

Lewis Wind Farm: Non-Technical Summary of the Environmental Statement

This Non-Technical Summary forms Volume 2 of the seven volumes of information submitted by Lewis Wind Power Limited in support of its planning submission for permission to build a major wind farm in the north of the Isle of Lewis.

The submission comprises the following documentation:

- Volume 1 Summary of Key Points document (*not part of the Environmental Statement*)
- Volume 2 Non-Technical Summary of the Environmental Statement
- Volume 3 Environmental Statement
- Volume 4 Environmental Statement Figures
- Volume 5 Landscape and Visual Graphics
- Volume 6 Appendices
- Volume 7 Technical Report

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OBTAINING COPIES OF THE PLANNING SUBMISSION

A copy of the planning submission is available on the www.lewiswind.com web site or may be obtained on a data CD by sending a cheque for £5.00, made payable to AMEC Wind Energy, to the Hexham address. Three hundred free copies of the data CD will be available on Lewis.

A copy of this Non-Technical Summary may be obtained free-of-charge by writing to AMEC Wind Energy at the Hexham address.

WHERE TO VIEW THE PLANNING SUBMISSION

The complete submission may be viewed at the following locations during normal office hours:

Comhairle nan Eilean Siar
Council Offices
Sandwick Road
Stornoway
Isle of Lewis
HS1 2BW

Stornoway Library
19 Cromwell Street
Stornoway
Isle of Lewis
HS1 2DA

AMEC Wind Energy
Bridge End
Hexham
Northumberland
NE46 4NU

Further locations are being considered on the Isle of Lewis and will be advertised in the local press.

INTRODUCTION AND BACKGROUND INFORMATION

Aims of this Document

Lewis Wind Power Limited (LWP) is proposing to construct, operate and decommission a major wind farm on Lewis in the Western Isles, off the north west coast of Scotland. This document provides a summary of the Environmental Statement (ES) prepared by LWP and its consultants in accordance with the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000, in support of a planning submission for the proposal.

The ES presents the results of an Environmental Impact Assessment (EIA) undertaken by LWP, a process that identifies the environmental and socio-economic effects (both negative and positive) of the proposed wind farm. The purpose of the ES is to provide the Scottish Executive, Comhairle nan Eilean Siar (CnES) and its other consultees, with the information needed to determine whether consent should be granted for the proposal under Section 36 of the Electricity Act 1989. In doing so, it informs the local community of the facts and background of the proposal in order for them to make an appropriate response to CnES during consultation.

Report Structure

The Environmental Statement covers all the potential significant effects caused by the development proposals. The Environmental Statement contains the following chapters:

- Introduction
- The Site

- Background to the Proposal
- Planning Framework
- Legal Framework and Development Context
- Design Process
- Construction
- Alternatives
- Socio-economics and Tourism
- Hydrology, Geology and Hydrogeology
- Habitats
- Ornithology
- Landscape and Visual
- Archaeology and Cultural Heritage
- Fisheries
- Fauna
- Peatslide Risk
- Carbon Balance
- Noise and Shadow Flicker
- Safety, Health and Environment
- Aviation and Ministry of Defence
- Radio-Communications
- Traffic
- Environmental Benefits
- Mitigation and Monitoring



Photomontage of view near Bragar on A858 (E129000, N947581)

The Applicant

The applicant is Lewis Wind Power Limited (LWP), a company registered in Scotland (Company Number SC225262) and established specifically to develop the Lewis Wind Farm proposal. The shareholders in LWP are the AMEC plc subsidiary company, AMEC Project Investments Limited and the British Energy plc subsidiary company, British Energy Renewables Limited. The combined strengths and expertise of AMEC and British Energy Renewables have been brought together to develop the project.

AMEC plc is an international project management and services company, with headquarters in London. Its wind energy business, operating as part of AMEC Project Investments Limited, is one of the UK's leading wind energy developers with more than 10 years' experience in the conception, engineering, management, operation and maintenance of wind farms.

AMEC has a substantial track record in both onshore and offshore wind farm development. In addition, AMEC's UK construction business has recently begun construction work on the 95 MW Blacklaw Wind Farm in central Scotland, under contract to Scottish Power plc.

British Energy plc is Scotland's largest electricity generator, producing over 40% of Scotland's electricity and some 20% of the UK's electricity. British Energy owns and operates eight nuclear power stations in the UK (AGR and PWR designs) along with one coal-fired power station and has its headquarters in Scotland. Through the nuclear stations, British Energy is the UK's largest producer of low-carbon emission electricity. British Energy Renewables has a track record in onshore and offshore wind energy development.

The combination of AMEC and British Energy brings a wealth of experience relevant to the development, design, construction, operation, energy trading and decommissioning of a major wind farm development.

Background to the Proposal and its Objectives

AMEC and British Energy announced plans to explore the feasibility of a major wind farm on Lewis in December 2001. This followed investigations into the potential for the regeneration of the Arnish Point fabrication facility, which had closed in 1999. LWP has set the following objectives for the proposal:

- to deliver a commercially viable wind farm
- to provide justification for the investment in a large efficient grid inter-connector to the Western Isles with spare capacity for other renewable projects
- to make a major contribution to Scottish and UK renewable energy targets
- to make a major contribution to the economy of the Western Isles

These objectives are consistent with those of CnES and its Community Planning Partners.

The proposed Lewis Wind Farm is expected to generate 2,150GWh of electricity per year, equivalent to the domestic needs of over 495,000 households. It would contribute approximately 6% of the UK's 10.4% renewable energy target by 2010 and approximately 40% of the Scottish Executive's 18% target by that same year.



Photomontage of view from Bragar on A858 (E129000, N947581)

THE PROPOSAL

LWP is applying to the Scottish Executive under Section 36 of the Electricity Act 1989 to construct a wind farm with an installed capacity of 702 MW, and associated infrastructure. This consists of:

- 234 wind turbines, each with a foundation and crane hardstanding
- 167 km (104 miles) of access roads
- nine electrical substations
- a control building
- nine wind monitoring masts
- overhead lines and underground cable
- five rock source areas
- eight temporary compounds
- four concrete batching plants.

The proposed wind farm would be divided into nine groups, which would be built in sequence. The layout of the wind farm is shown in Figure 1.

The wind turbines proposed for this development, see Diagram 1, would be:

- 3 MW generation capacity
- horizontal axis, upwind
- three glass and/or carbon fibre reinforced blades
- 100 m (330 ft) diameter rotor
- 90 m (300 ft) high, conical steel tower
- 140 m (460 ft) tip height
- off-white in colour

Each wind turbine would require a buried, reinforced-concrete foundation, typically 22 m x 22 m, 1 - 2 m thick (72 ft x 72 ft, 3 - 6 ft thick), with a 2 m (6 ft) high column in the middle for the tower. Each foundation would have an adjacent prepared area, the hardstanding, for the installation cranes to use.

Roads, with a typical running width of 5 m (16 ft), would run between the wind turbine bases for a total of 167 km (104 miles) and be constructed from locally sourced rock.

The electricity produced by each group of wind turbines would feed through underground cables into a substation building, housing high voltage switchgear and large transformers. An architect's concept of a typical substation is shown in Diagram 2. A high voltage line running the length of the site would connect the nine substations. Ninety percent of this high voltage line would be carried on steel pylons, 27 m (88 ft) high, with the remainder of the link routed underground. A total of 210 pylons would be required to support the overhead sections of the 56

km (35 miles) route. The whole route could not be buried for technical reasons. A scale drawing of the wind turbine and transmission pylons proposed on Lewis is shown in Diagram 1.

There would be a control building located just off the Barvas Road north of Loch Roisnavat. An architect's concept for this building is shown in Diagram 3. To monitor the performance of the wind farm, each wind turbine group would have a 90 m (300 ft) wind monitoring mast.

Large quantities of rock would be required for the construction of roads, hardstandings and foundations. Five rock source areas have been identified within the wind farm site boundary. Using stone from within the site would reduce the associated construction traffic on public roads. Similarly, concrete for the foundations and buildings would be mixed at four locations in temporary batching plants to reduce traffic. There would be temporary compounds to act as construction bases.

The wind farm would have a life of 25 years, after which it would be decommissioned leaving only the roads visible. Alternatively, if a new planning submission were to be submitted and granted, the site could be used for a new wind farm.

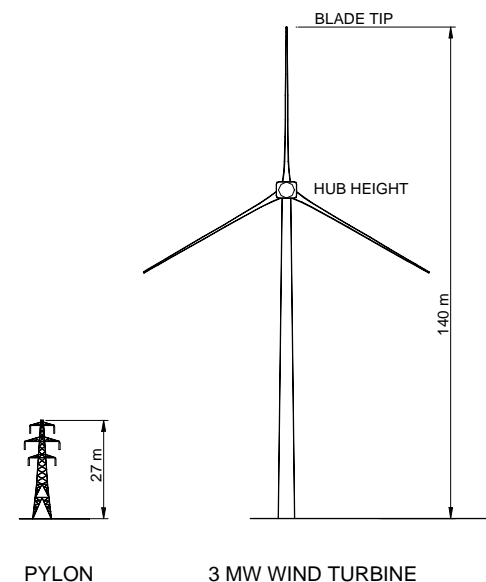


DIAGRAM 1. Scale drawing of proposed pylon and wind turbine

Planning Framework

The Lewis Wind Farm proposal is set within local, regional, national and European strategic and planning frameworks. The Scottish Executive released a National Planning Framework for Scotland in May 2004. Benefits to be gained through the delivery of renewable energy and wind projects were identified as playing a significant role in the Scottish economy – particularly in rural Scotland.

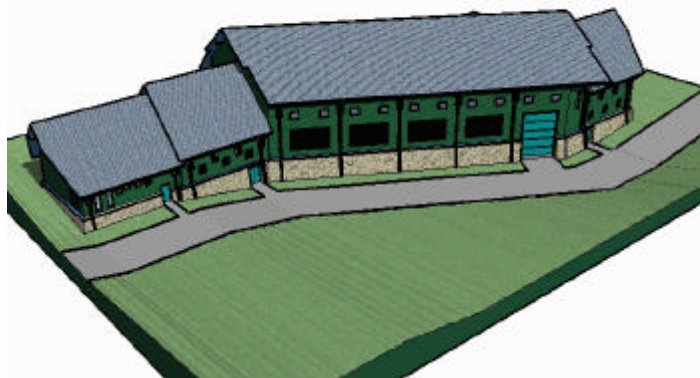
The proposed wind farm is strongly supported by local and national policies and targets to promote sustainable development in general, and renewable energy in particular. The proposal is fully compatible with the broad environmental and socio-economic ethos of the existing Western Isles Structure Plan.

Scoping the Environmental Impact Assessment

An environmental impact assessment can take several years to prepare because of the requirements to collect environmental information, especially on breeding and migrating birds. In order to ensure the relevant information was collected, a list of the surveys and the methods to be used to collect the data, a 'scoping' report, was produced. This was discussed with the Scottish Executive and their consultees, such as CnES, Scottish Natural Heritage and Historic Scotland, before work commenced.

The location of the wind farm proposal is within an area designated for its bird interest as a Special Protection Area (Natura 2000 site). This conservation status requires that the proposal be considered against the European Habitats and Birds Directives, which have been brought into UK law through the Habitats Regulations (1994).

Diagram 2. *Architect's concept of substation, courtesy of Anderson Associates.*



Consultation

Extensive consultation has been undertaken with the local community as part of the development process. These consultations have included presentations to community councils, area partnerships and other local groups, when LWP was requesting a 'scoping' opinion.

Following this consultation with community representatives, LWP held five public meetings and presentations in March/April 2003 outlining why the site was selected for development. LWP also presented details of the studies being undertaken and the general approach to wind farm development. These exhibitions were held in schools and community centres on the Stornoway Trust, Barvas and Galson Estates.

In November 2003 and March 2004, LWP held a further 14 public meetings and presentations. 'Drop-in' days were also held in Stornoway. As the final part of the consultation process in June and July 2004, LWP held eight public exhibitions in Stornoway, Bragar (two exhibitions), Ness, Airidhantuim, Tolsta, Barvas and Carloway.

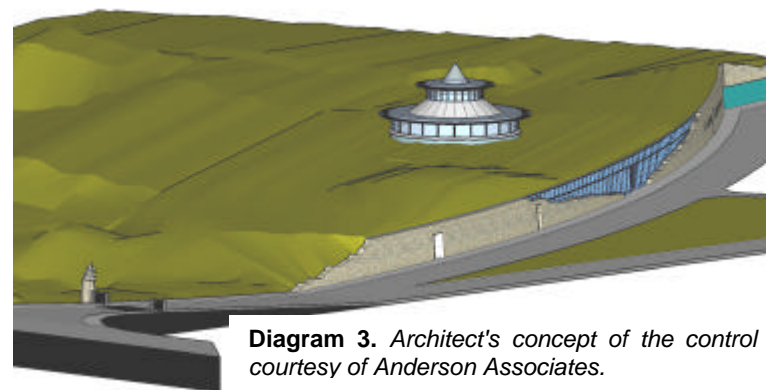


Diagram 3. *Architect's concept of the control building, courtesy of Anderson Associates.*

Design Process

The development of a commercial wind farm is a complicated process, which involves investigating various alternative layouts that attempt to meet the project's objectives while avoiding or minimising the impact on the local population and environment. The design of this proposal started in earnest when the survey information was available. Areas where wind turbines could be located were restricted by many factors. These are shown in Table 1

Table 1 *Factors determining the layout*

Economic	Technical	Environmental
Commercial Viability Wind resource availability	Wind turbine spacing Separation from public roads Connection to the grid Site access Potential Radio-communications interference Risk of triggering peat slides Slope of land Ministry of Defence facilities and operations Civilian air facilities and operations Maximum peat depth Buffer zone for other wind farms	Proximity to dwellings - noise Proximity to dwellings - shadow flicker Designated areas Ornithology Other fauna Sensitive habitats Hydrology and Fisheries Archaeology

The final layout has wind turbines at least 1,500 m (1,640 yards) from houses and avoids the internationally designated, candidate Special Area of Conservation (cSAC). Although 190 wind turbines are located in the Special Protection Area (SPA), the design is intended to minimise the impact on the SPA. Almost all environmental buffer zones are avoided completely.

Alternatives

Available alternative technologies and sites to deliver the Lewis Wind Farm's objectives have been assessed. LWP has concluded that the only available technology is onshore wind energy and that there are no alternative sites available for wind energy development that would deliver the proposal's objectives.



Photomontage of view from Gallows Hill, Stornoway (E141703, N932335)

Construction

In general, each of the wind turbine groups would be built sequentially. Rock from local quarries would be needed to build the initial access roads on the site. The on-site rock sources would provide most of the road stone and aggregate for the concrete to minimise road stone traffic on public roads. The wind turbine and electrical system components would be delivered on special vehicles, which would travel on the public roads for part of their journey. Deliveries would be timed to avoid peak traffic. The public roads that would be used are shown in Figure 2.

The construction would include the burying of cables, the erection of overhead lines, the building of nine indoor substations and a control building.

It is expected that the overall manufacturing and construction programme for the Lewis Wind Farm would be about four years, with physical construction being carried out over a three-year period. The programme for the construction works would be finalised following the approval of the new electrical grid inter-connector connection to the Western Isles.

Overhead Lines

The overhead lines associated with the proposal will be the subject of a separate submission under Section 37 of the Electricity Act 1989, which will follow this submission. Details of the overhead line are included in this submission for information only.

Safety

Safety is of utmost importance to LWP and all construction and operational works would be conducted under a Safety, Health and Environmental Management Policy. Public access would be restricted during the construction. Once operational, normal access rights would be restored.



Photomontage of view from Arnol on A858 (E131713, N948381)

SUMMARY OF FINDINGS OF THE ENVIRONMENTAL IMPACT ASSESSMENTS

The EIA process requires a number of surveys and studies to be undertaken. These studies have been carried out following consultation with the Scottish Executive, Comhairle nan Eilean Siar (CnES), Scottish Natural Heritage (SNH) and others.

LWP's interpretation of the main findings of the EIA is presented below. The main findings presented are those that have a substantial impact on the environment or economy of Lewis.

Socio-economics

The construction and operation phases of the Lewis Wind Farm are predicted to have a significant impact on the fragile economy of the Western Isles, particularly in terms of job creation. There are also predicted benefits to the wider Scottish economy.

Assuming construction and manufacturing activities were evenly spread over a four year period and significant elements of the manufacture and assembly of the towers and wind turbines are carried out locally, the proposed wind farm would provide full time employment for an estimated 333 people in the Western Isles for that period.

During its 25-year operational lifetime, the Lewis Wind Farm would create an estimated 346 new jobs in the Western Isles. Of these, 74 would be linked to the operation of the wind farm, including 33 direct wind farm employees and 41 supported by its supply chain. The remainder of the expected jobs would be created over time as a result of economic development activity funded by community payments made by LWP.

LWP would pay an annual rent of approximately £4 million per annum for the use of the land supporting the wind farm. It is expected that half of the rent would go to crofters directly affected by the development via their common grazings committees. A further 16% would go to the community-owned Stornoway Trust and 21% to the Galson Estate, which is the subject of a proposed community buy-out. Should the community buy-out of the Galson Estate proceed, 87% of the overall £4m per annum rental payments would go to crofters and the community.

In addition, LWP would make payments to the communities of the three estates (estimated to be £560,000 per annum) and to the Western Isles Development Trust (proposed to be £702,000 per annum). It has been assumed that a portion of these payments would be used to fund economic development activity.

Tourism

The latest tourism study for the Western Isles (by Macpherson Research) has been analysed as well as a number of tourism related studies carried out in Scotland and Europe.

It is likely that the development will have both positive and negative impacts upon the local tourism sector. In broad terms, it could be expected on balance that the development of the proposed wind farm would discourage some holidaymakers from visiting the Western Isles in the future. In contrast, the proposed wind farm would have a reduced effect on the segment 'Visiting Friends and Relatives'. The Business segment could actually grow. There is also the potential to counter some of the negative impact through the development of new facilities and additional promotional activity.

Habitats

The construction and operation of the proposed wind farm is predicted to result in the loss, disturbance and change to 788 hectares (1947 acres) of land, of this 577 hectares (1426 acres) are within the Lewis Peatlands Special Protected Area (SPA). The SPA is protected for its bird interest. This accounts for less than 1% of the total area of the SPA and is not considered significant in relation to the function of the SPA. No impacts are predicted for Lewis Peatlands candidate Special Area of Conservation (cSAC) or Loch Scarrasdale Site of Special Scientific Interest (SSSI). The roads and access tracks crossing the blanket bog and other habitats could cause a potential impact. These structures may act to restrict the movement of species from one area to another and potentially make them less viable. The layout has been designed around sensitive habitats, avoiding them wherever possible. To alleviate the remaining impacts significant schemes would be put in place to restore areas of plantation forests back to native blanket bog and restore areas of peatlands to better conditions.

Ornithology

This assessment draws largely on a precautionary approach due to the uncertainty surrounding the prediction of impacts. This precautionary approach predicts that the proposal has the potential to have effects on important bird species of the Lewis Peatlands SPA including dunlin, golden plover, greenshank, golden eagle and merlin. The Scottish Executive will make their own assessment of the impacts and the significance of effect on the Lewis Peatlands SPA.

The Lewis Wind Farm proposal includes measures to reduce the impacts of habitat loss and the displacement of upland waders. An example of this is through the restoration of former peat cuttings and felling of areas of recent coniferous planting.

LWP would be willing to consider enhancing habitats in the wider geographical area, should this be necessary.

Landscape Impacts

The impacts on the landscape would be significant; the landscape of northern Lewis with its flat plateaus and slightly undulating hills of blanket bog not being able to hide the wind turbines. The wind turbines would only be seen from the tops of the highest peaks in the South Lewis, Harris and North Uist National Scenic Area. The wind farm would be visible from the historic garden and designed landscape of Lews Castle, but only from high ground within the castle grounds.

Rivers

If the construction of a wind farm is not properly managed, there is the potential to pollute the rivers and streams of the area. Excavation could cause sediment to enter watercourses or change habitats, which could alter the response of the catchment to rainfall or cause peat to dry out. All construction operations would follow Best Practice and Scottish Environmental Protection Agency guidelines to protect the watercourses, therefore the risk of pollution would be low.

Peatslides

An independent expert has assessed the risk of peatslides occurring on the site. This assessment identified areas at risk and these were avoided in the design of the wind farm. As a precautionary measure, methods of construction would be followed that minimise the risk of peat slide.

Archaeology and Cultural Heritage

The development proposals have been assessed against the cultural heritage baseline, as far as this has been established. All known archaeology has been avoided where possible and would be fenced off during the construction period. Where it would not be possible to avoid an archaeological site, it would be excavated and recorded. If more archaeology were to be discovered during excavations for roads and wind turbine foundations, this would be investigated and recorded by an archaeologist.

Fisheries and Fauna

These studies are yet to be completed and will be submitted as an addendum to this Environmental Statement.

Carbon Balance for Construction Disturbance of Peat

The Lewis Wind Farm project is proposed to be constructed on peat. One of the main reasons wind farms are constructed is to offset the release of carbon emissions from fossil fuel production, as effectively the more energy is produced by wind, the less energy is needed to be produced by the burning of fossil fuels.

Peat in itself is a major carbon store; dead material is stored within it and doesn't break down. However, when peat is excavated it will start to break down releasing carbon stored within it. Therefore it is important that the Lewis Wind Farm would

compensate for these losses, to make it justifiable. Calculations show that it does, in just 4.6 months from the start of generation.

Noise, Shadow Flicker and Radio Communications

Calculations show that noise at the nearest properties would be within acceptable limits and not cause loss of amenity at dwellings closest to the wind farm. There are no shadow flicker effects predicted for any properties surrounding the proposed wind farm. No impacts are predicted for radio communications or microwave links. There may be interference with a TV broadcast link, however this would be addressed by LWP before construction starts.

Transport

There is predicted to be an increase in heavy goods vehicle traffic, although this would not be seen as significant in relation to the total number of vehicles using the roads each day. Internal site roads would be used to transport the bulk of the rock and materials; public roads would be used to take wind turbines and components to the site. Public roads would be used outside of peak traffic hours. Delivery drivers would be instructed to pull over intermittently to let traffic pass.

Aviation

The National Air Traffic Service is currently reviewing the layout with respect to their radar. LWP will continue a dialogue with the owners of Stornoway Airport to ensure aviation issues continue to be addressed properly. The Ministry of Defence and the Civil Aviation Authority have not indicated any problems with the proposal.

SUMMARY OF THE ENVIRONMENTAL IMPACT ASSESSMENT REPORTS

This section provides a more detailed review of the full reports from the Environmental Statement. The terminology used is more complex therefore a brief explanation of some of the terms is provided below:

Methodology – The processes followed to undertake the assessment.

Baseline – This term is used to describe the site as it is now, that is before the development. This needs to be described so that the potential impacts can be assessed.

Impact Assessment – This identifies and assesses the significance of the impacts on each environmental or socio-economic factor caused by the proposal over its lifetime. This includes the impacts caused by construction, operation and decommissioning.

Cumulative assessment - This section looks at other proposed developments and combines these effects with the effects of this proposal. This could potentially alter the impact to being more significant. For example, if an area is already being affected substantially by another development, an additional impact caused by this development may not be acceptable.

Mitigation – This term is used to describe measures that can be taken to reduce negative effects.

Residual Effects – This describes impacts that remain after the mitigation procedures are taken into account.

SOCIO-ECONOMICS**Introduction**

The socio-economic assessment considers the range of economic, social and community impacts and effects that are anticipated to arise as a consequence of the proposed wind farm.

Methodology

This analysis examined the characteristics, performance and prospects of the Western Isles Economy and looked in detail at how the proposed development would impact upon the economy. Data was collected from a wide range of research reports and on-line databases. Consultation also took place with policy makers, partners, agencies, business leaders and other wind farm operators.

Baseline

The Western Isles has a weak economy. The Isle of Lewis is one of the United Kingdom's, indeed Europe's, poorest regions. The declining population and small employment base are reliable indicators of the economy. The traditional sectors such as sea fishing, Harris Tweed, merchant shipping and agriculture have been in long-term decline. The initially successful development of the offshore fabrication facility at Arnish Point (Lewis Offshore) has declined. The forecasts for the future performance of the Western Isles economy are fairly bleak. Population is forecast to shrink by 17% between 2002 and 2018, which will be accompanied by substantial falls in employment and wealth generation.

Impact Assessment*Construction*

The £411 million construction programme would generate an estimated £120 million in additional output in the Western Isles economy. This figure reflects the expectation that significant elements of the manufacture and assembly of the towers and wind turbines would occur within Scotland and in particular within the Western Isles.

This level of manufacturing and construction activity would clearly have a large employment impact. It is expected that if the construction and manufacturing activity were to be spread evenly over a four-year period, they would provide employment to 333 people working locally at any one time on the manufacture and construction of the proposed wind farm. Around two thirds of these jobs would be created in the manufacturing and construction sectors in the Western Isles, whilst the remainder would arise broadly across the local economy (including in particular those sectors which would directly service the construction activity, for example hospitality and catering).

Operation

During its 25-year lifetime, it is expected that the Lewis Wind Farm would create approximately 346 new jobs in the Western Isles. Of these, 74 would be linked to the operation of the wind farm, including 33 direct wind farm employees and 41 supported by its supply chain. The remainder of the expected jobs would be created over time as a result of economic development activity funded by payments made by LWP to the communities of the three estates leasing land to LWP for the wind farm (estimated to be a total £560,000 per annum) and to the Western Isles Development Trust (proposed to be £702,000 per annum).

LWP would pay an annual rent of approximately £4 million per annum for the use of the land supporting the wind farm. It is anticipated that the distribution of this rent would be as follows: 50% paid to the shareholders of relevant common grazings on the three estates; 16% paid to the community owned Stornoway Trust; 21% paid to the Galson Estate (which is the subject of a proposed community buy-out) and 13% to the Barvas Estate. Should the Galson Estate buy-out proceed, 87% of the total overall rent of £4m would be received by crofters and community trusts.

Wider economic, social and community effects

Infrastructure and transport:

The Lewis Wind Farm would make an important contribution to the justification of the electricity inter-connector (a new electricity link from the UK mainland to the Western Isles), an investment that would be vital to both this project and the wider implementation of the renewable energy strategy for the Western Isles.

Sections of roads would be improved or upgraded, improving road surfaces and safety for the local residents. Access tracks that would be created to the wind turbines could be opened up to walkers and cyclists, improving accessibility to parts of Lewis (this potential benefit would be linked in with the habitat management plan).

People:

The likely implication of the increase in demand for labour on the scale envisaged would be that the forecast decline in the population would be halted to some degree as a consequence of residents being encouraged to remain on the Western Isles.

Housing:

The economic activity associated with the construction of the wind farm may lead to additional demand for housing. This could be met through rental properties, bed & breakfasts, hotels and the existing supply of houses. This could stimulate the housing market and have a range of both positive and negative effects, from increasing the wealth of existing homeowners to reducing the affordability of

property for local residents. There would also be the potential impact of loss of amenity to those houses situated close to the wind farm. The nearest dwelling would be 1,500 m (1,600 yd) from the nearest wind turbine. A review of the relevant research that has examined the relationship between wind farms and house prices provides little robust evidence that any relationship exists.

Business Development:

The proposed wind farm has the potential to stimulate the development of the supply chain for the wind farm sector both within Scotland and the Western Isles. There would be significant opportunities for some aspects of manufacture and assembly to take place within the Western Isles, in particular tower fabrication, blade manufacture and wind turbine assembly. The considerable level of investment that has been made by Western Isles Enterprise and their partners at Arnish Point would improve the prospects for achieving this.

Rural Development:

The wind farm would provide an important source of additional income to vulnerable crofting communities. The income would enable re-investment and facilitate diversification, which is important in sustaining this traditional way of life.

In addition, the establishment of Community Funds would provide a valuable resource for economic and community activity. On balance the wind farm, though positive for rural communities, might trigger the negative effect of job migration from crofting to wind farm related activity or encourage early retirement, as a result of the additional income provided by the wind farm.

Cumulative Impacts

This development is part of an ambitious strategy, which is being promoted by Comhairle nan Eilean Siar and Western Isles Enterprise to develop the renewables sector within the Western Isles. A study commissioned by Highlands and Islands Enterprise highlighted the considerable economic benefits that could be gained in the long term through the proactive encouragement of the renewables sector within the Western Isles.

Mitigation

To enhance the positive benefits and reduce the negative ones, the following can be applied:

- Where possible, employment opportunities would be opened up to people from the local area through the use of local employment initiatives.
- Try to ensure that the expenditure can be spent locally through the provision of services and suppliers.
- Maximise the use of local people in the construction and operational phases, in so far as this would be possible or appropriate.
- Ensure construction traffic uses set routes to and from site and does not disturb, so far as is possible, residential, business or tourist areas.

Residual Impacts

The construction and operation of the proposed wind farm has the potential to generate significant levels of additional output, which in turn would create or support considerable numbers of jobs in the local economy.

There would be the potential, after mitigation, that the development would affect the local area. The main areas where these could occur are:

- The potential for detrimental impact upon parts of the tourism sector; and
- The potential implications for local services as a consequence of the difficulties in anticipating and responding to changes in demand relating to wind farm developments.

TOURISM**Introduction**

This study reviews the existing information regarding the link between wind farms and tourism with particular emphasis placed on existing tourism levels on Lewis.

Methodology

This study is based on secondary sources of information with a review of existing studies and investigations regarding the impact a wind farm can have on tourism levels. Existing visitor levels to Lewis are also analysed along with the value of tourism to the Western Isles using existing studies carried out for the Western Isles Tourist Board (WITB).

Baseline

In the latest review of tourism figures, produced in 2003 by Macpherson Research, the sector was estimated to be worth £39.3 million to the Western Isles in 2002, a significant proportion of the local economy. Approximately 70% of the 179,700 people visiting the Western Isles in 2002 went for holiday purposes or to visit friends or relatives and approximately 27% visited the islands for business purposes. The volume and value of tourism have both grown in the period from 1999 to 2002, by 8.8% and 19.7% respectively. Tourism supports an estimated 1080 full time equivalent jobs in the Western Isles economy, with hotels and accommodation accounting for 58% of those jobs and restaurants and cafes accounting for 30%. Employment has grown broadly in line with the volume and value of the sector. Tourism jobs represent about 15% of all jobs in the Western Isles. The Isle of Lewis possesses the largest accommodation capacity of all the islands in the Western Isles, with the vast majority of this situated in Stornoway. The majority of tourists enter the Western Isles at Stornoway, which is the main air port and seaport in the Western Isles. Nearly 9 in every 10 tourists go sightseeing whilst visiting the Western Isles. Other popular activities include visiting beaches and the seashore, museums and visitor centres and historic sites. The most popular attractions are Callanish Stones, Carloway Broch and Lady Lever Park/Lewis Castle. Visitors appreciate the Western Isles for a wide range of reasons, the most common being the outdoor environment, especially the scenery, landscape, atmosphere, coast, nature and weather.

Impact Assessment and Mitigation

This assessment has been undertaken following the review of evidence presented in market research studies in Scotland (one of which was, in part, conducted in Stornoway) that have investigated public perceptions of wind farms. This has been combined with experiences from elsewhere in the UK and overseas to explore the potential impact on the behaviour of visitors to the Western Isles. The proposal would cause a fundamental change to the landscape character of northern Lewis, reducing the sense of isolation and remoteness and causing a perceptual change from an undeveloped to a developed landscape. The effects on the landscape and

visual amenity, however, although significant, would not necessarily be unacceptable and would be reversible.

The assessment predicts that the proposed Lewis Wind Farm would have a significant but small-scale direct negative effect through discouraging some tourists from visiting Lewis. On the other hand, with appropriate investment in related facilities, the proposed wind farm is predicted to have the potential to attract visitors. Wider impacts, for example on accommodation and transport during the construction period, have also been considered.

Mitigation

Proposed mitigation measures include:

- Developing facilities that would be attractions to visitors and which would help to inform visitors of the need for renewable energy in general and for this specific development. These could include an information centre at the wind farm, a viewing platform and guided tours.
- Working with the local authority in developing related tourism infrastructure and facilities. This would include interpretation points and way marked routes in the vicinity of the turbines.
- Working with the Western Isles' tourism agencies with responsibility for promoting tourism within the Western Isles.

Residual Impacts

It is likely that the development would have both positive and negative impacts upon the local tourism sector. However, it is difficult to predict the precise nature and scale of impacts, not least due to the lack of similar comparators in Scotland or elsewhere (in terms of the scale of development and the nature of the location). Broadly speaking, it could be expected that the development of the proposed wind farm would, on balance, discourage some holidaymakers from visiting the Western Isles in the future. In contrast, the Visiting Friends and Relatives segment would be less affected by the proposed wind farm and the Business segment could actually grow. There is also the potential to counter the negative impact through the development of new facilities and additional promotional activity.

HABITATS

Introduction

This chapter assesses the potential effects of the proposed Lewis Wind Farm on the habitats and flora (the plant species within the habitats) of the wind farm and surrounding ground. It then explains the ways in which ecology may be affected by the development and assesses the likely effects of the scheme. Direct, indirect and cumulative effects are considered. Proposals for mitigation of the impacts are also included.

Methodology

An assessment is made of the effects of the Lewis Wind Farm development upon the habitats and plant species which occupy the wind farm area.

Prior to assessment a detailed survey of habitats was made in 2002 and 2003, mapping the different types present and noting locations for species considered rare or scarce. The baseline survey covered almost 25,000 hectares (61,800 acres). It was undertaken by a group of professional ecological surveyors, supervised by an ecologist with experience of wind farm construction on blanket bog in Scotland.

Baseline Study

The baseline survey confirmed that the habitat survey area is largely dominated by blanket bog which, including water bodies, makes up approximately 90% of the ground. Despite the large area of survey, a relatively small number of vegetation types were recorded. This result is to be expected for blanket bog conditions, which are 'species-poor' environments. They support plants specifically adapted to very wet, acidic and often waterlogged conditions.

A major finding of the habitat survey was the extent and degree of peat erosion present. Gullies dissect the peatland environment for large areas and result in a lowering of the water table of the blanket bog. This dries out the bog surface, which is then colonised by dry blanket bog habitats. These dry types dominate the area forming about 60% of the survey area and results show that wet surface conditions occupy only 18% of surveyed ground. Pristine blanket bog (very wet and not eroded) is uncommon and only occupies 5.8% of the habitat survey area.

The mapping results were interpreted to isolate sensitive habitats (lochs, lochans, watercourses and very wet areas of peatland). Prevention and reduction measures employed at the design stage would reduce impacts on these sensitive ecological habitats (mainly active blanket bog and standing water habitats) by at least 50%.

Impact Assessment

An assessment of the likely effects of the wind farm was undertaken. This looked at the likely impacts of the development in the construction, operation and decommissioning stages. Several elements of the local ecology, which might be affected by the development were identified. These included

- the following geographical areas
 - Lewis Peatlands candidate Special Area of Conservation (cSAC)
 - Lewis Peatlands Special Protection Area (SPA)
 - Loch Scarrasdale Valley Bog Site of Special Scientific Interest (SSSI)
- unprotected ground in the development area
- nine habitats (including Active and Non-active Blanket Bog and seven other types listed under the EC Habitats Directive)
- scarce plant species.

A worst case scenario was analysed, where wind farm infrastructure is assumed to destroy or grossly alter the character of an area up to 50 m (55 yd) beyond road centrelines, rock source areas, wind turbine bases, substations, wind monitoring masts, temporary compounds, batching plants and the control building. Under this scenario, no impacts were predicted for the Lewis Peatlands cSAC or Loch Scarrasdale SSSI. A significant impact is predicted for the Lewis Peatland's SPA with 2.44% of the SPA (1,441 hectares, 3,561 acres) directly lost. The area of permanent loss would be too small to represent a threat to the ecological integrity of the remaining SPA area; therefore there would be no long-term harm to SPA habitats, given the very large area remaining.

More realistic estimates of potential impacts were also analysed. These are estimated based on knowledge of peatland hydrology, experience of road construction, peat cutting effects and the impacts of wind farm construction elsewhere on blanket peat. Realistic levels of habitat loss, disturbance and change for all construction phases total 788 hectares (1,947 acres). Of this, 577 hectares (1,425 acres) is within the SPA, representing less than one percent of the SPA's total area. Of the 788 hectares, there would be approximately 248 hectares (613 acres) of habitat loss, with a further 180 hectares (445 acres) affected by habitat disturbance but recovering over a predicted 5 – 15 year period.

Before considering mitigation, realistic impacts (habitat loss and habitat disturbance) on the SPA and also outside the SPA have been judged as significant. Indirect effects due to habitat change and blockage or severance of wildlife corridors have been judged as not significant.

Cumulative Impacts

Cumulative impacts were assessed including other potential wind farm developments at Pentland Road and Arnish Moor, together with other land use factors affecting northern Lewis. At present it seems possible to mitigate for most

wind farm habitat impacts, in part because forest plantations and abandoned peat cuttings could be used to re-create forms of blanket bog and heath.

The overall conclusion of cumulative impact is that the three proposed wind farms would, with mitigation, have no long-term effect on the extent of blanket bog and other semi-natural habitats. Cumulative impacts on habitat interests are therefore not significant.

Mitigation

Two major sets of proposals are made for habitat restoration and creation, to offset habitat loss and habitat disturbance:

A peatland management scheme would be used to handle excess peat produced by the development. The drier fibrous peat would be placed in 500 hectares (1240 acres) of abandoned peat cuttings. The wet semi-liquid excess peat material would be tipped into the floors of some rock source areas and small valleys of low ecological interest. The peat surface here would be left to vegetate. This storage technique is already used as a management technique on Lewis and there are other examples, elsewhere in the UK, where large peatland restoration schemes are currently being implemented based on previous success in this field of work.

A proposal to remove tree cover from conifer plantations within and outside the Lewis Peatlands SPA has been proposed by LWP. These areas would be managed to restore a blanket bog and wet heath vegetation cover. This approach has already been adopted for parts of the Flow Country in Caithness and Sutherland.

Residual Impacts

Mitigation measures proposed are sufficient to remove all the main significant effects of the development on habitats. The only significant residual impact remaining after mitigation would be the effect of habitat fragmentation. This effect would be an indirect impact, which is hard to quantify, but would be very unlikely to threaten the ecological integrity of SPA habitats, even in combination with the worst-case scenario.

ORNITHOLOGY

Introduction

LWP commissioned an independent study to provide information on the ornithological interests of the proposed wind farm area. The birds observed on and around the proposed site are described. There is an assessment of the likely impact on these birds by the proposal. As part of the development of the wind farm, LWP has consulted with Scottish Natural Heritage (SNH) and the Royal Society for the Protection of Birds (RSPB).

Methodology

Field surveys were undertaken during 2002, 2003 and 2004 in a core survey area, in which the proposed wind farm would be located, and in a 3 km (2 miles) radius buffer zone around this core area. The survey methods used were based on standard techniques and included surveys for upland bird species, vantage point surveys for raptors and bird flight activity. Site walkover surveys were made in the winter, and some more focused surveys, which provided information about diver behaviour and activity, were also undertaken.

The surveys recorded a range of breeding and wintering bird species including:

- species protected under Schedule 1 of the Wildlife and Countryside Act, 1981 and amendments and listed on Annex I of the EC Birds Directive (79/409/EEC), for example divers, raptors, upland waders and terns;
- species present in nationally important numbers, including greylag goose (native Scottish population) and arctic skua;
- migratory species including small numbers of whooper swan and, in the surrounding area, corncrake; and
- red list species of conservation concern including skylark, song thrush, starling and twite.

Baseline

The wind farm lies predominantly within the Lewis Peatlands SPA and Ramsar Site, which in total covers an area of approximately 60,000 hectares (150,000 acres) of the island and comprises largely blanket bog, at the north west of its range, with areas of open water. These habitats support a diverse assemblage of breeding birds of international importance.

The conservation objectives for the Lewis Peatlands SPA are:

“to avoid deterioration of the habitats of the qualifying species (red-throated diver, black-throated diver, golden eagle, merlin, golden plover, dunlin, greenshank); and significant disturbance to these species; to ensure that the site’s contribution to the favoured conservation status of these species is maintained.”

The preliminary findings of these surveys were used to identify primary bird areas. These were used in the design of the wind farm, including the transmission lines, to help reduce the impacts on many of the important breeding species on and around the site including divers, golden eagle, merlin, peregrine, greylag goose, skuas, terns and greenshank. The widespread distribution of dunlin and golden plover meant that constraints areas for these species could not be drawn up.

Impact Assessment

Where the predicted significance of impacts is uncertain, a precautionary approach has been employed in the assessment. As part of this, mathematical models have been used to predict the likely interaction between particular bird species and wind turbines, with assumptions made, including the probability of birds avoiding the wind turbines when flying past them.

LWP undertook to avoid areas constrained by bird activity. However the assessment using a precautionary approach in some cases, shows the potential for the proposal to have effects on qualifying interest bird species of the Lewis Peatlands SPA. These include dunlin, golden plover, greenshank, golden eagle and merlin.

The key predicted residual impacts on the basis of current information centre on, the displacement and potential loss of a number of greylag geese and golden eagles and merlin. In the case of the latter, there appears to be alternative nesting and foraging habitat in the surrounding areas.

The species with the greatest number of birds likely to experience displacement effects are golden plover, dunlin and greenshank. Partial mitigation is proposed through habitat restoration measures for these.

There is the potential for the seven species for which the SPA was designated to collide with the wind turbines. Although uncertain, this may under certain scenarios also be the case for corncrake and whooper swans.

Cumulative Impact

Additional impacts over and above those from the Lewis Wind Farm proposal are not predicted when considering the Arnish Moor and Pentland Road Wind Farms.

Mitigation

The design development has been achieved through an iterative process and has taken into account constraints due to the presence of birds. In addition the following specific measures would be implemented:

- The extent of habitat loss would be kept to the minimum necessary for completion of the works. This would be aided by on-site micro siting of the wind turbines and associated infrastructure during construction.
- Wherever possible removal of habitat would be undertaken outside the breeding season, and construction work would be undertaken outside the main part of the breeding bird season (mid March to June/July).
- In areas where Schedule 1 or Annex I bird species are present, work would be avoided when it is likely to cause disturbance to the birds when nesting and rearing young.
- Best practice, site measures would be adopted to reduce the risks of incursion into adjacent habitats, which could result in impacts on birds during construction. Lighting, if required, would also be designed to minimise spill into the surrounding environment, where birds are nesting or roosting.
- Approximately 10% of the length of the transmission line would be underground rather than overhead to avoid the risk of collisions. The locations for these underground sections are in areas intensively used by red and black-throated divers.
- In areas where overhead lines are used, the design would incorporate measures to reduce the risk to birds species from collisions such as deflectors, and from electrocution such as suspended insulators or insulating caps.

Further mitigation measures would be implemented to help reduce the impacts of habitat loss and displacement of upland waders, for example:

- Areas of coniferous plantation on and around the wind farm site and within the SPA would be felled and managed to encourage restoration of habitat suitable for attracting upland bird species, especially waders.
- Restoration of abandoned peat cuttings on-site would be undertaken, using peat that would be excavated during construction. The restoration would create a mosaic of wet and dry peatland habitats, which would mimic the natural conditions favoured by dunlin and golden plover.

The removal of developing plantations in the surrounding area would also help restrict future perching opportunities for birds such as crows, which kill the chicks of ground nesting birds. To help draw golden plover away from the wind turbines, pastures used by this species for foraging could be enhanced and created along low lying areas in the eastern part of the island.

LWP is committed to further discussion and if necessary further refinement of the assessment to help remove some of the current uncertainties. A monitoring programme would also be agreed with the Scottish Executive and its nature conservation advisors to record effects on bird species of nature conservation importance from the construction and operation of the wind farm. Where the monitoring identifies impacts LWP would discuss the options for implementing further mitigation measures.

Residual Impacts

The design of the wind farm has taken into account the constraints within the primary bird areas identified from the findings of the surveys. This has reduced the impacts on many of the important breeding species on and around the site including divers, golden eagle, merlin, peregrine, greylag goose, skuas, terns and greenshank.

The remaining predicted residual impacts are caused by disturbance, construction works and from collision risk.

Where predicted residual impacts remain, LWP is willing to discuss opportunities to enhance habitats in the wider geographical area for bird species and populations affected.

Conclusions as to the impact on the integrity of the SPA will be drawn from the Appropriate Assessment process. The Scottish Executive will undertake this.

LANDSCAPE AND VISUAL

Introduction

The appearance and visual effect of the proposed Lewis Wind Farm on the surrounding area has been given detailed consideration in an independent landscape and visual assessment.

Methodology

The existing landscape and visual resource of the study area in terms of its character, quality and sensitivity were evaluated within a 50 km (30 miles) radius from the centre of the proposed Lewis Wind Farm.

Baseline

The topography of the chain of Islands that make up the Western Isles is governed by the underlying solid geology, which is almost entirely made up of Lewisian gneiss. One of the most marked contrasts is the difference between the relatively flat ground formations of the plateau of northern Lewis, and the massive mountainous ranges of South Lewis and Harris, which rise abruptly out of the expanses of blanket bog.

The proposed Lewis Wind Farm site is located predominantly within the Boggy Moorland landscape type, which covers extensive areas of undulating boggy peat moorlands and rounded lochs on the northern end of the Isle of Lewis. The application site is not located within a National Scenic Area (NSA) or a National Park. Outside of the application site, but within the study area boundary, are the South Lewis, Harris and North Uist National Scenic Area. There is one historic garden and designed landscape within the study area, Lews Castle in Stornoway, which is considered to be of high sensitivity to change associated with the proposed development.

Impact Assessment

The effect of the proposed wind farm on the landscape resource, character and perception of the Boggy Moorland landscape type is considered to be major, long term, but this can be reversed when the wind farm is decommissioned. The wind farm would give rise to significant changes in landscape character for the duration of the project.

The proposed wind farm would have effects on the perception of the landscape resource of the study area. This impact would be limited to where the wind turbines are directly visible. The mountainous areas of southern Lewis would have views from their distant elevated summits and ridges. Although the proposed wind farm is considered to have significant effects on the perception of the landscape resource from parts of the NSA, a considerable part of the landscape within the NSA has no visibility of the proposed wind farm.

There would be no views of the proposed wind farm from Lews Castle itself, where the view is oriented across the harbour. However on the high ground within the castle grounds there would be views of up to 160 wind turbines to the north.

A viewpoint assessment analysis was carried out to assess the impacts on the visual amenity at specific locations in the study area. Thirty-six viewpoints were identified in consultation with SNH. These locations include the main transport routes and tourist attractions. Major, long-term but reversible effects were assessed for 33 out of the 36 viewpoints, resulting in an overall significant impact.

Cumulative Impacts

Consultation with Scottish Natural Heritage has identified the Arnish Moor Wind Farm and the Pentland Road Wind Farm as having potential cumulative visibility with the proposed Lewis Wind Farm. It is considered that the cumulative landscape and visual effects of the addition of these schemes are relatively marginal and insignificant as other wind farms are likely to be enveloped by the much larger scale development proposed for northern Lewis.

Mitigation

The detailed layout design has ultimately been shaped primarily by the requirement to minimise potential environmental effects on birds and habitats. These place considerable constraints on the layout design. Given the size and number of wind turbines proposed, micro-siting wind turbines would have little effect on the mitigation of landscape and visual effects.

Nevertheless, the site has been placed well away from main settlements and has been chosen not only for its technical ability to support a wind farm, but also for a wind farm that would sit reasonably well within its host landscape type. The Western Isles Landscape Capacity Assessment (University of Newcastle/SNH 2004) identifies the landscape type within which the proposed wind farm is located, as being the least sensitive landscape character type in the Western Isles for wind farm development and as being of low-medium sensitivity.

Residual Impacts

It is clear from the landscape and visual assessment, that the proposed wind farm would have significant effects on the landscape and visual amenity of a large area of northern Lewis. However significant effects are not necessarily unacceptable and would be reversible.

The acceptability of the significant effects identified is linked with a number of wider issues including public attitudes to wind farm development amongst residents of Lewis, and the understanding of the reasons behind the proposed development.

HYDROLOGY, GEOLOGY AND HYDROGEOLOGY

Introduction

An assessment was carried out to determine the existing hydrological conditions at the site and the potential geological, hydrogeological and hydrological impacts of the proposed scheme. Mitigation measures to reduce or negate any adverse impacts were also identified.

The following key issues were considered in relation to the development:

- impacts on water quality and water supplies
- modifications to natural drainage patterns
- impacts on groundwater
- impacts on flow in natural watercourses
- disturbance to the hydrological characteristics of peat
- abstractions
- fisheries

Methodology

Site visits were carried out between Autumn 2003 and Spring 2004. These involved preliminary site walkovers, desktop studies, literature reviews and consultation. More targeted investigations were carried out to analyse peat slide risk and measure peat depth under road and wind turbine locations.

Baseline

Site investigations identified highly eroded peat over the majority of the proposed area, with depths ranging from 1 m to 5 m (3 ft to 16 ft), over a rockhead of Lewisian Gneiss. Throughout much of the proposed road network an intermediate zone of glacial till lies beneath the peat and on top of the Gneiss. This is likely to be up to 10-12 m in thickness.

Twenty-eight different river catchments were identified within the study area. These varied from reasonably large salmonid rivers through to single non-branched streams flowing directly into the sea. Monitoring and assessment of the characteristics of the study area indicated the characteristically 'flashy' hydrological response expected within peatland catchments in which rainfall is converted to runoff quickly due to the generally impermeable nature of the blanket peat. The measured pH was low, which is consistent with runoff from an acidic blanket peat bog.

Impact Assessment

The design layout for the wind turbines has been determined primarily by environmental factors, land ownership and proximity to dwellings. From a hydrological perspective the wind turbines have avoided the most ecologically pristine blanket bog habitats (Class 1 and 2) with access tracks minimizing

incursion into these wherever possible. A buffer of more than 50 m was placed around Class 1 Habitat.

Possible hydrological impacts from wind farm developments are related to three main factors: erosion and sediment transport, potential polluting events, and/or the potential to interrupt natural or historic surface water and groundwater flows.

Based on an understanding of the baseline environment and the construction activities expected for the wind farm development, the assessment indicates that, prior to mitigation and management, activities with a potential minor effect are related to pollution, obstruction to river flows, disturbance to other freshwater bodies and abstraction. These activities require further authorisation by SEPA and must meet set standards for pollution control, drainage and wastewater control and suitable procedures must be in place for dealing with incidents. These standards will generally be higher for 'Protected Areas' (e.g. areas designated under the Habitats Directive) than for other areas.

Activities, which have the potential for a moderate or high impact prior to mitigation and management, would mainly occur during the construction period, and are related to excavation and potential degradation of habitat (peat drying at exposed faces).

Cumulative Impacts

There are two other potential developments, the Arnish Moor Wind Farm and the Pentland Road Wind Farm. The impacts from these wind farms in terms of the hydrology, geology and hydrogeology are judged as insignificant due to the size of these developments (less than 10 wind turbines) compared to the proposed Lewis Wind Farm.

Mitigation

There are a variety of good practices and recognised measures to mitigate and eliminate all of the potential impacts providing appropriate provisions are made in the construction planning and methodology. These include effective management at the construction stage and monitoring of sensitive areas. Given the significance of the designated areas, measures which at least meet or exceed current SEPA Pollution Prevention Guidelines would be applied to the site.

The construction of the Lewis Wind Farm project would be phased. This would allow adaptation to site conditions, as well as permitting wind turbines and construction techniques to be updated in line with advancing technologies.

LWP would implement an Environmental Management System, which would be updated to continuously improve as the project progresses.

A monitoring plan and programme would be developed for each phase of construction, in consultation with SEPA. The periodic inspection of the riverbeds and banks would be undertaken during the operational phase of the works, and culverts would be modified if required to reduce flow rates and any possible negative effects. Streams and drains would be inspected to ensure that they are operating correctly and they would be cleaned of silt or vegetation if required.

The areas that have been identified as being potentially sensitive would be continuously surveyed and monitored.

Residual Impacts

Even with the above mitigation measures there would be some residual impacts associated with the construction of the proposed wind farm. These effects are:

Mobilisation of suspended solids, particularly clays: During construction, there is a risk of the mobilization of suspended solids, which may then enter watercourses or sensitive habitats. The impact of this depends on the sensitivity of the area it affects; low for less sensitive areas and high for highly sensitive ones such as blanket bog habitats and important watercourses for fisheries.

Drying of peat edges and disturbance to habitats: The impact magnitude of any effect due to drying of peat and disturbance to peripheral habitat would be *minor*, being confined to a small extent relative to the size of the SPA.

Dewatering Depending on conditions there is the potential for generating a peatslide risk. This is dealt with in the following section.

PEATSLIDE RISK

Introduction

Peatslides are defined as the downward and outward movement of masses of saturated peat. The term 'peatslides' is used for all events ranging from catastrophic and rapid downhill flows, to only minor slips on gentle slopes. Peatslides have been recently reported in the Pennines and in Ireland. In the case of the peatslide at Derrybrien in Ireland in 2003, ground movements were attributed to conditions caused by a nearby wind farm under construction. For this reason a risk assessment should be undertaken when constructing on peat.

Methodology

Field surveys, aerial photograph interpretations and desk studies were used to evaluate peatland stability within the project area. This involved the preparation of peatslide susceptibility maps based on: an extensive literature review, a review of relevant case histories, an understanding of the properties of peatslide formation, modelling and geomorphological mapping. The field studies were carried out in March 2004.

Baseline

Although the Western Isles has been stated to have the lowest densities of inland landsliding in the UK, Lewis is considered susceptible to peatslides due to the unusual configuration of the peat blanket overlying inclined, impervious rock.

The largest peatslide on record for Lewis occurred on or around 20th November 1959 on Morsgail Moor, some 30 km (19 miles) west-south-west of Stornoway. It is referred to as the Morsgail Peatslide and was a natural event that caused considerable damage. More recently, another peatslide to the west of Stornoway and within the wind farm site was reported by SNH. Moreover, small peatslides and ancient back scars are evident at several locations throughout the wind farm site. The ecological field survey in 2002 for this project found the only recognised example of a peatslide in the Habitat Survey Area, on steeper slopes south of Beinn Lite.

Risk Assessment

The construction of the wind farm could exacerbate natural processes and potentially cause new areas to become unstable or exacerbate areas of existing poor stability. If tracks are located across the natural slope of the land, they may make the peat above unstable, thus increasing the risk of a peatslide.

Thirty-six specific locations were identified in the area of the proposed wind farm as vulnerable to ground movements. Twenty-one of these are sufficiently removed from the development activities so that no action would be required. Fifteen sites could be protected to reduce risk either by immediate avoidance or further investigation to inform of actual risk. Four locations are recommended for preliminary ground investigations to improve understanding of the peat profile, slope performance and ground behaviour across the wind farm site.

Mitigation

The preliminary peatslide risk assessment was used to identify potential areas of risk. The design of the wind farm layout has taken these into account to avoid high-risk areas. The following mitigation and management would also be applied;

- No concentrated loads shall be placed on marginally stable ground;
- Concentrated water flow onto peat slopes and unstable excavations would be avoided, and;
- Recognised work practices, which minimise risks to existing stability, would be adopted.

Ongoing ground investigation work would continue with regular surveillance and/or monitoring, using specialist movement detection equipment, of site roads and other works.

LWP would develop contingency plans to deal with any potential or actual peatslide.

ARCHAEOLOGY AND CULTURAL HERITAGE

Introduction

This study considers the likely effects on archaeological and cultural heritage interests of the construction and operation of a proposed wind farm on the Galson, Barvas and Stornoway Trust Estates on the Isle of Lewis.

Methodology

A desk-based archaeological investigation was undertaken on the area of the proposed wind farm site. A reconnaissance field survey was undertaken within the proposed development area. This fieldwork was conducted to assess the presence/absence, character and condition of the sites, monuments and landscape features identified by the desk-based assessment; to assess the topography and geomorphology of the proposed development area; and to identify any further features of cultural heritage interest not detected from the desk studies.

Baseline

Five-hundred and fifty-five sites of cultural heritage significance have been identified within the assessment area. Ninety Scheduled Ancient Monuments (one of which is additionally designated as a Category A Listed Building) are present within the 50 km zone. One site within the proposed development area is of National Importance, this is the Island of Dun in Loch Shiabhat.

Five shielings at Cuiashader, within the proposed development area, are of Regional Importance and are considered Category B Listed Buildings.

Impact Assessment

The predicted effects of the proposed wind farm on the cultural heritage resource within the Survey Area are summarised below:

- Direct effects are predicted at 10 sites, of these three are of moderate significance (two marker cairns and a shieling would be removed during quarrying operations), the rest are of imperceptible or slight significance.
- Indirect effects, in terms of affecting the character of the landscape, are assessed to be a significant effect, but are temporary and reversible lasting only for the lifetime of the project.

Cumulative Impacts

There are no cumulative impacts.

Mitigation

A range of mitigation measures is proposed to avoid, reduce or offset the adverse direct effects predicted, where practical and appropriate. This includes fencing of sensitive areas and excavation of archaeological finds. A programme of archaeological works in advance of and during the construction programme would

be proposed to offset the predicted adverse affects by recording any archeological features that would be disturbed by the construction of the wind farm.

Residual Impacts

The development proposals have been assessed against the cultural heritage baseline, as far as this has been established. Fifteen indirect impacts are judged to be significant in terms of the Environmental Impact Assessment (Scotland) Regulations 2002. It would not be possible to mitigate these effects without substantial design changes to the proposed wind farm.

The possibility that additional, buried and unrecorded remains of archaeological significance survive across the proposed development area is thought to be high, but the density of any such remains is unknown.

FISHERIES

A study of fisheries interest was undertaken between July and September 2004. The results of the fisheries studies will be submitted as an Addendum to The Environmental Statement in January 2005. The Scottish Executive can make no planning decision until the results of all relevant studies have been received and re-advertised for public consultation under Regulations 13 and 14 of the Electricity Works (Environmental Impact Assessment) Regulations 2000.

FAUNA

A study of the fauna interests was undertaken in summer 2004 and the results of the fauna studies will be submitted as an Addendum to The Environmental Statement in the last quarter of 2004. No planning decision can be made by the Scottish Executive until the results of all relevant studies have been received and re-advertised for public consultation under regulations 13 and 14 of the Electricity Works (Environmental Impact Assessment) Regulations 2000.

CARBON SAVINGS

Introduction

The electricity generated by the Lewis Wind Farm would be likely to displace that produced by fossil-fuel (non-renewable) generation and hence would contribute to national targets for reductions in carbon emissions to the atmosphere. The aim of this study is to assess the effects of the wind farm on the processes of carbon capture by blanket bog and the scale of losses from the carbon store which is present in the blanket peat. These effects are then compared with the carbon emission savings arising from the development.

Methodology

The approach followed here to assess the impact of the Lewis Wind Farm on the carbon balance of blanket bog in the development area is that used by SNH to judge the effects of wind farm developments on blanket bog and forest land cover.

Baseline

Much of the Lewis Wind Farm development would be located on blanket bog habitat, which is itself a major store of carbon. Much of the peatland is occupied by eroded peatland and only a small extent has intact, very wet conditions where carbon fixing is likely to be optimal and where net peat accumulation rates will be highest.

Impact Assessment

Carbon Savings

Due to Carbon Emission reduction:

The Lewis Wind Farm would have a generating capacity of 702 MW, and would create the opportunity to displace 518,000 tonnes of carbon per year of coal-fired generation or 286,000 tonnes of carbon per year for the current mix of generation technologies in the UK.

Carbon Losses

Due to loss of carbon fixing potential:

The total loss of carbon-fixing potential in the wind farm site resulting from the loss of vegetation/peat, amounts to 476 tonnes of carbon per year, before mitigation.

Due to loss of carbon stored in peat:

The carbon content of all peat that could possibly be disturbed is estimated to be 2,200,000 tonnes of carbon, assuming an average peat depth of 2.1 m (83 inch) and an average carbon content of 55 kg in one cubic metre of fresh peat.

In the worst-case, but highly unlikely, scenario (all peat that may be disturbed would be destroyed), carbon emission savings would require 7.7 years of generation to compensate for carbon losses. A more realistic scenario, assuming likely construction disturbance, would require 4.6 months of generation to compensate for carbon losses.

Carbon Balance

In summary, the carbon emissions savings from the proposed wind farm are very large. When compared to potential loss or damage to the present carbon-fixing potential of the vegetated surface and the carbon stored in the existing peat, the level of carbon emissions savings from the wind farm justifies the potential loss or damage to the present carbon store.

The losses to peat-fixing potential and carbon stored in peat are likely to be much lower than the above estimates. This is because the character of the northern Lewis peatlands suggests that much of the blanket bog is not active (not acting as a sink for carbon) and this could, overall, be emitting more carbon to the atmosphere than is being fixed.

Cumulative Impacts

Two further wind farms are proposed in the vicinity of The Lewis Wind Farm, with six wind turbines in a development at Pentland Road and three at Arnish Moor. The effects of the much larger LWP wind farm would dominate.

Mitigation

Initial design avoided placing site roads, wind turbine locations and compounds on the wettest blanket bog, which is probably still absorbing carbon. Indeed, compounds were placed, where possible, in areas of old peat cutting where much of the peat carbon store has already been removed. A floating road design would be used where possible, reducing the total amount of peat to be excavated. Excess peat would be placed in old peat cuttings and rock source areas under a live peat turf vegetation cover to prevent degradation.

Residual Impacts

Assuming that all mitigation proposals are successful, all excess peat would be used to form other habitats and would remain as a peat store.

NOISE**Introduction**

Noise predictions were carried out to evaluate the likely perception of noise levels to local residents and those working in the vicinity. Wind turbines do produce noise, albeit at a low level. The impacts of noise during the construction of the wind farm were also assessed.

Methodology

The noise impact predictions were calculated using guidance in reports and in Planning Advice Note 50 on noise during construction.

Baseline

The proposal would be sited in a quiet rural area, where the background level is less than 35 decibels on the 'A' weighted scale, most closely tuned to human hearing, when the wind is low and when human activity is not generating vehicle noise.

Impact Assessment

Noise levels from the wind turbines at the surrounding dwellings are predicted to be 35 decibels, or less, on the 'A' weighted scale, at the assessment wind speed. This is within acceptable levels and should not cause loss of amenity at the nearest dwellings. Construction noise would also be within recommended limits.

Cumulative Impacts

There are no cumulative impacts predicted.

Mitigation

No additional mitigation would be required.

Residual Impacts

There would be no residual impacts, as amenity at the nearest dwellings would be protected.

SHADOW FLICKER**Introduction**

Shadow flicker is a phenomenon that occurs in a particular combination of conditions including geographical position, time of year and time of day. It happens when the sun is low in the sky and shines on a building from behind a wind turbine rotor. This can cause the shadow of the wind turbine blades to be cast onto the building, which appears to flick on and off as the wind turbine rotates. When this flicking shadow is viewed through a narrow opening it is known as shadow flicker.

Methodology

Calculations of the extent of this effect were carried out using the geometry of the wind turbine and the latitude of the site.

Shadow flicker has rarely been a problem in connection with a wind farm and thus there are no guidelines available on what exposure would be acceptable. There is no standard for the assessment of shadow flicker. In Germany, the rule of thumb is that less than 30 hours a year is acceptable.

Impact Assessment

There are no dwellings where shadow flicker caused by the wind farm should be a problem, based on the available assessment criteria.

Cumulative Impacts

No cumulative impact assessment was necessary.

Mitigation

No mitigation would be required.

Residual Impacts

There are no residual impacts.

RADIO COMMUNICATIONS

Introduction

Wind turbines can interfere with television transmission and microwave links. Consultation with key groups was carried out, including TV channel companies, telephone communication companies and the Emergency Services.

Design Mitigation

Avoiding areas around transmission mast locations limited interference.

Impact Assessment

No interference with microwave links would be expected. It is likely that a television re-broadcast link would be affected by the proposed development. The developer would resolve this by providing an alternative link. Any remaining interference with TV reception due to the wind farm would be addressed by LWP. No interference with emergency channels is expected.

TRAFFIC

Introduction

The transportation impacts related to the proposed Lewis Wind Farm were assessed.

Methodology

The volume of the wind farm traffic each month was estimated at five locations on the public road network where the potential impact was thought to be greatest.

Baseline

The roads, in principle, can take standard European 40 tonne vehicles, however the actual capacity of the roads is not clear. Traffic counts show that weekday traffic on the A857 totals 6,200 vehicles and weekday traffic on the A858 nearly 400 vehicles. A significant increase in volume of this traffic (non wind farm related) is not expected.

Impact Assessment

The main transportation impacts would be associated with the movements of commercial heavy goods vehicles to and from the site during the construction phase of the development. The predicted flows all show a significant increase in heavy goods vehicle traffic. The increase in overall traffic would not be significant - less than 20%. Construction traffic would be managed carefully especially in relation to the timing of vehicle movements to avoid peak times, keeping disturbance to a minimum. The highest traffic flows would be in the middle section of the Barvas road. However, the A859 through the West of Stornoway and the Marybank Estate would have a noticeable increase in traffic, as the current flows are low.

Cumulative Assessment

No cumulative assessment was required, because the other wind farms should be built before this proposal.

Mitigation

The construction plan would be to use the site roads to move most of the rock from on site sources and concrete from on site batching plants, which comprised most of the loads. Public roads would be used for moving the wind turbines components, as these loads are long, heavy and cumbersome, but of relatively low number.

Other mitigation measures include the following:

- Site entrance roads would be well maintained and monitored and road cleaners would be available.
- The delivery vehicles would move at set times each week when traffic would be low and so that members of the public would know when they are likely to encounter them. The delivery vehicles would pull in at intervals to allow passing.
- A traffic management system would be implemented to cover all wind farm movements.

Residual Impacts

Once the wind farm becomes operational, it is envisaged that the amount of traffic associated with the scheme would be minimal. Regular visits would be made to the site for maintenance and fault investigation. The vehicle used for these visits would be likely to be a light van or similar and there would be occasional heavy goods vehicle deliveries to the main building.

AVIATION AND MINISTRY OF DEFENCE

Introduction

During the development of the wind farm, civil and military air traffic routes in and around the proposed site were investigated.

Civil Aviation

LWP met with representatives from the Civil Aviation Authority, Highlands and Islands Airports Limited and the National Air Traffic Services (NATS) several times throughout the development of the wind farm layout to discuss the wind farm proposal. The ongoing discussions have enabled LWP to develop the wind farm layout without compromising the safeguarding of the airport.

NATS are reviewing the layout with respect to their radar and will identify any impacts on their equipment.

Ministry of Defence

There are no issues with the Lewis Wind Farm affecting Ministry of Defence.

SAFETY, HEALTH AND ENVIRONMENT

Introduction

Safety is of prime importance to LWP and the company and its shareholders are totally committed to protecting both people and the environment.

Safety, Health and Environmental Management Policy

The wind farm would have a policy to cover both the construction and operational phases in accordance with recognised standards. This would set out how the site would be controlled and operated to ensure the health and safety of the public and the workforce are paramount and that any impact on the environment in and around it would be minimised. All work would be planned in advance and risk assessments carried out. The SHE policy would require investigation of incidents and near-incidents, and active auditing and inspection to ensure that work would be carried out in accordance with the SHE policy.

Construction Safety

The project would fully comply with the Construction (Design and Management) Regulations 1994. A full safety plan would be produced governing all aspects of the work.

Public Safety

Safety of the public and staff is of paramount importance to the developers. During construction and major maintenance, access to areas around the wind turbines would be restricted to the public. The wind farm owners would not seek to restrict

people or animals from the area of the wind turbines on health and safety or security grounds during normal operation.

MONITORING PROGRAMME

A monitoring programme is to be set out and agreed between the Scottish Executive its consultees and LWP. LWP have at this stage put forward a range of monitoring proposals principally covering the issues of hydrology, birds and habitats.

Additional to a monitoring programme, would be the development of a Construction Management Plan, which once more would be finalised in consultation with all relevant parties.

LWP is committed to the implementation of these measures as its continued policy of delivering best practice.

SUMMARY

The Environmental Statement presents LWP's assessment of the impacts of the Lewis Wind Farm proposal based on detailed baseline information using methodologies agreed during a formal scoping process. This has included consultations with a number of statutory and non-statutory bodies. As a reminder, the purpose of the Environmental Statement is to provide the Scottish Executive, CnES and its other consultees, with the information needed to determine whether consent should be granted under Section 36 of the Electricity Act 1989. In doing so, the local community is informed of the facts and background of the proposal in order to make appropriate response to CnES during consultation.



Photomontage of view from Galson on A857 (E144544, N958633)

