

# Proposed Western Isles Connection

## **Environmental Appraisal Non-Technical Summary**

**October 2008**

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# Non-Technical Summary

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## 1. Introduction

- 1.1.1.1 Scottish Hydro Electric Transmission Limited (SHETL) are seeking to construct a new electricity transmission connection between the Isle of Lewis and the main transmission system at Beaully Substation, Inverness-shire.
- 1.1.1.2 It includes the construction / installation and operation of two High Voltage Direct Current (HVDC) cable circuits that involve underground cable sections between the landing site at Grabhair and the proposed converter station, and between Dundonnell at the head of Little Loch Broom and the proposed converter station at Beaully. The connection also includes subsea cables between Grabhair, on Loch Odhairn and Dundonnell, on Little Loch Broom; the construction / installation and operation of the proposed converter stations at Grabhair and Beaully; and the maintenance aspects of the proposed development.
- 1.1.1.3 An Environmental Appraisal (EA) has been prepared which has set out the detail of the need for the project and its characteristics. The EA has considered effects on the land-based environment, encompassing the soils and geology, hydrology and hydrogeology, ecology and nature conservation, forestry, agriculture and sporting land use, landscape character and visual impacts, cultural heritage and archaeology, access and recreation, construction traffic and transport, effects on other infrastructure, other physical effects (including noise), carbon budget and planning and committed development. Cumulative effects on the environment and on the people of the area have also been considered.
- 1.1.1.4 Effects on the marine environment have considered the potential for effects on designated areas; on marine mammals; fishing and aquaculture; on marine benthology; on the ecology of the intertidal area and on the marine ornithology of the area between Loch Odhairn and Little Loch Broom.
- 1.1.1.5 Assessments have been undertaken in accordance with best practice and approved methodologies and this information is set out at the outset of each technical chapter of the EA. Consultations with relevant statutory organisations and others are detailed. Supporting information is included in the Appendices to the EA with plans and figures illustrating the findings of the assessment, also provided.
- 1.1.1.6 This document is the Non-Technical Summary (NTS) of that EA.

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## 2. The Project and Project Characteristics

### 2.1.1 Project need

2.1.1.1 The project is required in order to enable renewable energy generation projects located on the Isle of Lewis to connect to the GB electricity system. This is in accordance with the wider UK Government objectives to provide increasing proportions of its energy use from renewable sources.

2.1.1.2 The existing subsea connection between Lewis and the Scottish mainland is of an insufficient capacity to accommodate the anticipated levels of electricity to be generated on Lewis and requires to be reinforced. This is in line with the wider requirement for reinforcement of the electricity transmission network within Scotland due to the growth of renewable energy schemes.

### 2.1.2 Project characteristics

2.1.2.1 The proposed project includes the construction / installation and operation of two HVDC modules, each consisting of:

- a converter building at Grabhair, Isle of Lewis;
- an underground cable circuit from the Grabhair converter station, connecting to a subsea cable circuit between Grabhair and Little Loch Broom and then connecting to an underground cable circuit from Dundonnell, Little Loch Broom to Beaully; and
- a converter building at Beaully, Inverness-shire.

2.1.2.2 Maintenance aspects of the proposed project are also addressed as part of the EA, though in respect of the proposed cable circuits, these would relate to the repair of any faults rather than any requirement for ongoing or regular maintenance operations.

2.1.2.3 The route of the proposed cable circuits covers a distance of approximately 1.5km on Lewis and 76km on the Scottish mainland. Installation of the proposed cable circuits within the land-based sections of the project would be through the use of a chain trencher, which would excavate the trench, lay the cables and backfill the trench as a continuous operation. In more constrained locations a traditional excavator would be used instead of the chain trencher. Ducts would be placed beneath roads and a railway line, and some watercourses, to permit the cables to pass beneath these features. Joint bays would be required to connect lengths of cable together; these would be located at approximately 800m intervals. Operations are expected to take approximately two years to complete.

2.1.2.4 The route of the subsea cables is approximately 80km in length. These would be laid using cable lay vessels; and then buried using a water-jetting technique. The

subsea cables would be laid during the summer months over a two year period, with one circuit laid each summer.

- 2.1.2.5 Converter stations would be built at the proposed locations at Grabhair on Lewis and at Wester Balblair, near Beauly; the works would take around eighteen months to complete in each case.

### **3. Geology and soils**

- 3.1.1.1 The assessment of effects on geology and soils has considered the construction, and operation of the proposed project. The baseline geology and soils position has been defined through identification of the broad geological characteristics of each route section, as well as generic areas with geotechnical and peat stability issues and areas of contaminated land along the line of the route. The sensitivity of the geology and soils, geotechnical stability and contaminated land has been determined with reference to the quality and sensitivity of the baseline features. Specific assessment has been undertaken for particular locations associated with geologically designated sites along the route, and for potential areas at risk of instability associated with peat slippage.

- 3.1.1.2 The potential impacts of the proposed project on geology and soils, geotechnical and slope stability and contaminated land were identified and mitigation measures developed to avoid, reduce or offset these effects. The residual impacts of the proposed project on these, following mitigation, were then assessed.

- 3.1.1.3 No significant residual impacts on geotechnical conditions or contaminated land have been predicted. One moderate adverse residual impact is predicted in respect of the loss of peat from the area of the proposed Grabhair converter station site.

### **4. Hydrology and Hydrogeology**

- 4.1.1.1 The assessment of effects on hydrology and hydrogeology has considered the construction and operation of the proposed project. The baseline hydrological and hydrogeological conditions have been assessed and described through an identification of the broad hydrological and hydrogeological characteristics of each section of the route, in addition to detailed survey work in areas where the proposed cables would cross significant watercourses. The sensitivity of each watercourse along with that of the associated aquatic ecology and fisheries interests was assessed in detail at each of these watercrossing points. Detailed hydrological data was obtained and analysed for the 10 key catchments that the proposed cables would pass through. Peat was surveyed for areas in which there was a risk of stability problems being encountered, whether through depth or gradient. Areas of potential groundwater sensitivity or abstraction from ground or surface waters were identified.

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- 4.1.1.2 This information was used to determine any potential impacts on the hydrology and hydrogeology of the area. Mitigation measures, including the method of crossing each watercourse, the route which the cable should follow, and a range of generic mitigation measures which should be employed during the project to avoid, minimise or offset these were identified. Any residual impacts which would remain after these mitigation measures had been considered were assessed.
- 4.1.1.3 Significant residual effects on the hydrology and hydrogeology of the area between Grabhair and Beauly are restricted to the loss of peat resource and the diversion of one watercourse at Grabhair, which would represent a moderate adverse residual effect. The mitigation measures proposed are considered suitable in mitigating other potentially significant impacts upon the identified water resources to below significant levels of impact.

## 5. Ecology and nature conservation

- 5.1.1.1 The assessment of effects on ecology and nature conservation has considered the construction and operation of the proposed project. The baseline ecology and nature conservation has been defined through identification of the broad ecological characteristics of each section of the route, in addition to detailed survey work within a 200m wide corridor along the proposed cable route. The sensitivity of habitats and species has been determined with reference to the quality and sensitivity of the baseline features. Specific assessment of plant communities using the NVC (National Vegetation Classification) categories has been undertaken for particular locations associated with ecologically designated sites along the route.
- 5.1.1.2 The potential impacts of the proposed project on ecology and nature conservation were identified and mitigation measures developed to avoid, reduce or offset these effects. The residual impacts of the proposed project, which would remain after these mitigation measures are implemented, were also identified.
- 5.1.1.3 Heat dissipation from the operational cables has the potential to cause local increases in soil/peat background temperature or associated drying effects. It is anticipated that such increases would be detectable at distances of up to several metres (less than 10m) and have potential to result in observable differences in vegetation biomass and species diversity. Some alteration to vegetation cover and species diversity may be unavoidable, and in uncultivated areas could become apparent relatively quickly. Cable construction and soil/habitat reinstatement procedures would be modified as appropriate to minimise the extent of residual habitat change in response to monitoring data from the test cable above the southern end of Loch Glascarnoch.
- 5.1.1.4 Significant residual adverse effects other than those relating to heat dissipation are the loss of an area of blanket bog at the location of the proposed converter

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station at Grabhair and losses associated with the removal of trees from specific locations within the route of the proposed cable circuits.

## 6. Agriculture and sporting interests

- 6.1.1.1 The assessment of effects on agricultural and sporting interests has considered the potential impacts of the proposed development on 44 agricultural and sporting land interests. Six of these have been considered on Lewis with the remaining 38 on the mainland between Little Loch Broom and Beaully.
- 6.1.1.2 Mitigation has been developed to limit the effects during construction and operation of the proposed underground circuits as far as is practically possible. However, there will be adverse residual effects on the land interests during the construction phase. These effects will be temporary and relate to disturbance to land, access, drainage and general operation of farming and sporting activity in the vicinity of the proposed works.
- 6.1.1.3 It is expected that the proposed underground circuits would pass through 73km of agricultural and sporting land and 146.70ha of land would be temporarily disturbed. 2.13ha of agricultural land would be permanently lost to the proposed Grabhair converter station.
- 6.1.1.4 During the operational phase, following implementation of the mitigation proposals, the residual effects on agricultural and sporting interests are considered to be negligible.

## 7. Forestry

- 7.1.1.1 The assessment of effects on forestry has considered the potential impacts of the proposed development on twelve areas of commercial forestry in addition to potential impacts on areas of native woodland.
- 7.1.1.2 Effects would relate to the permanent removal of land from production; the felling of productive crops; felling of non-productive woodland; potential for windblow; isolation of stands; restricted access; disruption of deer fencing; damage to forest roads; and potential reclaiming of grants.
- 7.1.1.3 Moderate adverse effects, pre-mitigation, would relate primarily to the isolation of stands, with some areas identified as having potential for windblow or for restrictions to road / track access. Three positive effects would occur due to the improvement of access. Such improvements are required in order to access the cable route, but will also be of direct benefit to the management and harvesting of woods in the future.
- 7.1.1.4 Following the implementation of the mitigation measures as proposed, the construction and operation of the cable route and converter station would not result in any significant residual effects on forestry.

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## 8. Landscape character

- 8.1.1.1 The assessment of effects of the proposed development on the landscape character of the areas of the proposed converter station and cable connection, on Lewis, and between Little Loch Broom and Beauly, has considered potential effects on the landscape character and the landscape resource, including consideration of effects on designated areas, on wild land search areas or areas with wild land qualities, on the landscape setting of cultural heritage features and on the landscape of tourism or recreation features of the area. Consideration has also been given to the potential for cumulative effects on landscape character.
- 8.1.1.2 The majority of significant adverse effects on landscape character relate to the construction phase of the proposed development, and as such would be short-term, temporary effects. In the majority of instances these would reduce to non-significant effects on completion of the construction operations and following the reinstatement of the groundcover vegetation (generally estimated as requiring two to three growing seasons in order to achieve good establishment of species). Exceptions to this would occur where there would be more substantial loss of existing tree and scrub vegetation, or of hedgerows, generally in the more southern part of the proposed development, south of Loch Achonachie. In addition the presence of the proposed converter stations at Grabhair and Beauly, would give rise to moderate adverse effects on landscape character, at least in the short- to medium-term.
- 8.1.1.3 Significant residual adverse effects on landscape character are limited to the following:
- in the Grabhair area, from the presence of the proposed converter station; and
  - medium term moderate adverse effects (including cumulative landscape effects) on landscape character in the area of the proposed Beauly converter station, whilst roadside and other planting becomes established.
- 8.1.1.4 The presence of the proposed converter station site at Grabhair would not give rise to significant cumulative effects on landscape character. Effects would be influenced more by the presence of wind turbines in the wider landscape. The presence of the proposed converter station site at Beauly would result in moderate adverse cumulative effects on landscape character during the period when new roadside and other planting in the area becomes established.
- 8.1.1.5 In overall terms it can be concluded that there would be very limited significant residual adverse effects on the landscape character of the area of the proposed Western Isles Connection. The main features of the development would be the proposed converter station sites; provided mitigation measures are implemented as proposed, there will be only very limited residual and significant adverse effects on landscape character

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## 9. Visual impact

- 9.1.1.1 An assessment of effects of the proposed development on the visual amenity of the areas of the proposed converter station and cable connection, on Lewis, and between Little Loch Broom and Beauly, has been undertaken. This has considered the extent to which the construction and operation of the proposed connection would adversely affect visual amenity, for residential properties, users of roads and rights of way (or other means of transportation) and users of formal and informal areas of recreation, where these exist in proximity to the proposed development. Cumulative effects on visual amenity have also been addressed.
- 9.1.1.2 The majority of significant adverse effects on visual amenity relate to construction effects, arising from the presence of plant and machinery and from the general disturbance anticipated to the surface vegetation and any loss of trees or scrub. On completion of the construction operations, such effects would be reduced, generally to non-significant levels of effect, particularly after the groundcover vegetation is re-established (generally estimated as requiring two to three growing seasons). In addition there would be some significant adverse visual effects arising from the presence of the proposed converter stations at Grabhair and Beauly.
- 9.1.1.3 Significant residual adverse effects on the visual amenity of the areas concerned are generally limited. These comprise:
- moderate adverse effects on users of the B8060 in the vicinity of the proposed Grabhair converter station site;
  - short-term, moderate adverse effects on users of the A832 from the presence of pipe bridge crossings adjacent to the road; in the medium to longer term, effects would reduce to minor adverse and negligible;
  - moderate adverse effects in the short- to medium-term for users of the informal path to the south-west of the proposed Beauly converter station site, until proposed planting areas are properly established; and
  - moderate adverse cumulative and transient visual effects on road users, within the section of the A831 passing the proposed converter station site, from the presence of the converter station buildings and the proposed Beauly Denny terminal tower. Over time and with the establishment of additional roadside planting (as part of the Beauly Denny project), such cumulative effects would be reduced to minor adverse.
- 9.1.1.4 There would also be minor beneficial residual effects from the provision of laybys in the Dundonnell River area.
- 9.1.1.5 In overall terms it can be concluded that there would be very limited significant residual adverse effects on the visual amenity of the area of the proposed Western Isles Connection. The main features of the development would be the proposed converter station sites; provided mitigation measures are implemented as

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proposed, there will be only very limited residual and significant adverse visual effects.

## 10. Cultural heritage and archaeology

- 10.1.1.1 The assessment of effects on the cultural heritage has considered the potential effects of the construction of the underground cables and their associated converter stations upon known cultural heritage features and unrecorded features that may potentially be present.
- 10.1.1.2 All construction impacts upon known cultural heritage features have been assessed as being of minor or negligible significance, following mitigation. Mitigation would comprise a programme of archaeological works, marking out important sites and micro-routeing and reinstatement, as detailed above.
- 10.1.1.3 In addition, the potential for effects upon the setting of cultural heritage features has been considered. Given that the corridor will be reinstated following construction, no potentially significant impacts have been identified. Consequently, no mitigation is proposed in relation to setting effects.
- 10.1.1.4 It is considered that, following the implementation of the mitigation measures as proposed, there would be no significant residual impacts relating to the operation and maintenance of the cable circuits on the cultural heritage resource of the area.

## 11. Access and recreation

- 11.1.1.1 The assessment of effects on access and recreation has considered the extent to which the construction of the proposed underground HVDC cable circuits, and their subsequent operation, would adversely affect this aspect of the area.
- 11.1.1.2 The potential for significant effects would arise solely from the construction of the underground cable circuits in areas where the route would cross over or otherwise affect features of high sensitivity. In the majority of instances these would be short-term effects and would be reduced to non-significant effects through the implementation of mitigation measures.
- 11.1.1.3 Locations where significant effects would remain, during construction, post-mitigation, are as follows:
- in the Corrie Hallie area of the Little Loch Broom to Dundonnell section of the route: moderate adverse effects (temporary effect); and
  - in respect of the effects on the parking area at Loch Droma in the Dirrie More area: moderate adverse effects (temporary effect).
- 11.1.1.4 Locations where significant effects would remain once construction operations are completed, post-mitigation, are as follows:

- in the Dundonnell River section of the route: moderate beneficial effects from the provision of additional laybys (permanent, post-construction).
- 11.1.1.5 All construction effects would be temporary, for the duration of the construction operations. The longest effects would be associated with the construction of the proposed converter stations, which would require an 18 month construction period. Permanent effects would be beneficial, from the provision of additional laybys in the Dundonnell area and from any improvements to parking areas resulting from their use as construction compounds.
- 11.1.1.6 In conclusion therefore it is considered that the potential adverse effects of the proposed Western Isles Connection, on the recreation and access aspects of the area affected by the project, will be limited. Mitigation measures have been developed in order to prevent, reduce or offset such adverse effects. In the longer term there will be benefits to the access and recreation use of the area, from the provision of additional laybys and improved areas for parking.

## 12. Construction traffic and transport

- 12.1.1.1 The assessment of construction traffic effects has considered the impacts of heavy goods vehicle movements over the proposed construction routes for the project. Through consultation with The Highland Council and the Comhairle nan Eilean Siar, as well as carrying out detailed surveys of each route, the main potential constraints that would lead to adverse impacts from construction traffic have been identified and the mitigation measures considered necessary to remove or reduce the effect of these constraints have been devised.
- 12.1.1.2 Residual effects of the construction traffic have been identified with the main source being temporary land and road closures required for works within or near the carriageway. Many of the route closures would take place for a period of a single day and where diversion routes are not available, access would be maintained through the use of temporary excavation covers. Periods of single lane operation on the trunk and principal routes will result in some delays to existing traffic, with the greatest duration occurring on the A832 through Dundonnell Gorge. It is considered unlikely that the levels of traffic on this route are such that temporary traffic control for a period of up to 9 weeks would constitute a significant level of disruption.
- 12.1.1.3 In many instances, improvement works to local tracks and the formation of additional passing places to accommodate the construction traffic would provide an overall residual benefit following the completion of the works.

## 13. Effects on other infrastructure

### 13.1.1 Effects on utilities' apparatus

13.1.1.1 The project construction effects would have the potential, in some areas, to interfere with the utilities' infrastructure, where this is located in proximity to, or across the route of the proposed underground cable circuits. These effects could be significant and adverse.

13.1.1.2 Provided that the necessary precautions are taken by those responsible for the installation of the project, it is considered that there would be few significant adverse impacts on the utilities' apparatus, from the construction of the proposed development. Such damage that may occur would be repaired rapidly.

13.1.1.3 There would be no significant residual effects on the infrastructure apparatus.

### 13.1.2 Effects on the railway line

13.1.2.1 The route of the proposed cable circuits crosses the Inverness – Dingwall – Stromeferry First Scotrail railway line to the south of Killin Farm. This proposed crossing point is in close proximity to a small watercourse and the A835, both of which also required to be crossed by the proposed cable circuits.

13.1.2.2 It is proposed that these crossings are achieved through the use of horizontal directional drilling. Ducts would be placed, passing beneath the railway, the watercourse and the road, to enable the underground cable circuits to be routed through this area.

13.1.2.3 Mitigation measures would be put in place to address any potential for adverse effects during the installation process. There are unlikely to be any adverse residual effects on the railway line.

## 14. Other physical effects

### 14.1.1 Electromagnetic fields

14.1.1.1 The EA has considered the potential for the land based sections of the proposed development to give rise to electromagnetic fields during the operation of the development.

14.1.1.2 All concerns, known to SHETL, regarding the health effects of electromagnetic fields relate to alternating fields associated with AC transmission. There are no identified concerns with HVDC transmission.

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- 14.1.1.3 The cables associated with the proposed development are placed close together and the current in each cable goes in opposite directions. The result is that the magnetic field levels from the cables never reach the magnitude of the earth's magnetic field. Typically, the magnetic field at a point at which the public can access will be a few percent of the earth's natural magnetic field.
- 14.1.1.4 The overall effect of the cable circuits is to vary the earth's natural magnetic field, within the normal range of variability. No concerns over health effects are envisaged.
- 14.1.1.5 The highest field strengths around the perimeter of the proposed converter stations would be those produced by the incoming overhead lines and underground cables. At Grabhair, these would be HVDC cables (as discussed above) and additional cables associated with the proposed wind farm developments (132kV AC underground cables). There is no electric field associated with the 132kV AC cables. The maximum magnetic field is predicted to be  $6\mu\text{T}$ , directly above the cable circuits. Under present guidance from the International Commission on Non-Ionising Radiation Protection, there is no requirement to investigate magnetic fields unless the levels exceed  $100\mu\text{T}$ . At Beauly, the only additional circuits entering the substation as a result of this development would be the proposed HVDC cables which are discussed above. As such, there would be no increases in the field strengths around Beauly Substation as a result of this project.
- 14.1.1.6 The predicted electric and magnetic fields resulting from the development do not present any known risk to health.

## **14.1.2 Noise**

- 14.1.2.1 Both construction noise and operational noise (from the proposed converter stations) have been considered as part of the EA.
- 14.1.2.2 Construction noise impacts would be short term, limited to the duration of operations in any one area. The majority of the development is not in close proximity to residential properties and will therefore not present a noise impact. Where construction approaches residential property, the contractor would liaise with residents, to explain the nature and duration of the planned construction works, and the measures employed to reduce any noise impact. If necessary, construction work would be limited to the less-sensitive periods of the day, e.g. after 0900 and before 1800, in order to minimise the noise impact. Mitigation measures have been developed to address potential adverse effects.
- 14.1.2.3 Operational noise impacts at the proposed Grabhair and Beauly converter stations have considered the potential for adverse effects at the closest noise sensitive receptors (residential properties) and have had regard for the rural nature of these

areas. A mitigation measure is proposed to address the potential for noise from the most significant noise source (the cooling fans).

14.1.2.4 Future tenders for the converter stations must provide a noise assessment which will confirm that they can meet the sound power levels specified, in order to meet the appropriate limits.

14.1.2.5 If the specified sound power levels are adhered to, there is no reason in terms of noise impacts that the proposed development should not be granted planning permission.

### **14.1.3 Air quality**

14.1.3.1 The EA has considered the potential for the proposed project to adversely affect air quality through the generation of dust during construction operations.

14.1.3.2 The potential for nuisance may be directly related to the number and proximity of residential areas to the site. For much of the route of the proposed cable circuits, there are no or very few properties located in close proximity to the construction corridor.

14.1.3.3 Mitigation measures would be developed to ensure that the risk from dust generation is minimised at source.

14.1.3.4 As such it can be concluded that the potential for the project to give rise to adverse impacts on air quality would be limited to those properties closest to, and downwind of the route of the proposed HVDC cable circuits. These would comprise properties in the Dundonnell strath, at Lochdrum, at Comrie, Muirton Mains, Black Dyke, Achnasoul, Auchmore, Corry of Ardnagrask, Altyre and Teanalonaig. Careful attention would be paid to construction operations in proximity to these properties in order that effects can be minimised.

14.1.3.5 Given the implementation of the mitigation measures as proposed, it is considered that the potential for significant adverse effects would be reduced to no greater than minor adverse.

### **14.1.4 Radio interference**

14.1.4.1 The EA has considered the potential for the proposed development to give rise to effects of radio frequency interference on the environment of the areas concerned; specifically in the vicinity of the converter stations proposed at Grabhair and Beaully. The underground and sub-sea cables are not considered to be sources of radio frequency interference.

14.1.4.2 Given the location of telecommunications equipment 350m from the proposed Grabhair converter station and 300m from the proposed Beaully converter station,

the specification for the converter stations would ensure that the limits within the applicable standards are met at a distance of 300m from the converter stations.

- 14.1.4.3 Measurements would be made following installation to confirm compliance and additional filters installed as required to ensure that the specification is met. By ensuring that all applicable interference standards are met at a reduced distance of 300m from the converter station, no significant residual effects are predicted with regards radio frequency interference.

## 15. Carbon budget

- 15.1.1.1 Carbon dioxide emissions have been calculated for the Western Isles Connection construction and trenching operations. It is estimated that approximately 23,000 tonnes of carbon dioxide would be released to atmosphere over a project period of 24-36 months, arising from transport and site plant emissions, displacement of peat and concrete batching for converter station development platforms.

- 15.1.1.2 Carbon sources such as plant emissions and concrete batching are necessary in providing the infrastructure to facilitate the proposed Connection, in support of the renewable energy and electricity generation network. Such activities would also be performed efficiently to assist in the control of carbon emissions.

- 15.1.1.3 Where possible, mitigation has been provided to reduce potential emissions of carbon. This would comprise sustainable management of displaced peat, summarised as follows:

- where peat resources would be extracted during trenching operations, peat would be placed back into the void previously created by trenching, as soon as practicable. The hydrology of the peat and surrounding peat bog would be restored and vegetation would be reintroduced to prevent drying out and evaporation from wind drying effects; and
- where peat resources would be extracted for the construction of the converter station development platform at Grabhair, a clay lined peat basin would be created within the periphery of the site for the translocation of peat. This would provide a stable and impermeable basin to contain the peat resource and restore adequate peat hydrology (peat at saturation). Vegetation would be reintroduced across the reinstated peat bog to prevent drying out and evaporation from wind drying effects.

- 15.1.1.4 The mitigation would prevent peat desiccation and significantly reduce the associated carbon emissions arising from site operations. The routing of the cable circuits has been adjusted to seek to avoid areas of deeper peat; the residual peat disturbance would be further offset provided that the peat is sufficiently restored after displacement and its hydrology and vegetation is reinstated back to original conditions. It is estimated that this would present a potential carbon dioxide emissions saving of approximately 18,480 tonnes.

- 15.1.1.5 The SNH Technical Guidance Note for carbon balancing of wind farm developments estimates that in most cases the carbon payback achieved through the displacement of fossil derived energy with renewable energy sources, would be within 3 years (for displacement of mixed grid electricity). Here it must be noted that the construction of infrastructure proposed for this project would potentially serve multiple wind farm developments on the Western Isles. Therefore, carbon emissions associated with site operations would be considered minimal relative to the potential number of wind farm developments on the Western Isles.
- 15.1.1.6 The proposal for the construction of the converter stations and HVDC cable installation could facilitate future renewable energy developments, in addition to wind energy, which may be proposed for the Western Isles. This would therefore potentially further reduce the period of carbon payback.

## **16. Planning and committed development**

- 16.1.1.1 The EA has provided an assessment of the planning policy context for the proposed Western Isles Connection, together with a review of committed development. The planning policy review has identified the various statutory Development Plans (both Structure Plans and Local Plans), together with a wide range of National Planning Policy and relevant supplementary guidance that exists and is of relevance.
- 16.1.1.2 The project is driven by the requirement to provide an efficient and economic transmission system in Scotland. The proposed development is identified within the National Planning Framework and has been designed to minimise environmental effects, including on international and nationally designated sites, whilst at the same time maximising efficiency of operations and use of technology. The project complies with the requirements of SPP1.
- 16.1.1.3 This EA has considered the potential effects of the project on the environment and on the people of the areas affected by the proposed development. A detailed assessment of these impacts is provided in the relevant technical chapters and is cross-referenced as appropriate within the Planning and Development chapter.
- 16.1.1.4 A review of the proposed project in terms of committed development has been undertaken. This has demonstrated that the Western Isles Connection project would not give rise to significant adverse effects upon such development.

## **17. Cumulative impacts**

- 17.1.1.1 The EA has considered the potential for the proposed project to give rise to cumulative impacts on people and property, and on the natural and cultural heritage environment of the area.

- 17.1.1.2 Cumulative effects are anticipated as largely relating to the construction and installation of the proposed project. The majority of potential cumulative effects would be limited in their duration (for instance, from the combined effects of construction on access, visual amenity, noise and air quality) and as such are not considered to be significant, particularly given the implementation of mitigation measures as set out in this EA.
- 17.1.1.3 The operation of the proposed HVDC cable circuits is not expected to result in any significant adverse cumulative effects. Consideration has been given as to whether there would be any significant adverse cumulative effects as a result of the operation of the proposed converter stations.
- 17.1.1.4 The assessment of cumulative effects has used, as its base, the identified residual significant effects, post-mitigation, as these would be the effects with greatest potential for adverse cumulative impacts.

### **17.1.2 Cumulative effects on people and property**

- 17.1.2.1 Potential cumulative effects on people and property would relate to potential adverse effects on agricultural land holdings, on visual amenity, on access and recreation, and from effects of construction noise and air quality.
- 17.1.2.2 Consideration has been given to the potential for cumulative effects on people and property in the Grabhair area; within the Dundonnell strath; in the Gorstan and Garve areas; in the Comrie area; in the Muirton Mains, Fairburn and Faebait / Auchmore areas; and in the area between Ruisaurie and the Beauly substation at Wester Balblair.
- 17.1.2.3 No cumulative effects have been identified as occurring on the people and property of these areas of the proposed development.

### **17.1.3 Cumulative effects on the cultural and natural heritage environment**

- 17.1.3.1 The proposed project has the potential to give rise to cumulative effects on the cultural and natural heritage environment, in particular from the combination of effects on soils and water, on these wider aspects. Changes to the soils and hydrology of the area could adversely affect both the cultural heritage resource and the natural heritage resource.
- 17.1.3.2 Construction operations have the potential to adversely affect the soils, water and ecological environment of an area, not only as a result of direct disturbance from excavation and reinstatement, but also as a result of the risk of contamination from construction materials (fuel, cement and so on) or from poor construction practices resulting in run-off of soils or silt into watercourses. The depositing of dust particles can also adversely affect vegetation and water, though such effects are

usually only temporary. Changes to soil structure can alter the vegetation composition of areas, as can changes to the water content of soils (both increases and decreases).

- 17.1.3.3 Operational effects are less likely to give rise to potential cumulative effects.
- 17.1.3.4 Consideration has been given to the potential for cumulative effects on the cultural and natural heritage environment, in the areas of the proposed Grabhair converter station; in the Dundonnell strath; in the area of the Beinn Dearg and Fannich Hills AGLV; in the area of the Fannich Hills SAC; in the area of the Beinn Dearg SAC; in Strath Garve; in the Carn Faire nan Con area; in Strathconon; in the area of the River Orrin crossing; and in the crofting landscape in the Ruisaurie area.
- 17.1.3.5 Significant, moderate adverse cumulative effects were identified in the area of the proposed Grabhair converter station, as a result of the changes to the soils resource, the hydrology, ecology and landscape character. Mitigation, in the form of monitoring of the effectiveness of the proposed mitigation measures, is proposed in order to address this predicted cumulative effect.
- 17.1.3.6 Short term cumulative effects were identified in the area of the Beinn Dearg and Fannich Hills AGLV, for the duration of the period of the re-establishment of the ground cover vegetation.
- 17.1.3.7 In the other areas of the proposed development, no cumulative effects have been identified on the cultural and natural heritage environment.

## 18. The marine route

- 18.1.1.1 The marine route for the proposed subsea cable section, including seabed features and obstructions in the area between Loch Odhairn and Little Loch Broom, together with the proposed landing sites, has been described. A brief description of the environmental issues is provided, setting out the information to be provided in the remainder of the marine section of the EA.
- 18.1.1.2 An outline of the consents and authorisation process applicable to the subsea route of the HVDC cables is provided together with a summary of the key issues applicable to the project.
- 18.1.1.3 The methodology used in surveying the proposed route corridor is described; with baseline information obtained in respect of the geology, sediment composition, contamination, bathymetry and topography of the seabed along the cable route. The survey objective was to identify a safe and economically viable route, with a target burial depth of at least 1.0m for the HVDC subsea cables between Grabhair and Dundonnell. A description of the route is provided.
- 18.1.1.4 The measures anticipated as being required in order to ensure the protection of the proposed cables are set out, both for the shore-ends of the cables and within

the subsea section of the proposed route. Measures required in respect of the co-ordination of the works with other activities, such as fishing, are identified.

## 19. Marine mammals

19.1.1.1 The assessment of effects of the project on marine mammals has considered:

- the importance of the proposed marine cable route and adjacent areas for marine, including breeding and migratory populations;
- the potential impacts of the construction and operation of the subsea cable on marine mammals and to predict the significance of those impact;
- mitigation measures incorporated into the development to reduce potential impacts on marine mammals; and
- the residual impacts following mitigation and the significance of these.

19.1.1.2 The overall conclusion of the assessment is that neither the installation nor the operation of the subsea cable section will have a significant adverse impact upon marine mammals in the areas the cable goes through or nearby.

## 20. Fishing and aquaculture

20.1.1.1 The assessment of effects on fishing and aquaculture has considered:

- the importance of the area of the proposed marine cable route as a fishery;
- the potential impacts of the construction and operation of the marine on fishing stocks, shellfish growing areas and commercial fish farms and the prediction of the significance of those impacts;
- mitigation measures incorporated into the development to reduce potential impacts on fishing vessels in the long term and decrease the likelihood of cable damage; and
- the residual impacts following mitigation and the significance of these.

20.1.1.2 The overall conclusion of the assessment is that neither the installation nor the operation of the subsea cable section would have any significant adverse long term impact upon fishing and aquaculture.

## 21. Marine benthology

21.1.1.1 The assessment of effects on marine benthology (the study of organisms attached to, living on or in the seabed) has considered:

- the importance of the proposed marine cable route and adjacent areas for its benthic species and habitats;

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- the potential impacts of the installation and operation phases on the marine benthos and the significance of those impacts;
  - mitigation measures incorporated into the development to reduce potential impacts on the marine benthos; and
  - the residual impacts following mitigation and the significance of these.
- 21.1.1.2 The overall conclusion of this assessment is that neither the installation nor operation of the subsea cable section would have any significant adverse impacts upon the benthology along or around the proposed cable route.
- 21.1.1.3 There are priority species and habitats, along the proposed cable route, of both national and regional importance. The cable route has been designed to ensure that the route would be far enough away from the sensitive sites to make adverse effects low or negligible in magnitude.
- 21.1.1.4 SNH gave survey recommendations in respect of this aspect of the project: *“If during the course of the survey any important habitat and species are found then a full survey of the extent of these should be carried out.”* The results of the surveys have determined the need for further work to be carried out.
- 21.1.1.5 The survey methods employed for the assessment were not subject to any significant limitations and the results of video footage which was obtained during survey did not highlight the need for further survey work in relation to important habitats or species.
- 21.1.1.6 Residual effects on the benthic fauna, following the implementation of mitigation measures, would largely be limited to mortalities through direct crushing under the cable. The temporary, low magnitude effects of smothering, increased turbidity and increased suspended sediments are also likely to occur following mitigation measures. During the operation phase of the cable there would be a small thermal change in the surrounding waters and a weak electromagnetic field produced. Both the effects of thermal change and electromagnetic field production are considered to be of low magnitude and would therefore be of little concern to the benthic fauna, particularly where the cable would be able to be buried.

## 22. Intertidal ecology

- 22.1.1.1 The assessment of effects on the intertidal ecology has considered:
- the importance of the proposed marine cable route and adjacent areas for its intertidal species and habitats;
  - the potential impacts of the installation and operation phases on the intertidal ecology and the significance of those impacts;
  - mitigation measures incorporated into the development to reduce potential impacts on the intertidal ecology; and

- the residual impacts following mitigation and the significance of these.

22.1.1.2 The overall conclusion of the assessment is that neither the installation nor operation of the subsea cable section will have any significant adverse impacts upon the intertidal ecology along or around the proposed cable route.

22.1.1.3 There are priority species and habitats, along the proposed cable route, of both national and regional importance. The mitigation measures considered when routeing the cable have been designed to ensure that the route is far enough away from these sensitive sites to make adverse effects very low or negligible in significance.

22.1.1.4 Residual effects on the intertidal ecology, following the implementation of mitigation measures, will largely be limited to mortalities through direct crushing under the cable. The temporary, low magnitude effects of smothering, increased turbidity and increased suspended sediments are also likely to occur following mitigation measures. During the operational phase of the cable there will be a small thermal change in the surrounding waters and a weak electromagnetic field produced. Both effects of thermal change and electromagnetic field production are considered to be of low magnitude and therefore of little concern to the surrounding ecology, particularly where cable burial has been possible.

## 23. Ornithology

23.1.1.1 The assessment of effects of the marine cable on ornithology has considered:

- the importance of the proposed marine cable route and adjacent areas for birds, including breeding and migratory populations;
- the potential impacts of the construction and operation of the marine cable route on birds and to predict the significance of those impacts;
- mitigation measures incorporated into the development to reduce potential impacts on birds; and
- the residual impacts following mitigation and the significance of these.

23.1.1.2 The overall conclusion of the assessment is that neither the installation nor the operation of the subsea cable section will have any adverse impact upon ornithology in the areas the cable goes through or nearby.

23.1.1.3 There are areas of ornithological importance, both nationally and regionally, in the area. However the proposed route is far enough away from these sensitive sites to make the significance of the effects negligible.

23.1.1.4 The presence of the cable laying vessel in the area during installation will have no adverse effects on birds in the area.

23.1.1.5 The shoreline installation equipment will have a short-term minor effect but birds in the area will return after the installation and no breeding sites at the landfalls have

been discovered during the assessment that would be impacted upon by the marine cable.

## 24. Conclusions

24.1.1.1 The assessment of effects of the proposed Western Isles Connection has considered the potential environmental effects for the land-based and marine interests within the area of the proposed development.

24.1.1.2 The majority of the significant adverse effects identified within this EA relate to the construction and installation of the proposed development and as such, would be short term, temporary effects. In the majority of instances (the main exception being effects on agriculture and sporting interests) once construction operations are completed, effects would be reduced to below significant effects.

24.1.1.3 The significant residual effects are summarised in the above sections of this chapter and are indicated on NTS Figure 1 sheets A - K.

24.1.1.4 Major adverse, permanent residual effects are predicted in the following areas:

- on ecology and nature conservation, as a possible worst case effect from heat dissipation from the operational HVDC cables, on blanket bog, in the area of the HVDC cable located within this habitat type on Lewis;
- on ecology and nature conservation, as a possible worst case effect from heat dissipation from the operational HVDC cables, on areas of good quality blanket bog and blanket bog / wet heath mosaic in the Braemore Junction area;
- on ecology and nature conservation, as a possible worst case effect from heat dissipation from the operational HVDC cables, on areas of good quality blanket bog in the Corriemoillie Forest area; and
- on ecology and nature conservation, as a possible worst case effect from heat dissipation from the operational HVDC cables, on areas of good quality blanket bog to the east of the Luichart Dam in the area south of Garve.

24.1.1.5 Major adverse, temporary residual effects are predicted in the following areas:

- on agricultural and sporting land use, as a result of temporary constraints to land use, in specific areas of land interest on Grabhair;
- as cumulative effects on visual amenity for users of the A832 and A835 during construction operations; and
- as cumulative effects on visual amenity on users of the A835 in the Loch Glascarnoch area during HVDC cable construction operations, from the presence of the Lochluichart wind farm.

24.1.1.6 Moderate adverse, permanent residual effects are predicted in the following areas:

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- from loss of peat within the area of the proposed Grabhair converter station, as effects on geology and soils, hydrology, ecology and nature conservation and landscape character; and as cumulative effects on this area;
  - on hydrology, from the proposed diversion of a watercourse at the Grabhair converter station site;
  - on visual amenity in the area of the B8060 close to the proposed converter station site;
  - on ecology and nature conservation, as a possible worst case effect from heat dissipation from the operational HVDC cables, on modified bog, wet heath and marshy grassland habitats, in the area of the HVDC cables located within this habitat type on Lewis;
  - on ecology and nature conservation, as a possible worst case effect from heat dissipation from the operational HVDC cables, on roadside mudflats, dry heath, broadleaved woodland and riverine vegetation habitats, in the area of the HVDC cables located within these habitat types in the Little Loch Broom to the Dundonnell River area;
  - on ecology and nature conservation, as a possible worst case effect from heat dissipation of the operational HVDC cables, on verge-side blanket bog and blanket bog / wet heath mosaic, in the Dundonnell River area;
  - on ecology and nature conservation, from the loss of immature roadside native broadleaved trees in the Dundonnell River area;
  - on ecology and nature conservation, as a possible worst case effect from heat dissipation of the operational HVDC cables, on dry heath and mire, and roadside blanket bog and degraded blanket bog / wet heath mosaic, in the Braemore Junction area;
  - on ecology and nature conservation, as a possible worst case effect from heat dissipation of the operational HVDC cables, on wet heath and degraded blanket bog and blanket bog / wet heath mosaic habitats, in the Dirrie More area;
  - on ecology and nature conservation, as a possible worst case effect from heat dissipation of the operational HVDC cables, on the more sensitive dry heath and degraded blanket bog and blanket bog / wet heath mosaic habitats, in the Loch Glascarnoch area;
  - on ecology and nature conservation, as a possible worst case effect from heat dissipation of the operational HVDC cables, on the dry heath, wet heath, acid grassland and roadside blanket bog habitats, in the Corriemoillie Forest area;
  - on ecology and nature conservation, from the loss of riverside trees and broadleaf woodland in the Garve area;

- on ecology and nature conservation, as a possible worst case effect from heat dissipation of the operational HVDC cables, on areas of wet heath and dry heath habitat in the Garve area;
- on ecology and nature conservation, from the loss of mixed plantation woodland and broadleaf woodland in the Strathconon area;
- on ecology and nature conservation, as a possible worst case effect from heat dissipation of the operational HVDC cables, on areas of dry heath habitat in the Strathconon area;
- on ecology and nature conservation, as a possible worst case effect from heat dissipation of the operational HVDC cables, on areas of wet heath, dry heath and broadleaf woodland in the Loch Achonachie to Auchmore area; and
- on ecology and nature conservation, as a possible worst case effect from heat dissipation of the operational HVDC cables, on areas of dry heath and broadleaf woodland in the Auchmore to Wester Balblair area.

24.1.1.7 Moderate adverse, temporary residual (post-construction) effects are predicted in the following areas:

- on agriculture and sporting land use, as a result of temporary constraints to land use, in respect of the Grabhair Common Grazings;
- on agriculture and sporting land use, as a result of temporary constraints to land use, for the Dundonnell Estate (Keppoch and Brae House Farms);
- on access and recreation, as a result of temporary constraints to access, within the Dundonnell strath area;
- on agriculture and sporting land use, as a result of temporary constraints to land use, within the Strone Estate;
- on the landscape character of the Beinn Dearg and Fannich Hills AGLV, until the vegetation cover is re-established;
- on agriculture and sporting land use, as a result of temporary constraints to land use, within the Loch Droma Estate;
- on agriculture and sporting land use, as a result of temporary constraints to land use, within the Lochluichart Estate;
- on landscape character within the *Rounded Hills* landscape character type, as cumulative effects from the construction of the HVDC cables and the presence of the Lochluichart wind farm (if these are coincident);
- on agriculture and sporting land use, as a result of temporary constraints to land use, within the Corriemoillie Estate;
- on agriculture and sporting land use, as a result of temporary constraints to land use, within various land interests in the Garve area;

- on visual amenity in the Strathconon area, as cumulative effects from the presence of the Fairburn wind farm and the installation of the HVDC cables;
- on agriculture and sporting land use, as a result of temporary constraints to land use, within various land interests in the Scatwell Estate, Torrachilty Wood area;
- as cumulative effects on landscape character of the *Narrow Farmed Strath* and *Forest Edge Farming* landscape character types, from construction of the HVDC cables in conjunction with the presence of the operational Fairburn wind farm;
- on landscape character within the Loch Achonachie to Auchmore area, from the loss of existing tree and scrub vegetation from within the corridor of the existing overhead lines;
- on agriculture and sporting land use, as a result of temporary constraints to land use, within various land interests in the Fairburn Estate area;
- on agriculture and sporting land use, as a result of temporary constraints to land use, within various land interests in the Ruisaurie / Altyre / Teanalonaig areas;
- on landscape character, as cumulative effects from the proposed converter station and the terminal tower of the proposed Beaully Denny 400kV overhead line;
- on visual amenity, for users of the informal path to the south of the substation extension; and
- on visual amenity for users of the A831, as cumulative effects from the presence of the converter station and the terminal tower of the proposed Beaully Denny 400kV overhead line.

24.1.1.8 Moderate beneficial residual effects are predicted in the following areas:

- from the provision of a new footpath within Grabhair;
- from the provision of new laybys on the A832 within the Dundonnell River area;
- on forestry, from the improvement of access in the Braemore Junction area;
- on access and recreation, from the improvement of the parking area at Loch Droma;
- on ecology and nature conservation, from the removal of conifer seedlings from an area of blanket bog and wet heath habitats close to the route east of the Luichart Dam;
- on forestry, from the improvement of access in the Strathconon area;
- from the provision of additional passing places within the Torrachilty Wood forestry track;

- from the provision of additional passing places on the road network within the Loch Achonachie to Auchmore area;
- on forestry, from the improvement of access in the Ord Hill area; and
- from the provision of new and additional passing places in the Corry of Ardnagrask area.

24.1.1.9 In the longer term the temporary, major and moderate adverse effects as identified above at paras. 24.1.1.5 and 24.1.1.7 would be removed or reduced to below-significant effects. Beneficial effects would remain as permanent features to the areas concerned.

24.1.1.10 The Grabhair converter station would result in moderate adverse residual effects on the soils, hydrology, ecology and nature conservation and landscape character of the area of the converter station site. There would be moderate adverse cumulative effects in this location, though monitoring of the effectiveness of the mitigation proposed for this area (and the development of additional measures, if required) would assist in reducing these effects to minor adverse.

24.1.1.11 The majority of the remainder of the residual effects are related to the potential effects of heating from the operational cables on the ecology and nature conservation of the area. These effects can be expected to be highly localised to the area of the cable circuits. Other significant residual effects relate to the loss of tree cover from the route of the cable circuits and mitigation is proposed that seeks to minimise any such losses to the minimum necessary for the construction of the cable circuits.

24.1.1.12 No significant residual effects are predicted in respect of the proposed subsea (marine) cables.

24.1.1.13 The routeing of the proposed HVDC cable circuits and the siting of the two proposed converter station sites, at Grabhair and at Lewis, have had regard for the sensitive nature of the environment, both on Lewis and on the Scottish mainland, in the area of the proposed development. Wherever possible, the cables have been routed within areas of low environmental sensitivity; where routeing within designated or higher quality areas cannot be avoided, routeing has sought to minimise potential adverse effects, for instance from routeing within degraded roadside verges within the two Special Areas of Conservation in the Fannich Hills and Beinn Dearg areas.

24.1.1.14 In conclusion, effects on the environment have been minimised as far as possible and mitigation measures have been developed in order to address adverse effects. Once construction operations have been completed and these mitigation measures implemented, the residual effects on the environment of the area of Grabhair and between Little Loch Broom and Beauly, are expected to be limited.

24.1.1.15 Copies of the full Environmental Appraisal can be obtained by writing to SHETL at the address below, enclosing a cheque for £50 for a paper copy (three large

volumes) or £5 for a CD copy. Cheques should be made payable to Scottish and Southern Energy plc.

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