflectivity	Arcus
Traffic and Transport	Carazon
Other Issues	Arcus

1.5 Renewable Energy

Energy underpins virtually every aspect of the economy. However, the use of fossil fuels such as oil, gas and coal, which currently provide the bulk of our energy, releases greenhouse gases such as carbon dioxide into the atmosphere. Population growth and changes in lifestyle have increased levels of demand for energy and an increase in the burning of fossil fuels, to the extent that there is now scientific consensus of opinion that this is causing a warming of the atmosphere which poses a considerable global threat.

The UK is currently responsible for the release of around 2 per cent of the world's global greenhouse gas emissions[2]. UK energy industries are the largest contributors to UK greenhouse gas emissions, contributing over a third (54 million tonnes) of the total amount of carbon dioxide emitted in the UK.

Renewable energy is the term used to describe energy flows that occur naturally and continuously in the environment, such as energy from the wind, waves or tides. This means that these sources are continuously replenished. To help lessen the effects of climate change, greenhouse gas emissions must be reduced and one way of helping to achieve this is by generating energy from renewable sources that emit low or even zero levels of greenhouse gases.

[2] Speech by Elliot Morley "Tackling climate change – the UK approach", 2nd International Solar Cities Congress, Oxford, Monday 3 April 2006, www.defra.gov.uk

1.5.1 International Context

Under the Kyoto Protocol, participating countries have agreed to limit or reduce their emissions of greenhouse gases and have been assigned targets stipulating the maximum amount that they can emit per year over the period of commitment (2008-2012)[3].

This was reinforced on 15th December 2004 at the 10th Conference of Parties Framework Convention on Climate Change, where Kofi Annan, then United Nations Secretary General stated; *"I urge you also to look ahead, beyond the Protocol, which takes us only to year 2012. The longer-term challenge is to promote the use of low-carbon energy source, low greenhouse gas technologies and renewable energy sources".*

1.5.2 European Context

The EU produces around 22% of global greenhouse gas emissions and has agreed under the Kyoto Protocol to a cut of 8% from 1990 levels by 2008-2012.

In March 2007 The European Council agreed to a common European strategy for energy security and tackling climate change. This includes a binding target of reducing greenhouse gas emissions by 20% by 2020 and by 30% in the context of international action.

The EU's 2001 Renewables Directive aims to increase the share of electricity produced from renewable energy sources in the EU to 21% by 2010, thus helping the EU reach its target of overall energy consumption of 12% by 2010.

In March 2005, the European Union agreed that it would be dangerous to let global warming exceed 2°C. The New Scientist reports that the earth has already warmed 0.6°C since pre-industrial times. However, because of time-lags in the natural systems, such as the thermal inertia of the oceans, the world could be within a decade of becoming unavoidably committed to an eventual 2°C warming[4].

The 2007 European Council agreement sets a further target for 20% of the EU's overall energy consumption to be from renewable energy sources by 2020.

The 20% renewable energy target is an ambitious goal representing a large increase in the Member States' renewable energy capacity. Latest data shows that the current share of renewable energy in the EU as a whole is around 6% and projections indicate that by 2020, on the basis of existing policies, renewable energy is unlikely to exceed 10% of the EU's energy consumption[5].

In 2006, 7,708 MW of wind power capacity was installed in the EU, taking the total installed capacity in Europe at the end of 2006 to 48,545 MW, representing 65% of the global total. Over the past 10 years, cumulative wind power capacity in the EU has increased by an average 30% per year[6].

1.5.3 UK Context

The United Kingdom is committed to reducing greenhouse gas emissions by 12.5% from 1990 levels by 2008-2012 as part of the Framework Convention on Climate Change (the Kyoto protocol). However, the UK Government has set a domestic target for reduction of CO_2 emissions beyond the commitment to the European Union of 20% from 1990 levels by 2010.

In 2003 the Energy White Paper "Our Energy Future – Creating a Low Carbon Economy" was published, in this the Government announced a goal to cut CO2 emissions by 2050 with 'real progress' by 2020.

In March 2007 a draft Climate Change Bill was published which creates a new legal framework for the UK to achieve a mandatory 60% cut in the UK's carbon dioxide emissions

[3] Kyoto Protocol to the United Nations Framework Convention on Climate Change, 1997

[4] Climate Scientists Fear Fudge at G8 Summit, http://www.newscientist.com

[5] EU Commission Renewable Energy Road Map. Renewable energies in the 21st century: building a more sustainable future.

[6] Global Wind 2006 Report, Global Wind Energy Council (GWEC)

by 2050 (compared to 1990 levels), with an intermediate target of between 26-32% by 2020. If approved, the UK is likely to become the first country in the world to set such a long-term and significant carbon reduction target into law.

In May 2007 "Meeting the Energy Challenge" A White Paper on Energy was published[7]. In this the UK Government reiterated its commitment to cut the UK's carbon emissions by 60% by 2050 and by 26-32% by 2020 against a 1990 baseline.

Latest estimates show that total UK greenhouse gas emissions fell by 15% between 1990 and 2006, while carbon dioxide emissions fell by 6.4% between 1990 and 2005. However, annual net carbon dioxide emission levels in the UK have actually risen by around 1.2% during 2006 due to a switch from natural gas and nuclear to coal for electricity generation in response to higher gas prices and lower nuclear output, thus the total change is a fall of only 5.3%[8] and further action is needed to curb carbon dioxide emissions over the next few years if the Governments targets are to be met.

1.5.4 UK Renewable Energy Strategy

The Government has set a target of 10% of the UK's electricity supply to come from renewable sources by 2010, with an aspiration for 20% renewable generation by 2020. In 2006 renewables accounted for only 4.6% of electricity generated in the UK[9]. The recent draft EU Renewable Energy Directive set a target of 15% of the total energy consumed in the UK (electricity, heat and transport) to come from renewable sources by 2020. This would require a ten-fold increase in the level of renewable generation and use in the UK over the next 12 years[10]. The UK Government is now reviewing and consulting on its Renewable Energy Strategy in order to meet the UK share of the EU renewables target. It is expected that the UK Renewable Energy Strategy will be published in Spring 2009. Possible measures to deliver the UK share of the EU target include:

- Extending and raising the level of the Renewables Obligation to encourage up to 30-35% of UK electricity to come from renewable sources by 2020 (currently it is less than 5%)
- Helping the planning system to deliver, by agreeing a clear deployment strategy at regional level similar to the approach established for housing

In order to meet the 2020 target the Renewable Energy Strategy Consultation paper expects wind power (on and offshore) to be a key growth area. Initial modelling suggests the UK needs 14 GW of onshore wind compared to 2.5GW today, which equates to around 4,000 new 3MW onshore turbines in addition to the approximately 2,000 turbines already installed. A large proportion of onshore wind development is expected to take place in Scotland[11].

In essence wind energy is currently the most viable form of renewable energy that will allow these ambitious targets to be met in the short to medium term.

1.5.5 Energy Security

Security of energy supply is vital to the UK economy. The UK's natural energy resources are declining and are currently only partly replaced by indigenous supplies of energy such as wind, as such the UK will become more dependant on imported fuels to meet it energy demand. The May 2007 White Paper on Energy states that by 2020, around 80% of the UK's fuels are likely to come from overseas. As such the UK faces greater exposure to developments in the global energy system including becoming more vulnerable to the impact of overseas disruptions to energy supplies caused by international disputes and accidents, facing higher and more volatile energy prices.

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[7] Meeting the Energy Challenge A White Paper on Energy, May 2007, DTI

[8] Department for Business Enterprise & Regulatory Reform (BERR) UK Energy in Brief July 2007 www.berr.gov.uk/files/39881.pdf

[9] BERR UK Energy in Brief July 2007 www.berr.gov.uk/files/39881.pdf

[10] UK Renewable Energy Strategy www.berr.gov.uk/energy/sources/renewables/strategy/page43356.html

[11] Renewable Energy Strategy Consultation http://renewableconsultation.berr.gov.uk/

Increasing the use of indigenous renewable sources of energy will reduce our dependence on imported fossil fuels and will bring diversity and security of supply to the UK's energy infrastructure. The Renewable Energy Strategy Consultation estimates that meeting the 15% renewable energy target in 2020 could reduce gas imports by between 12-16%, with increasing benefits as these become more scarce and expensive[12].

The UK energy industry still relies on finite, diminishing sources of fossil fuel such as coal, oil and gas. In 2006, approximately 75 per cent of the UK's electricity was generated from fossil fuel sources, 18 per cent from nuclear sources, and 4.5 per cent from renewable sources[13]. In 2006 biofuels accounted for 82% of renewable energy sources, hydro (large scale) accounted for 8% and wind power contributed 8.2%. At the present time the UK wind industry (on and offshore) has an installed capacity of 2,545.5MW, enough energy to power the equivalent of 1,423,300 homes[14].

1.5.6 Scottish Context

The Scottish Government is committed to promoting the increased use of renewable energy sources to help tackle climate change and to support economic growth in Scotland.

It has recently set an increased target of supplying 50% of Scotland's electricity demand from renewable sources by 2020, and an interim milestone of 31% by 2011. Ministers want to see targets exceeded and not merely met[15].

Progress towards these targets is being driven by the Renewables Obligation (Scotland) which requires electricity suppliers to provide an increasing proportion of their electricity generated from eligible renewable sources.

In 2006 13% of electricity in Scotland was generated from renewables, consisting of 7.9% from hydro (natural flow) and 5.1% from other renewables (wind, wave, solar and thermal renewables)[16].

As of September 2008 there are 55 operational wind farms totalling 1,208 MW generating in Scotland. 12 wind farms are currently under construction with a capacity of 615.1 MW and a further 51 wind farms are consented with a capacity of 1,544.3 MW[17].

1.6 Wind Power

In the short to medium term, onshore windfarms are likely to be the only substantial new source of renewable energy which is both economically viable and environmentally acceptable. The Cabinet Office Performance and Innovation Unit has estimated that onshore wind could be the UK's cheapest source of electricity in 2020 (costing 1.5-2.5 p/kWh, compared to 1.9-2.0 p/kWh for gas, 3.0-3.6 p/kWh for coal and 3.0-4.5 p/kWh for nuclear).[18]

The generation of electricity from wind turbines, being almost free of emissions, offsets the production of greenhouse gases from fossil fuelled electricity generators. In addition to these benefits, the environmental footprint of windfarms such as this proposal are largely reversible, as the turbines and associated above ground infrastructure can be removed from site with little subsequent visible trace of their previous existence..

[12] Renewable Energy Strategy Consultation http://renewableconsultation.berr.gov.uk/

[13] BERR UK Energy in Brief, July 2007 www.berr.gov.uk/files/39881.pdf

[14] Windfarms of the UK, www.bwea.com/ukwed/index.asp (It should be noted that the number of homes supplied may vary depending on wind speeds and household electricity consumption).

[15] The Scottish Government http://www.scotland.gov.uk/Topics/Business-Industry/Energy/19185/17612

[16] The Scottish Government Statistics http://www.scotland.gov.uk/Topics/Statistics

[17] http://www.bwea.com/statistics

[18] The Energy Review, February 2002

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2 ENVIRONMENTAL APPRAISAL

2.1 Introduction

Environmental Appraisal is a process similar to Environmental Impact Assessment and is intended to provide the Local Planning Authority with sufficient environmental information to determine a planning application which has been deemed as not requiring formal EIA under the Environmental Impact assessment regulations (Scotland) 1999.

A Screening Opinion was sought form the Scottish Executive in September 2006 to determine whether formal EIA would be required for this proposal, which in response considered that this development would not have a significant impact on the environment by virtue of its nature, size, location or potential impact to warrant formal EIA.

Notwithstanding that, this Environmental Appraisal ensures that any potential effects from the proposal on the environment have been investigated and any necessary mitigation or management measures identified. Consultation has been carried out with a wide range of authorities to make certain that all environmental considerations have been addressed.

Guidance on what amounts to significant effects is given in the Scottish Executive Circular 15/1999. Annex A states that the likelihood of significant effects from windfarms *"will generally depend upon the scale of the development, and its visual impact, as well as potential noise impacts. EIA is more likely to be required for commercial developments of five or more turbines or more than five MW of new generating capacity".*

2.2 Environmental Appraisal Methodology

Initial "pre-screening" consultations were undertaken with statutory and other bodies which have identified a number of issues addressed within this Environmental Appraisal.

The pre-screening inquiries, preparation and production of the EA have been conducted in accordance with the latest Government Regulations and guidance, comprising:

- The Environmental Impact Assessment (Scotland) Regulations 1999;
- Circular 15/1999 The Environmental Impact Assessment (Scotland) Regulations1999;
- Planning Advice Note (PAN) 58 – Environmental Impact Assessment, September 1999;
- Preparation of Environmental Statements for Planning Projects that require Environmental Assessment, A Good Practice Guide (Department of the Environment, 1995).
- Guidelines for Environmental Impact Assessment (Institute of Environmental Management and Assessment 2004).

The provision of environmental information through an Environmental Appraisal involves the compilation, evaluation and presentation of all the likely effects of a proposed development. Together with post application consultation, this document aids the planning authority in considering and determining the planning application.

2.2.1 Identification of Issues

The following issues have been technically assessed in this Environmental Appraisal:

- Socio Economics including recreation and tourism;
- Landscape and Visual;
- Ecology;
- Ornithology;
- Hydrology and Hydrogeology;
- Archaeology and Cultural Heritage;
- Noise;

- Existing Infrastructure including aviation and telecommunications;
- Shadow Flicker; and
- Access and Traffic.

All elements of the project including the access track, control building, anemometer mast and other associated infrastructure have been assessed.

2.3 Technical Assessments

Each of the technical assessments follows a systematic approach, with the principal steps as follows:

- Description of baseline conditions;
- Prediction of potential effects including cumulative effects;
- Assessment of effects;
- Identification of appropriate mitigation measures; and
- Assessment of residual environmental effects.

2.3.1 Prediction of Potential Effects

The prediction of the potential effects covered the following three phases:

- Construction;
- Operation; and
- Decommissioning

Following identification of potential environmental effects, baseline information was used to predict changes to existing site conditions, and permit an assessment of these changes.

2.3.2 Assessment of Effects

The effect that the development may have on each environmental receptor would be influenced by a combination of the sensitivity of the environment and the predicted degree of alteration from the baseline state (both positive and negative). Environmental sensitivity may be categorised by a multitude of factors; for instance; threat to rare or endangered species; transformation of natural landscapes; changes to soil quality and land use; etc. The initial assessment, consultation and pre-screening phases identified these factors along with the implications.

It is the opinion of the Scottish Executive that the development of two wind turbines at Olgrinmore would not have a significant effect on the environment. Nevertheless, this Environmental Appraisal will evaluate the effects created by the wind turbines against the current baseline.

In order to evaluate environmental effects, assessment criteria are identified within each chapter. Thresholds of significance are then used to make explicit the conclusions of the assessment process. Significance is based on the structured elevation of the three main criteria:

- Identifying the nature and form of any predicted environmental effects;
- Assessing whether effects identified are significant; and
- Assessing the likelihood of identified effects.

For the purposes of environmental effect assessments, 'effect' is generally considered in terms of:

- Not significant – no detectable or material change to a location, environment or species;
- Minor – a detectable but non-material change to a location, environment or species;
- Moderate – a material, but non-fundamental change to a location, environment or species; and
- Major – a fundamental change to a location, environment or species.

This Environmental Appraisal generally follows this theoretical approach. Where specific topic areas adopt a variation, this is identified within the particular assessment chapter. Within each assessment chapter the criteria for assessing significance of effects are also made explicit. Each chapter also proposes measures to avoid, reduce or remedy significant adverse effects (mitigation measures). The assessment process concludes with an examination of residual effects after mitigation has been applied.

2.3.3 Mitigation

Where the assessment process identified any adverse effects, mitigation measures were proposed during the design phase. Such measures included the consideration of alternatives; physical design evolutions such as movement or loss of turbines; and management and operational measures.

This strategy of avoidance, reduction and remediation is a hierarchical one which seeks:

- first to avoid potential effects;
- then to reduce those which remain; and
- lastly, where no other measures are possible, to put forward remediation measures.

Each specialist consultant has identified appropriate mitigation measures. As indicated previously, these measures have largely been integrated into the overall design strategy (embedded mitigation) rather than "added on" to the proposals. By adopting a flexible and iterative approach to the design, the Applicant has been able to respond to the findings of consultation and environmental assessment work, and mitigate accordingly.

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10 CULTURAL HERITAGE

10.1 Introduction

The purpose of this chapter is to appraise the proposed development in terms of potential effects upon the Cultural Heritage resource of the site and surrounding area. Cultural heritage resources include Scheduled Ancient Monuments, other archaeological sites, Listed Buildings and other buildings of historic or architectural importance (and recorded in the Sites and Monuments Record maintained by Highland Council), Conservation Areas, and Inventoried Designed Landscapes and Historic Gardens.

The appraisal is intended to identify cultural heritage sites which may be affected, either directly (e.g. through physical disturbance during construction) or indirectly (e.g. through changes to visual and archaeological setting) during construction, throughout operation or from de-commissioning of the proposed wind farm.

The appraisal takes into account the limited scale of the turbine cluster, and whilst the methodology is based to a large extent on standard assessment techniques, it acknowledges the view taken by the Scottish Ministers in their determination that the development falls under Schedule 2 paragraph 3(i) of the 1999 EIA regulations, that the 2 turbine development "would not be likely to have a significant effect on the environment by virtue of its nature, size, location or potential impact".

10.2 Methodology

10.2.1 Appraisal Methodology

This appraisal has involved:

- Consultation with the Statutory and Non-statutory authorities to gain data establishing the baseline conditions for the site and its surrounding area;
- Desk-based studies and site visits to contribute to and validate data relevant to establishing the baseline conditions;
- Assessment of the effects expected from the development and their potential effect upon the existing conditions;
- Assessment of the significance of the effects taking into account the sensitivity of the site (and selected features beyond the site), the magnitude of potential effects (both direct and indirect) and the likelihood of such effects occurring; and
- Identification of means to mitigate and avoid, where possible, any potential effects, as well as the assessment of the residual effects which may exist after mitigation.

10.2.2 Relevant Guidance

The appraisal has been undertaken taking into account the following guidance and legislation:

10.2.2.1 Guidance

- *National Planning Policy Guideline 5: Archaeology and Planning* (NPPG 5, 1994) sets out how the archaeological resource and the settings of archaeological sites should be treated within the land-use planning process.
- *National Planning Policy Guideline 18: Planning and the Historic Environment* (NPPG 18, 1999) deals with Listed Buildings, Conservation Areas, World Heritage Sites, Historic Gardens, Designed Landscapes and their settings. It complements the advice set out in NPPG 5.

10.2.2.2 Legislation

- Statutory protection for archaeology is principally outlined in the Ancient Monuments and Archaeological Areas Act (1979) as amended by the National Heritage Act (1983) and nationally important sites are listed in a Schedule of Monuments. Scheduled Monument Consent (SMC) is required before any work affecting the fabric of a Scheduled Monument can be carried out.
- The Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997 details the duties of National and Local Authorities in respect of the listing and protection of Listed Buildings and conservation Areas.

10.2.2.3 Regional and Local Policy

The appraisal has taken into consideration relevant policies dealing within the development plan. These are further discussed in Chapter 4.

10.2.2.4 Other

The following guidance and advice was also considered:

- Standards and Guidance for Archaeological Desk Based Assessments (Institute of Field Archaeologists, 1999). This advises that the aim of a desk-based assessment is to gain information about the known and potential archaeological resource within the proposed development site boundary and that from this an appraisal can be made on the presence or absence of archaeology.
- Planning Advice Note Archaeology - Planning Process and Scheduled Monument Procedures (PAN 42, 1994) provides advice on the handling of archaeological matters within the planning process and on the separate control over Scheduled Monuments under the Ancient Monuments and Archaeological Areas Act (1979).
- Planning Advice Note - Renewable Energy Technologies (PAN 45, Revised 2002) provides a useful advice and information for on-shore wind power, and contains guidance on the visual effects from wind turbines.
- Landscape Appraisal for Onshore Wind Development, University of Newcastle 2003.
- Guidelines on the Environmental Impacts of Wind Farms and Small Scale Hydroelectric Schemes, Scottish Natural Heritage, 2001.
- Visual Assessment of Wind Farms – Best Practice, University of Newcastle (for Scottish Natural Heritage), 2002.
- Memorandum of Guidance on Listed Buildings and Conservation Areas (Historic Scotland, 1998).

Historic Scotland have not yet established any policy guidelines with regards to visual impacts on the settings of Scheduled Monuments, and have recommended guidance be taken from Scottish Natural Heritage, *Visual Assessment of Windfarms: Best Practice*. However, this report is accompanied by the clause: 'The views expressed by the author(s) of this report should not be taken as the views and policies of Scottish Natural Heritage'.

10.2.3 Consultation

Consultation was undertaken with both Statutory and Non-Statutory Consultees as part of the Appraisal process. The responses are summarised below;

Table 10.1 Consultation Responses

Consultee	Response
Highland Council Archaeologist	Provided data from Sites and Monuments Record. Agreed that a more limited appraisal was in keeping with scale of development and agreed data collection range of 5km for designated and non-designated nationally important features.
Historic Scotland	In their response to the scoping report, HS identified six Scheduled Ancient Monuments and one Listed Building which they requested by assessed for potential (indirect impacts). These are SAMs 490, 491, 530, 592, 2235, 5292 and Listed Building HB 7793. These have been addressed in section 10.5 below.

10.2.4 Assessment of Effects

The assessment of effects on the cultural heritage is concerned with direct (physical) and indirect (largely visual) impacts.

10.2.4.1 Direct (Physical)

The appraisal of physical effects considers direct impacts to the cultural heritage, where sites or potential sites / buried archaeology is in danger of being disturbed or destroyed. Physical impacts are likely to occur during construction and decommissioning, and are permanent and irreversible. They are discussed in 10.5.1 Potential Construction Effects.

10.2.4.2 Indirect (Visual, noise etc.)

This appraisal will take account of the potential visual intrusion on the settings of Scheduled Monuments, monuments registered as nationally important and Listed Buildings that exist within the proposed wind farm site and the 30km Zone of Theoretical Visibility. The setting of a national monument or Listed Building can be loosely interpreted as features that form an integral part of their significance. Setting can be tangible, such as a defined boundary or intangible, such as atmosphere or ambience. The main concern for visual impacts is the potential for the proposed development to fragment the historic landscape, separate connectivity between historic sites and impinge on views to and from sites with important landscape settings. Visual impacts can occur during construction, operation and decommissioning. Wind farms can have a lifespan of up to 25 years, but the visual impacts from this sort of development are considered temporary and easily reversible.

Planning Advice Note - Renewable Energy Technologies (PAN 45, Revised 2002): notes that: 'visual effect will be dependent on the distance over which a wind farm may be viewed, whether the turbines can be viewed adjacent to other features, different weather conditions, the character of the development and the landscape and nature of the visibility'. It further clarifies the relationship between distance and prominence of the windfarm in an open landscape. So, within an area of 2km from the windfarm it will be a prominent feature, and relatively prominent at between 2-5km. Between 5-15km, the windfarm will only be prominent in clear visibility and as part of the wider landscape. At between 15-30km the turbines will only be seen in very clear visibility and then as a minor element in the landscape. It is therefore considered for this assessment that the indirect visual impact on the setting of a nationally important monument beyond 10km from the windfarm is not significant. Beyond 5km an historic site of regional importance does not suffer significant impacts on setting.

It is also important to consider existing screening of the cultural heritage from natural topography of the landscape. Forest and woodlands can also provide suitable visual screening to the cultural heritage. However, it is noted that in managed forests the level of screening will alter and views may be opened up over time, which once were non-existent.

No detailed consideration of potential impacts from noise or shadow flicker has been undertaken for Cultural Heritage features, since no significant above ground or built heritage features exist within or immediately adjacent to the site to receive any such impacts. The assessment of indirect (visual) effects is based on the final form of the proposed development and is discussed in 10.5.2 Potential Operational Effects.

This appraisal proceeds from a consideration of the *Sensitivity* of a cultural heritage feature against the *Severity* of any potential impact, to arrive at the *Significance* of the effect.

Sensitivity for the purposes of this appraisal has been equated with designation status, as shown on the table below;

Table 10.2 Sensitivity

Level of Sensitivity	**Designation Status**
Very High	World Heritage Sites
High	Scheduled Monuments, Non-Scheduled Category C/V monuments, Grade A Listed Buildings, Registered Battlefields, Inventoried Designed Landscapes and Historic Gardens.
Medium	Grade B Listed Buildings, regionally important archaeological features and areas (as defined in the Sites and Monuments Record). Conservation Areas.
Low	Grade C (S) Listed Buildings, sites and features noted as Locally important in the Sites and Monuments Record.
Negligible	Badly preserved/damaged or very common archaeological features/buildings of little or no value at local or other scale.

Listed Buildings are nationally designated and are placed on Lists maintained by Historic Scotland. They are subject to a grading process (Grade A, B, C(s)) and we have taken this categorisation as indicative of a presumed level of importance, based on rarity, period, architectural style, completeness, degree of subsequent alterations and so on. This appraisal has assigned the Grades to different levels of sensitivity as shown above on Table 10.2.

Non-Scheduled Monuments that are registered as nationally important by Historic Scotland fall into different categories of importance. There are two categories that are relevant to sites in this appraisal, the definitions of which are given below:

Category C: Almost certainly of national importance.

Category V: Very probably of national importance, but would require a visit.

Severity is a measure of the nature of the expected impact. It has been broken down, for direct and indirect impacts, as shown on table 10.3 below. For purposes of visual assessment, proximity to the windfarm (within the Zone of Theoretical Visibility) has been taken to be the determining attribute (so as to allow for concordance with the statements of visual prominence presented in PAN 45).

Table 10.3 Severity

Level of Magnitude	Definition
Very High	Total loss of or major alteration to a site, building or other feature. Presence within or immediately adjacent to windfarm site.
High	Major damage to or significant alteration to a site, building or other feature. Loss of one or more key attributes. Extensive change to the setting of a Scheduled Monument, monuments registered as nationally important or Category A/B Listed Building or other feature (i.e. proximity within 2km of the windfarm site).
Medium	Damage or alteration to a site, building or other feature. Encroachment on an Area considered to have a high archaeological potential. Change in setting to monuments/buildings and other features within 5km of development site, (i.e. proximity within 2-5km of the windfarm site).
Low	Minor damage or alteration to a site, building or other feature. Encroachment on an area where it is considered that low archaeological potential exists. Minor change in setting of monuments, site and other features (i.e. proximity within 5-15km of the windfarm site).
Negligible	No Physical impact. Proximity within 15-30km of the windfarm site.

The *Significance* of any potential effect can be arrived at by matching *Sensitivity* against *Severity* in the following table;

Table 10.4 Significance

Sensitivity Severity	Very High	High	Medium	Low	Negligible
Very High	Major	Major	Moderate	Minor	Minor
High	Major	Major	Moderate	Minor	None
Medium	Moderate	Moderate	Moderate	Minor	None
Low	Minor	Minor	Minor	None	None
Negligible	Minor	None	None	None	None

10.2.5 Zone of Theoretical Visibility

The Zone of Theoretical Visibility has been calculated to ground contours, and takes no account of ground cover (tree plantations, buildings and settlement).

In considering effects using this methodology, the following points need to be borne in mind. Firstly, the Zone of Theoretical Visibility is a theoretical construct, based upon a fairly crude base terrain modelling. It does not take into account the presence of structures and vegetation that may add a screening effect in the landscape. Within each "band", based on numbers of turbines theoretically visible, no distinction is made in how much of each turbine is visible. The ZTV therefore represents an absolute "worst case scenario" and in reality visual effects are likely to be substantially less than suggested.

Secondly, mechanical application of the methodology will generate major and medium effects, for which (in case of visual effects upon settings) no mitigation is proposed. Where

this is the case, predicted medium or major effects are discussed in detail within the appraisal text (in section 10.5.2 Potential Operational Effects) and ameliorating conditions highlighted.

10.3 Baseline Description

10.3.1 Site Description

The site and proposed layout are described fully in Chapter 3. It is worth noting here that the site is a rectangle approximately 1.2 km in length and 250m wide, aligned approximately west-south-west/east-north-east. The eastern end of the site is bounded by the Scotscalder road. The land rises gently from the road, and reaches a highpoint along a ridgeline approximately a third of the way into the site. From there the ground slopes gently down to the west.

The underlying geology of the site is the Lybster Flagstone formation, overlain by peat (the Moss) and glacial till deposits (the drier, higher ground on the western side of the site). The western third of the site is part of Olgrinmore Moss, which is a peat moss. The depth and composition of this is currently unknown. The rest of the site is drier, and the majority is covered by immature commercial forestry, except for a small area of rough grass adjacent to the road. The boundaries of the site are primarily post and wire, with some remains of stone walling and banks along their lengths. A power transmission line crosses north to south across the eastern part of the site, through a corridor kept clear of forestry.

The development consists of two turbines to be located in the western half of the site, that is, within the Moss. An anemometer mast will be located on the higher ground in the middle of the site. Access will be off the Scotscalder road, in the middle of the eastern boundary, with an access track constructed along the centreline of the site towards the turbine locations.

10.3.2 Site Walkover

A site walkover survey was carried out by a qualified and experienced archaeologist on Tuesday 18th December 2007. Weather conditions were clear and sunny, although the extremely cold conditions meant that the ground was covered by a heavy frost throughout the day. Despite this, surface visibility was generally good, except in those areas of the site covered by immature but dense commercial forestry. The ground surface appears to have been subject to considerable disturbance resulting from forestry activities in this area. The visit was conducted to determine whether previously unrecorded archaeological features were visible on the surface, and to assess the condition of any features recorded in the sites and monuments record. Coordinates were recorded using a Garmin Gecko 201, with an accuracy of 6m.

No previously unrecorded features were noted during the walkover, although the two farmsteads noted on the Ordnance Survey mapping but not on the Highland Council SMR data were visited and briefly recorded.

10.3.3 Features within the site

The only relevant recorded feature is the Appat Hill Cairn (SMR ref. 13630), shown as lying on the southern border of the site study area. The modern boundary effectively bisects the cairn, although the original dimensions can't be established on the surface, since the cairn has virtually no physical presence above ground south of the boundary fence, with the exception of a few large stones within the ditch along the boundary. This field adjacent to the site must have been subject to improvement work in the recent past. The cairn within the site is in poor condition, and has been damaged by the encroachment of a track along its northern side, and there is evidence that vehicles have tracked over the centre of the cairn as well.

The remains form a low mound, measuring approximately 10m from its northern edge south to the fence line, and approximately 18m east-west along the fence line. The cairn appears to survive to approximately 1m high in the centre along the fence line, but generally is c. 0.3 to 0.5m in height. There appears to be a slight depression in the centre (of the remaining part).

The highest point is at 309859/954451 at approximately 88m AoD. Its position is shown on Figure 10.1

Two farmsteads with surrounding enclosures are shown on the O/S 1:25000 Explorer series mapping (Sheet 451, Thurso and John o' Groats, Edition A, Revised 2002), one on the northern side and one on the southern side of the site. These are not recorded on the Highland Council Sites and Monuments Record. Both were visited and a brief record made during the site walkover. Their positions are shown on Figure 10.1. They are considered to be of local importance and most are no earlier in date than the mid to late Nineteenth century.

The southern steading (shown as Farmstead A on figure 10.1) is comprehensively ruined, with abandoned farming machinery and other modern debris scattered around it (see photograph at Figure 10.3). Wooden roofing material appears to have been dragged off the structure and deposited to the north-east. The house itself has wall standing to a maximum of 2m high and 0.75m thick. The dimensions in plan are approximately 12m east-west and 6m north-south. The south-western corner of the house is at approximately 309720/954420. The main entrance of the house and, as far as can be determined, the barns/outbuildings to its east was on the southern side. There is a rough stone-walled enclosure to the south-west. There appears to have been a smaller square enclosure, approximately 10m x 10m on the front of the house, the southern part of which is contiguous with the Site boundary. Parts of this enclosure are formed of the flats stone slabs typical of this part of Caithness. A number of small deciduous trees grow around the steading. The steading lies on the southern edge of the ridge which traverses the site from north-west to south-east. The land rises slightly to north-west, but drops to east and to west. A modern timber-built forestry watch hut/hide lies on its side to the west of the house.

The northern steading (shown as Farmstead B on Figure 10.1) appears to be of a similar age and construction to Farmstead A, but although it seems to have been abandoned for a longer period of time, it has not been so comprehensively structurally ruined (see photograph on Figure 10.3) It lies on the highest point along the northern boundary, on the same ridge that the southern steading occupies. It faces to the south, with it back wall nearly contiguous with the northern boundary of the site. The main structure is divided in two, with the domestic part to the east. A smaller outbuilding was added to the western end of the structure. A walled enclosure, approximately 50m x 50m) lies to the immediate east of the house, within which are a number of small deciduous trees. The south-western corner of the main structure lies at approximately 309475/954640. The walls are approximately 0.75m thick, with the height of the walls 2m to the sill and approximately 3/4m to the top of the pitched roof. The internal dimensions of the domestic section are approximately 10m east-west x 4m north-south, with a fireplace at either end. The adjacent section has a 6m x 4m internal space, with no fireplace. The roof for this main range is completely missing. The small later addition to the west had 3m x 4m internal space, with a water trough. Its slate roof sloped up to the end wall of the main range. There is a modern timber built forestry hut/hide to the south of the main structure.

There is a significant bank and ditched linear feature running through the centre of the site from east to west, stopping before it reaches the Moss. This may be a former boundary separating the two farmsteads, and also serving a drainage function, draining the higher ridge to east and west. The boundary bank is approximately 0.5m high and 1m wide, and constructed of material upcast from the ditch to its south. It is in poor condition, and appears to have been damaged by modern forestry activities. The feature is considered to be of local importance, and to date to the post-medieval period (probably mid-Nineteenth century) and date to the same period as the farmsteads.

10.3.4 Features beyond the site boundary

The appraisal has used a 5km search area in order to assess the potential for significant visual impacts upon the settings of cultural heritage features. There are no Designed Landscapes nor Battlefields within this area. Other features are discussed below.

10.3.4.1 Scheduled Ancient Monuments

There are 22 Scheduled Ancient Monuments of all periods within 5km of the site boundary. These are mainly prehistoric ritual or funerary sites such as cairns, chambered cairns and stones, with some hut circles and other settlement sites. A number are later prehistoric Broch sites. 19 of these lies within the Zone of Theoretical Visibility, and are listed below and identified by their Index number;

494 Tulach an Fhuarain, cairn 310m NW of Bridge of Westerdale

496 Tulach Lochain Bhraseil, cairn 310m WNW of Bridge of Westerdale

534 Cairn Merk, broch 800m SSE of Bridge of Westerdale

541 Cnoc Donn, broch 600m ESE of Dale Farm, Halkirk

545 Dale Farm, broch 800m SE of

464 Loch a'Mhuilinn, chambered cairn 300m NE of

482 Sithean Mor, long cairn 160m NW of Loch a'Mhuilinn

490 Torr Beag, chambered cairn 500m NE of Beinn Freiceadain, Brawlbin

491 Torr Mor, cairn 500m NNE of Beinn Freiceadain,Brawlbin

523 Brawlbin, hut circle 550m NE of Beinn Freiceadain

530 Buaile Oscar, fort & chambered cairn, Beinn Freiceadain

542 Cnoc an Ratha, fort SSE of Shurrery Kirk

592 Torr Phadruig, hut circle 730m NE of Beinn Freiceadain,Brawlbin

509 Achies, broch 180m E of

2235 Achies, broch 800m NE of

2400 Achanarras, cairn 800m NW of

2401 Achanarras, cairn 800m NW of

2402 Achanarras, hut circle

5296 St Peter's Chapel, Halkirk

Potential impacts upon the settings of Scheduled Monuments are considered below (section 10.5.2), based on the operational form of the wind turbines.

10.3.4.2 Listed Buildings

Only 5 Listed Buildings lie within 5km of the site boundary, and all are in Westerdale, and Listed at Category B. All lie within the Zone of Theoretical Visibility. None lie within 2km of the site boundary. These are:

HBNUM 7793 Dale House, Westerdale

HBNUM 7794 (2 entries), Dove Cote and Walled Garden, Dale House, Westerdale

HBNUM 7805 Westerdale Bridge (B870)

HBNUM 7806 Westerdale Church (Church Of Scotland)

Potential impacts upon the settings of these buildings and features are considered below (section 10.5.2).

10.3.4.3 Non-scheduled Nationally Important Monuments

This class of feature are those monuments recorded at category C or V on the Highland Council Sites and Monuments Record. Under the guidance in NPPG5, they are treated for purposes of this appraisal as if they were Scheduled Monuments. There are 38 features within 5km of the site boundary, and 11 of these lie within 2km of the site. These are considered below in section 10.5.2.

10.3.5 Archaeological Potential

The surrounding area has a rich archaeological record, particularly in prehistoric archaeology. Whilst the site walkover did not reveal any previously unrecorded features (other than the post-medieval farmsteads shown on OS mapping but not recorded in the Sites and Monuments Record), the potential remains that unknown buried archaeological remains of any period may exist across the site. The site has clearly not been subject to the level of agricultural improvement apparent in fields to the south and east, perhaps indicating a greater chance for survival at the surface, however, the commercial forestry activities have cleared damaged the ground in the area of the plantation. The presence of the dense plantation also meant that much of the site has not been able to be inspected. The presence of the Annat Hill Cairn within the site, albeit in poor condition demonstrates that prehistoric remains can survive in the area.

The presence of the moss across the western part of the site may mask earlier prehistoric features that existed prior to the its formation (assuming that its formation was a function of climatic change as well as the effects of earlier prehistoric farming activities such as deforestation in the Neolithic and early Bronze Age. In addition, the peat deposits may have preserved deposits containing archaeologically important evidence for past climate and environment.

If encountered, any unknown archaeological remains are likely to be of prehistoric date, and of local or regional importance. The potential for significant and nationally important remains to be encountered is considered to be low.

The development footprint is relatively limited, compared to the area of the site. The largest impact will come from the construction of an access track and crane pads, and the excavations for the two turbine foundations.

10.4 Assessment of Effects

10.4.1 Construction Effects

No effects are anticipated from construction upon any nationally important designated or non-designated cultural heritage features.

Depending upon the final arrangement of for the access track, there is a possibility that it will cause damage to the locally important boundary feature running along the site centre. There is a low potential for significant unknown archaeological remains of all periods, but most likely to be prehistoric, to be encountered during groundworks on the site. Mitigation is proposed in section 10.6 below.

Indirect, visual effects upon the settings of feature beyond the site boundary are considered below.

10.4.2 Operational Effects

No direct effects are anticipated from the operation of the turbines.

There are potential indirect, visual effects upon the settings of some cultural heritage features within 5km of the proposed turbines. These are discussed below. The appraisal takes into account the limited scale the development, being only two turbines and an anemometer mast. The presence of Causymere windfarm to the south-east also means that the proposed turbines would not introduce a completely new class of features in the wider landscape, which also includes modern vertical elements in the form of the communications masts on

Ben Dorrery. The locations of features falling within 5km of the site, and lying within the one of Theoretical Visibility are shown on figure 10.2.

10.4.2.1 Scheduled Ancient Monuments

Nineteen Scheduled Ancient Monuments lie within the Zone of Theoretical Visibility within 5km of the site boundary. In all cases, both turbines are predicted to be visible in whole or in part.

Only one Scheduled Monument is located within 2km of the site. This is St. Peter's Chapel, Halkirk (Index number 5296). This monument is situated on the northern bank of the Olgrinbeg Burn, which runs east into the River Thurso. The setting of the monument is considered to be it relationship to the Burn, and the presence of the two turbines (the nearest of which is 2.1km to the north-west) is not considered to constitute a significant change to that setting. The presence of the turbines is likely to be further reduced by the proximity of the woodland to the immediate north-west of the Chapel. Although the Monument is of "high" sensitivity, the impact is considered to be of "low" magnitude, and the significance of the effect "minor" (see wireframe viewpoint 04 on figure 10.4b).

There are 18 Scheduled Monuments within 2-5km of the site boundary. These monuments are of "high" sensitivity, and according to the matrix on table 10.3 would receive an impact upon their settings of "medium" magnitude, resulting in an effect of "high" significance. However, they are further assessed below in relation to their settings and associations, and a final statement of the significance of any impact upon setting is given.

The cairns at Westerdale (Index numbers 494 and 496) lie on the western bank of the River Thurso, which forms part their immediate setting (along with Dale House and associated buildings on the opposite side of the river, and the Bridge and buildings at Westerdale to the immediate south). Both turbines would be visible from this location at approximately 4.3km to the north-west, over intervening properties and plantations at Olgrinbeg and Appat. An indicative sense of the degree of visibility of the turbines can be gained from the representation on View Point 7 of the Landscape and Visual Assessment (Figure 6.26a and 6.26b). The turbines would not block views of the cairns, but would be present in long views towards them from Buaile Oscar. However, the cairns themselves would not be visible in such views, having a relatively limited above ground presence, and the intervening mass of Ben Dorrery would further limit any views. The relationship of these features to each other, and to their riverside setting would not be affected. The significance of the potential impact upon the settings of these two features is therefore assessed as being of "minor" significance.

The Cairn Merk Broch (index number 534) lies approximately 800m south of Westerdale Bridge, on a bend on the eastern bank of the river, and can be approached from the north along a public footpath along the river bank. It lies approximately 4.8km from the nearest part of the site boundary, and 5.3km from the nearest turbine. The degree of intervisibility with the windfarm is similar to the cairns north of Westerdale, and the setting is similarly dominated by its riverside location. At this distance, the effect upon its setting is considered to be of "minor" significance only.

The Cnoc Donn broch (Index number 541) lies approximately 600m south-east of Dale Farm. Although the broch is approximately 4.2km from the site boundary, the nearest turbine is over 5km. The turbines would be visible from the broch above the intervening buildings and vegetation at Dale Farm itself. There are no long views towards the broch in which the turbines would be directly instrusive (blocking the feature) or would form a significant or dominant part of wider views. The relationship between this features and the brich to its south (Index Number 545) would not be adversely affected. The impact of the two turbines upon the setting of the two monuments is considered to be of "minor" significance.

The chambered cairn north-east of Loch a'Mhuilinn (Index number 464) is approximately 3.7km north-east of the nearest turbine. It is located adjacent to an area of forestry to its north-west and overlooking a minor burn which eventually feeds Loch Calder. It appears to be related to the range of prehistoric monuments (scheduled and non-scheduled) on the north-eastern flank of Beinn Freideadain and Ben Dorrery. The presence of the turbines to the south-east does not affect the immediate setting of the monument, and its relationship to

its neighbours, although the turbines will be visible in views from the feature towards the south-east. The significance of the impact upon its setting is considered to be "minor".

The Sithean Mor long cairn (index Number 482) lies within forestry on the north-eastern flank of Beinn Freiceadain. It essentially has no or very limited intervisibility with related monuments and with the proposed turbines (which are approximately 4km to the south-east). The impact of the turbines upon the setting of this feature is therefore assessed as being "not significant". Cnoc an Ratha (Index Number 542) also lies within the same block of forestry, and further away from the turbines. It is therefore assessed as not receiving any significant impact upon its setting.

Buaile Oscar Fort and associated chambered cairn (Index Number 530) lie on the summit of Beinn Feiceadain, approximately 3km from the nearest turbine. The monument is related to the surrounding prehistoric features on the flanks of Beinn Freiceadain and Ben Dorrery, and it is likely to have formed a focus for settlement in the area. An indication of the visibility of the turbines is given in view point 1, figure 10.4a. It is noted that there is a modern telecommunications mast on Ben Dorrery, and the turbines at Forrs and Causymere are part of the wider landscape. The proposed turbines will bring turbines closer to the fort but their presence within the landscape is to some extent reduced by the fact they will not be skylined in views from the fort. Nor will they affect the relationship of the fort to the monuments on the flanks of the higher ground which it surmounts. The elevation of Beinn Freiceadain means that the fort will continue to be a prominent focal feature in the wider landscape, and its eminence in this regard will not be compromised by the proposed turbines. The significance of the potential impact upon the setting of the fort is therefore assessed as being of "minor" significance.

Index Numbers 490 (Torr Beag chambered cairn), 491 (Torr Mor cairn), 523 (Brawlbin hut circle) and 592 Torr Phadruig hut circle are considered together. A representative wireline (from Torr Phadruig, which is closest to the proposed turbine at approximately 2.7km) is presented at view point 2, figure 10.4a. These scheduled features are part of a larger group of prehistoric monuments surviving on the flanks of Beinn Freiceadain and Ben Dorrery. They are primarily associated with each other and to the Buaile Oscar fort above them, and overlooking the lower land sloping towards Loch Olginey and the valley of the River Thurso. The turbines are visible in views to the south-east but as part of the wider landscape. The interrelationship of these features to each other and the non-scheduled monuments on the north-eastern slopes of the Beiin Freiceadain/Ben Dorrey high ground is not affected by the presence of the turbines, and therefore the potential impact upon the settings of these features is assessed as being of "minor" significance.

The Broch 180 m south of Achies (Index Number 509) lies approximately 4.4km east of the nearest turbine. It lies in fields between the farms of Upper Achies (c. 250m south) and Achies (c. 200m west), which constitute its immediate setting. It is not considered that the presence of the turbines to the west will significantly affect this setting and the significance of the potential impact is considered "minor". The broch 800m to the east of Achies (Index number 2235) is similarly located in fields, but on the east side of a small north-flowing stream. It is approximately 4.9km east of the nearest turbine. A wireline representation of the turbine visibility is show on View point 3, figure 10.4b, which indicates that the tops of the turbines will be visible above the horizon. It is likely that intervening vegetation and structures at Achies, Strathcoul and Achingoul will further reduce the visibility, so that the impact of the two proposed turbines upon the setting of the broch is considered of "minor" significance.

The two cairns and hut circle north-west of Achnarras (Index numbers 2400, 2401 and 2402) lie approximately 4.7km from the nearest part of the site boundary but over 5.5km from the nearest turbine. They lie in fields on the northern slope of the Achanarras Hill as it falls away to the north. The may be related to the non-scheduled cairn to the south, upslope on Achanarras Hill. Their immediate setting and interrelationship will not be adversely affected by the proposed turbines, and at that distance it is considered that the two turbines will form a strong element in views to the west as part of the wider landscape. The visibility of the turbines is likely to be further reduced (as with Achies Broch, above) by the presence of

intervening vegetation and structures at Achies, Strathcoul and Achingoul. The impact upon the setting of this group of features is assesses as being "not "significant".

10.4.2.2 Listed Buildings

There are 5 Listed Buildings within 5km of the site boundary which lie within the Zone of Theoretical Visibility. All are Category B. In all cases both turbines will be visible in whole or part.

HBNUM 7793 Dale House, Westerdale, lies approximately 4.4km from the nearest of the proposed turbines. It is located on the eastern bank of the River Thurso, north of Westerdale. It setting is mainly determined y its relationship with River Thurso, which it is situated to overlook. It is a Nineteenth century house, and approached by a drive from the south-south-east. The turbines, where visible above the plantations at Olgrinbeg, will be relatively prominent to the left of the house to the north-west, as one approaches the house along its drive. Its entrance faces the drive, and it principal views face across the river to the west-south-west. A belt of conifers runs along the northern side of the building down to the river. The turbines will only be relatively prominent in views from along the river's edge, or the upper floors of the house, and only then in the right hand periphery of such views, if the viewer were looking west-south-west (the direction the house faces over the river).The Building is Category B and considered to be of "medium sensitivity", and the magnitude of the impact is considered to be "low", given the limited number of turbines, and primary orientation of the house, which affords only a limited view towards the site. The impact is therefore considered to be of "minor" significance only. A representative view point from Westerdale can be found as View Point 7, figure 6.26 of the Landscape and Visual Assessment.

HBNUM 7794 refers to two Listed features within the grounds of Dale House, the Dove Cote and Walled Garden. It is considered that the settings of these features relate directly to the house, and the general situation of the house alongside the River Thurso. Neither is considered to receive any significant affect upon their setting from the proposed turbines.

HBNUM 7805 is the Westerdale Bridge carrying the B870 over the River Thurso. Its setting is considered to be its relationship to the river, and to the buildings in Westerdale. The turbines would be relatively prominent in views to the north from the bridge, although they would not interfere with the view over the rapids and the old water mills along the river. The bridge is considered to be of "medium" sensitivity by virtue of its designation, but the impact is considered to be "low", given the limited number of turbines in the scheme. The significance of the impact is considered to be "minor".

HBNUM 7806 is the former Westerdale Church, a single storey building dating to the mid-Nineteenth century, situated on the south side of the B870, west of the River Thurso in Westerdale. The turbines, where visible will only be relatively prominent in views to the north-north-west approximately 4.5km km from the church, across the B870. The church is no longer in use. The Building is considered to be of "medium" sensitivity by virtue of its designation, but the impact is considered to be "low", given the limited number of turbines in the scheme. The significance of the impact is considered to be "minor".

10.4.2.3 Non-Scheduled Nationally Important Monuments

There are 32 non-scheduled monuments recorded on the Sites and Monuments Record and lying within the Zone of Theoretical Visibility that are considered potentially nationally Important (categories C and V). They are considered below, in groups if closely geographically related, and identified by their NMRS number. These monuments are of "high" sensitivity (on the basis that they are here treated as if they were Scheduled, in accordance with the guidance in NPPG5), and according to the matrix on table 10.3 would receive an impact upon their settings of "medium" magnitude, resulting in an effect of "high" significance. However, they are further assessed below in relation to their settings and associations, and a final statement of the significance of any impact upon setting is given

Shinnery cambered Cairn (ND05NE0017), Torr Phadruig Cairn (ND05NE0032), Blar A'Choire standing stone (ND05NE0019), Blar A'Choire hut circle (ND05NE0037), Ben Dorrery standing

stone (ND05SE0004) are part of a larger group of prehistoric monuments surviving on the north-eastern flanks of Ben Dorrery and Beinn Freiceadain (including a number of Scheduled Monuments as discussed above). The presence of the two turbines in views to the south-east is not considered to adversely affect the interrelationship of this group, nor their relationship to the Buaile Oscar fort above them, nor to the non-scheduled features further downslope to the north-east. ND05SE0004 lies closest to the turbines, at approximately 2.4km from the turbine 1. The turbines will be fully visible from this feature, but the shoulder of the hill and the increased distance will partly reduce the presence of the turbines in views from the other features. The impact upon their setting is considered to be of "minor" significance, in that the two turbines will not affect the relationship of the features to each other and their scheduled neighbours.

The Blar A'Choire round chambered cairn near Dorrery (ND05NE0020) and the Dorrery chambered cairn (ND05NE0021) are related to the group of monuments listed above. They are separated here as their immediate setting is lower on the hill slope, and closer to the settlement of Dorrery and the minor road that approaches it from the north. The proposed turbines are not considered to affect their relationship to the features further upslope to the south-west. Views from the features towards the turbines will include Dorrery. In reflection of this, the potential impact upon the setting of these features is considered to be of "minor" significance.

The hut circle near Dorrery Lodge (ND05NE0022) lies in a field near to Dorrey, and close to the eastern side of the minor road which approach the settlement from the north. The turbines are not considered to adversely affect this setting of the feature, which has only a limited above ground presence, nor its relationship to the possible related features upslope to the south-west. The significance of the impact of the turbines on the setting of this feature is considered to be "minor".

The Crochan hut circle (ND05NE0026) and Torr Nan Dearcag homestead (ND05NE0025), sitiuated to the north-east of Dorrery, demonstrate that the remains of former settlement can be found on lower ground, and that the exploitation of the area has followed similar patterns for lengthy periods of time. They lie some 2.2km north of the nearest turbine, and north of the railway. The setting of these features is the field within which they lie and their relstionship to each other, and to the two adjacent cairns to north and south (ND05NE0031 Torr Na Cubhaige cairn and ND05NE0023 Cnoc Scoot Cairn), as well as to the group of monuments to the south-west on the flanks of Beinn Freiceadain and Ben Dorrery. Although the turbines will be prominently visible in views to the south, they do not directly affect these relationships, nor prevent an understanding of the forms of settlement in the area. The impact upon the setting of these four features is therefore considered to be of "minor" significance.

The Sithean Harraig cairn (ND05NE0030) lies very close to the eastern side of the B870, north of Scotscalder Station, and approximately 2.4km north of the two turbines. The setting of the monument is here considered to be defined by the modern road, it have no related monuments in near procimity. The turbines will be visible in views to the south, but only above intervening structures, such as at Scotscalder, and the plantation to the north of the site, at Bannerman's Well. There are no long views towards the monument in which the turbines would block the feature. The impact on the setting of this feature is therefore considered to be "minor".

The chapel and graveyard site at Achardale (ND15NW0011) lies in a bend on the southern side of the River Thurso, north of the modern farming settlement at Achardale. The site lies approximately 3.2km to the north-east of the nearest of the two turbines. The turbines would be visible in views from the site to the south-west, but only above the plantations at Scotscalder and Bannerman's Well. The setting of the monument is closely related to its position within the river valley and its proximity to Achardale, and this is not considered to receive any significant affect from the proposed turbines.

The cist near Houstry Mains (ND15NW0030) lies adjacent to field boundaries, close to the east of the B874 and north-west of Houstry. At 5.7km approximately from the nearest of the turbines, which would be visible only above intervening plantation and settlement, the

features is not considered to receive any significant effect upon its setting. The same assessment applies to the cairn on the Moss of Halkirk, which is recorded in close proximity (ND15N0008).

The Cairn at the north end of Achanarras Hill (ND15NW0022) is related to the three scheduled features (Index numbers 2400 2401 and 2402) discussed above. As with those features, this cairn is not considered to receive any significant impact upon its setting, due to distance from the two proposed turbines and intervening cover.

The three hut circles at Benachie Farm (ND15NW0020, three records, huts A – C) lie on the north-west part of Achanarras Hill. They are related to the other features discussed above on the shoulder of the hill. The setting includes the plantation to the immediate west. This will serve to screen the turbines in part, along with intervening settlement and plantation closer to the proposed turbines. The setting of these features is not considered to receive any significant impact.

The hut circle and cairn south of Dale Farm (ND15SW0009 and ND15SW0026) are located adjacent to the Achlachan Burn. The area is shown as under plantation, and is located some 4.7km from the nearest of the two proposed turbines. The immediate setting of the features next to the Burn will not receive any significant impact, and surrounding plantation will prevent any significant impact upon it. Should the area be opened up by felling, more distant screening is afforded by the plantation at Olgrinmore and Olgrinbeg, and intervening settlements at Appat and Appat Hill.

The four features on Achlibster Hill consist of the Carn Liath hut circle (ND15SW0025), the Achlibster Hill Cairn (ND15SW0028), the Achlibster Hill hut circle (ND15SW0029) and the burnt mound (ND15SW0030) lie within plantation to the south of Braehour, and the nearest feature is approximately 1.9km south of the turbines. The turbines may be visible in breaks in the plantations, but they are not considered to have any significant upon the setting of these features.

The two mills at Westerdale (ND15SW0034 and 35) lie adjacent to the River Thurso to the North of Westerdale Village. There setting is defined at their riverside location, and relation to the village and bridge to the south, and to Dale House to the north-east. Although the turbines may be visible in views to the north-east from the mill, they will be partially screened by the intervening plantation at Olgribeg, and the settlements at Appat and Appat Hill. It is considered that the two proposed turbines will not have any significant effect upon the setting and the interrelationship of the mills to each other, the river and to Westerdale.

The small Pullyhour henge (ND15SW0003) site lies approximately 2.4km east of the nearest turbine. The turbines would be visible above Appat Hill and the plantation on the site, in views from the henge to the west. This feature consists of the low earthwork remains of a bank and ditch surrounding a circular area. The site is in open fields on the eastern side of the River Thurso. Excavations in 2008 suggest a secondary phase with placement of upright element possibly forming a deliberate alignment with a distant feature. The limited above ground presence of the henge means that it is not visible in any long views. The turbines do not affect visibility between the henge site at Buaile Oscar and th sites on the slopes of Ben Dorrery, nor do they intrude in views from the henge site to the nearest cairn to the south (Leosag, ND15SW0004). The impact upon the setting of the cairn of the turbines is considered to be "minor" at worst. The same assessment applies to the Leosag cairn to its south, in that the turbines will be visible over Appat hill to the west, but will not affect any intentional relationship with the henge site to the cairn's north.

The broch at Achingoul (ND15SW0001) lies in farmland to the east of Achingoul farm. The land slopes down to the north-east, towards the River Thurso. Although the broch is approximately 550m from the nearest part of the site boundary, the nearest turbine is 1.3km from it. The two turbines may be visible above Achingoul in view to the west, but they will not affect the broch's setting facing east and north east above the Thurso. The turbines may be visible as part of wider views north and south towards the broch, along the river, but will not directly block any views to the feature. The significance of the potential impact upon the setting is considered "minor" at worst.

ND05SE0002 is a record for standing stones on Appat Hill. The given coordinates put this feature adjacent to B870, on its western side. The location is approximately 800m to the east of the nearest turbine. The field boundary on the western side of the road is wire and post, with limited coarse hedging, and remnants of a bank beneath, with limited survival of the distinctive slabstone boundary. There is no clear sign that standing stones have been incorporated into this boundary, and there is no sign that the stones remain within the adjacent field. The field has been comprehensively clared and improved in the past (to the extent that the half of the Appat cairn along the northern boundary with the Olgrinmore site has been destroyed to the south of the modern fence. It is likely that the stones have been destroyed or removed as part of this clearance and improvement. No impact is therefore anticipated from the proposed turbines.

10.5 Mitigation

No recorded features within the site will be directly affected by the construction of the development. The Annat Hill cairn will be fenced off to prevent any accidental encroachment during construction. A record will be made of its condition.

Although neither of the farmsteads is directly threatened, it is proposed that a detailed, photographic record be made of the structures as they currently survive.

The central boundary feature, if it is threatened by the proposed access track, should be subject to a brief recording exercise, including limited excavation to record its profile and construction.

It is proposed that an archaeological core-sampling programme be carried out, in advance of construction, on the Moss within the development footprint, to enable the recovery of potentially archaeologically important environmental samples, as part of a mitigation strategy of preservation by record.

A watching brief will be carried out during construction, where significant groundworks are expected.

The extent and scope of the proposed archaeological recording programme will be agreed with the Highland Council Archaeologist in advance of construction, and implemented in response to an appropriate planning condition.

10.6 Residual Effects

No residual direct effects are anticipated upon cultural heritage features, subject to the implementation of an appropriate programme of archaeological recording.

There will be changes in the settings of some cultural heritage features (as noted in section 10.5.2 above). These are temporary (lasting for the life-time of the development, that is the 25 years for which consent is sought), and fully reversible upon decommissioning.

10.7 Summary of Effects

Table 10.5 Summary of Effects

Potential Effect	Mitigation	Residual Effect
Construction Effects		
Potential to damage unknown (buried) archaeological remains	Watching brief (and subsequent excavation/recording if required)	None (preservation by record)
Potential to damage unknown environmental evidence for past climate and economy	Programme of core –sampling	None (preservation by record)
Operational Effects		
There will be an indirect (Visual) effect of "minor" significance upon the settings of 3 listed Buildings, 15 Scheduled Monuments and 16 Non-scheduled but nationally important monuments within5km of the site boundary.	None	Temporary and reversible effects of "minor" significance upon settings (considered significant for purposes of the EIA regulations).
Decommissioning Effects		
Restoration of existing condition in terms of visual settings (all other factors remaining unchanged)	None	Restoration of existing setting.

10.8 Statement of Significance

No significant direct effects are anticipated upon archaeological features within the site, although some mitigation is proposed to ensure that the potential for buried remains to be encountered is addressed, and that other features within the site boundary are protected from accidental encroachment during construction.

Three effects of minor significance are anticipated upon the settings of Listed Buildings, all within Westerdale. The appraisal has identified potential impacts upon the settings of 15 Scheduled Ancient Monuments, but these are considered "minor". Similarly there are potential impacts upon the settings of 16 non-scheduled but nationally important features, but these are assessed as being of "minor" significance.

Any potential impacts upon settings are considered temporary, lasting only for the consent life of the turbines, and fully reversible upon decommissioning. It is not that impacts of "minor" significance would not be considered significant in respect of the EIA regulations.

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Key

- Proposed Turbine Locations
- Anemometer
- Indicative Control Building Location
- Indicative Track Layout
- Study Area
- Construction Compound
- Crane Hardstanding

Cultural Heritage Features

- Farmstead
- Appat Hill Cairn

1:5,000 Scale @ A3

0 125 250 m

N

Archaeological Sites within Site

Figure 10.1

Olgrinmore Wind Turbines Environmental Appraisal

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Key

- Proposed Turbine Locations
- Study Area
- 5km Archaeological Study Area
- NMRS
- Scheduled Ancient Monuments

1:40,000 Scale @ A3

0 1 2 km

N

Archaeological Sites within 5km of Site
Figure 10.2

Olgrinmore Wind Turbines Environmental Appraisal

Southern Farmstead
(309664mE 954436mN)

Northern Farmstead
(309508mE 9954650mN)

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Photographs of On-Site Farmsteads
Figure 10.3

Olgrinmore Wind Turbines Environmental Appraisal