

# Non-Technical Summary

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# 1 Introduction

- 1.1.1.1 Scottish Hydro-Electric Transmission Limited (SHETL) and SP Transmission Limited (SPT)<sup>1</sup> are seeking consent from the Scottish Ministers, under Section 37 of the Electricity Act 1989, to install and keep installed a 400 kilovolt (kV) overhead electricity transmission line from Beauly, west of Inverness in SHETL's licence area, to near Denny, south of Stirling, in SPT's licence area. The proposed route of the line is shown on Figure NTS 1A to 1B.
- 1.1.1.2 To meet the requirements of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000, an environmental impact assessment (EIA) of the proposed project has been undertaken. The findings of the assessment, including the measures which would be taken to prevent, reduce and where possible offset any significant adverse effects on the environment are reported in an Environmental Statement (ES) which is being submitted with the Section 37 application. This document is the Non-Technical Summary (NTS) of that ES.
- 1.1.1.3 Information in the ES will be used to support applications to The Highland Council, Perth and Kinross Council and Falkirk Council for planning permission for the substation works associated with the line.
- 1.1.1.4 In order to identify a line which is feasible, meets transmission needs and which seeks to minimise the effects of the proposed project on the environment and on people, the approach adopted by SHETL and SPT to routeing the line and developing the project has involved extensive consultation with land owners, local communities, statutory environmental agencies, local authorities and interest groups.

# 2 The Need for the Project

- 2.1.1.1 The Government has set a target that 10% of electricity supplies within the United Kingdom should be generated from renewable sources by 2010. The Scottish Executive is encouraging the development of electricity generation from renewable sources in Scotland, through the Renewables Obligation (Scotland) Orders 2002 and 2004. A target has been set to increase the proportion of Scotland's electricity generated from renewable sources from the present 13% to reach 18% by 2010 and with aspirations to generate 40% from renewable sources by 2020.
- 2.1.1.2 The market has reacted by bringing forward proposals for renewable electricity generation and a large proportion of these proposals is for onshore wind-powered generation in Scotland. The capacity of the existing transmission network is inadequate to cope with the projected levels of generation. As holders of electricity transmission licences SHETL and SPT have a statutory duty to develop and maintain an efficient, co-ordinated and economical system of electricity transmission and thus were required to consider how to provide adequate transmission capacity.
- 2.1.1.3 SHETL requires to upgrade its network to enable new renewable generation to connect on the north of Scotland system. In order to export the renewable generation into south of Scotland, SPT requires to reinforce its transmission system from its boundary with SHETL.
- 2.1.1.4 Studies were undertaken in 2001 to identify how the existing network could best be reinforced to accommodate renewable generation. It was concluded that replacement of the existing 132kV double circuit overhead transmission line between Beauly substation and Denny with a new 400kV double circuit overhead transmission line would facilitate the required transmission capacity to accommodate renewable generation. The electricity industry regulator, Ofgem, has also concluded that the new overhead transmission line is both required and justified. Funding arrangements have been put in place by Ofgem to allow the proposed project to progress.
- 2.1.1.5 SHETL also identified that the line should connect into substations at Fort Augustus, Tummel Bridge and Braco in order to provide flexibility in future network design and to allow the connection of potential new generation seeking to develop in these areas.

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<sup>1</sup> SHETL and SPT are holders of transmission licences

## 3 The Proposed Project

### 3.1 Introduction

- 3.1.1.1 The proposed project is to construct and operate a double circuit 400kV overhead transmission line on steel lattice towers from Beauly substation to a new substation near Denny, via substations at Fasnakyle, Fort Augustus, Tummel (near Tummel Bridge) and Braco. One circuit of the line would operate at a voltage of 400kV and the other at 275kV. The project also involves expansion or construction of substations, associated works and dismantling of the existing 132kV overhead transmission line between Beauly and Denny. The proposed route of the line and the location of the associated substations is shown on Figures NTS 1A to 1B.

### 3.2 Proposed Route

- 3.2.1.1 The proposed 400kV transmission line is 220 kilometres (km) long from Beauly in the north to Denny in the south. The land use character of the route has been described in four sections as follows:

- **Beauly to Fort Augustus:** This 50km long section follows a predominantly upland route over areas of remote and unpopulated moorland, forested in sections. Several river valleys are crossed along this section. The existing substations at Beauly (near Balblair), Fasnakyle (near Cannich) and Fort Augustus would all be redeveloped.
- **Fort Augustus to Tummel Bridge:** This 77km section crosses the Grampian Mountains over areas of remote upland moorland and coniferous forests and some river valleys. From Dalwhinnie to Dalnacardoch the alignment of the proposed route follows the line of the A9 trunk road. A new substation would be constructed near Tummel Bridge.
- **Tummel Bridge to Braco:** This 63km section crosses upland areas comprising moorland and some river valleys before reaching the low lying landscape to the east of Crieff and Muthill. The proposed route crosses moorland and forestry to the proposed new Braco substation.
- **Braco to Denny:** This 30km section crosses the Allan Water and A9 before crossing moorland on the Ochil Hills. South of these hills the proposed route crosses the broad flat valley of the River Forth and follows an alignment avoiding the main settlements along the route. The proposed route terminates at the proposed new Denny North substation to the north-east of Denny.

### 3.3 Project Overview

#### 3.3.1 The 400kV Overhead Line

- 3.3.1.1 The new line would be supported by approximately 600 towers of a galvanised steel lattice type. The majority of towers are between 50 and 56m, with extremes from 43 to 65m as a result of natural features and at crossing points. The spacing between towers would normally vary in a range of 275m to 450m, depending on topography and altitude, with towers being closer together at higher altitudes to counteract the effects of greater exposure to high winds and other weather effects.
- 3.3.1.2 Three types of tower would be used:
- line towers, used for straight sections of line;
  - angle towers, used where the line changes direction; and
  - terminal towers, used where an overhead line terminates, for example at substations.
- 3.3.1.3 Concrete tower foundations would be formed to secure the tower to the ground. Photographs of typical construction working areas are shown in Figures NTS 2A and 2B. Towers similar to those proposed for the project are shown in Figure NTS 2C.
- 3.3.1.4 Consideration has been given to the design and aesthetics of the towers for the proposed overhead transmission line so that the tower designs selected would be the most suitable for

the environmental context of the project route whilst meeting technical and operational constraints. A study was undertaken of tower structures and designs available worldwide. The visual characteristics of these designs were considered. The study concluded that steel lattice tower designs would have the best visual performance for this project due to their greater transparency and longer span lengths, which reduces the number of towers required.

- 3.3.1.5 Conductors<sup>2</sup>, manufactured from aluminium, are attached to the crossarms of the towers by insulators which are typically coloured porcelain or clear glass. An earth wire would be strung between tower peaks to provide protection against lightning strikes.

### 3.3.2 Substations

- 3.3.2.1 Substations are required to connect local demand and generation to the transmission grid. They transform the voltage of the electricity from the transmission voltage down to levels used for onward distribution of power. They are also used to switch circuits to allow the control of the transmission system and the safe disconnection of circuits for construction and maintenance.

- 3.3.2.2 A total of six substations would be required for the proposed project at the following locations:

- Beauly, where the existing substation would be expanded using additional land to the east of the current site;
- Fasnakyle, where the existing substation would be redeveloped entirely within the current site;
- Fort Augustus, where the existing substation would be expanded on land to the south of the current site;
- Tummel, where a new substation would be constructed on a site at the southern edge of the settlement of Tummel Bridge;
- Braco, where a new substation would be developed on a site at Feddal Hill to the west of Braco village; and
- Denny North, where a new substation would be developed on land near Dunipace where a number of transmission lines intersect and a cable sealing end compound already exists.

- 3.3.2.3 In addition, the existing substation on the 132kV line at Braco would be dismantled and removed.

- 3.3.2.4 Substations consist of a fenced compound enclosing transformers, switchgear and support structures, a control building and overhead line towers. The largest items of plant within the compound are the transformers, which are typically between 5m to 10m tall and coloured grey.

### 3.3.3 Access

- 3.3.3.1 Access tracks would be required to facilitate construction of the line and substations. The required works include 154km of temporary track, some of which could become permanent if necessary permissions were obtained, and the upgrading of 124km of existing track. In addition, there would be works required where some of these tracks form a connection with the nearest public road.

- 3.3.3.2 Further information on access track design, which has been progressed through the development of an access track strategy, reflecting the environmental sensitivities of the land crossed by tracks, is presented in Section 5.

### 3.3.4 Associated Works

- 3.3.4.1 In addition to the new transmission line and substation construction, a number of ancillary works would be required to complete the project. These are:

- **Temporary construction compounds** which are sites where construction materials, plant and office accommodation are situated. Compounds are likely to be required in three

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<sup>2</sup> The name given to metallic wires strung from tower to tower to carry electric current.

locations for the line construction. These main facilities would be supported by a number of smaller storage areas along the route. The locations of construction compounds and storage areas would be identified by the appointed contractor for the project and agreed with SHETL and SPT.

- **Temporary helicopter landing areas** which may be required every 5km along those parts of the route which would be served by helicopter access. These sites would be developed with hardstanding and fenced off for security.
- **Borrow pits** which may be developed in locations close to the proposed route to provide a local source of stone for access tracks.
- **Public roads** which would be used for construction vehicle access to the line. Roads would require upgrading in a number of locations - for example to incorporate passing places, to improve visibility at junctions and to strengthen roads and bridges to accommodate heavy goods vehicle (HGV) traffic.

3.3.4.2 The contractor would agree all associated works with SHETL and SPT and the necessary permissions and consents obtained from the relevant planning and transport authorities prior to their construction.

### 3.3.5 Dismantling of 132kV Line

3.3.5.1 All of the existing 132kV line between Beaulieu and Denny would be removed, 220km in total and some 815 towers. Existing access tracks would be left in place as these are used for other purposes by landowners and others. SHETL and SPT would offer to restore and contribute to the replanting of areas of land along the 132kV line once the line has been removed.

## 4 Route Selection

### 4.1 Strategic Alternatives

4.1.1.1 A variety of strategic alternatives to achieve the transmission line capacity were considered by SHETL in the early stages of the project. The following options were assessed:

- Use of an existing 275kV route from Beaulieu to Foyers, with a new route from Foyers to Fort Augustus, and retention of the existing 132kV route between Beaulieu and Fort Augustus. This option had generation constraints, limited possible future capacity increases and was rejected by SHETL on technical and financial grounds. The 400kV line from Fort Augustus to Denny would still be required.
- A number of routes west of the proposed route were considered but rejected due to cost and their remoteness from sites of renewable energy generation. It was considered that these longer radial connections would have greater environmental impact than connections to the chosen route.
- An east coast option involving reinforcement of the existing 275kV infrastructure between Beaulieu and Blackhillock/Keith and down the coast to connect with SPT's area near Westfield in West Lothian. This route would involve construction of more new 400kV overhead towers along a 330km route and would be more expensive and extensive than the proposed route. Due to its remoteness from many of the renewable generation sites, it would require additional radial transmission lines. For these reasons this option was also rejected.

4.1.1.2 A preliminary study of options was therefore undertaken in 2002 for the broad corridor of the existing 132kV line between Beaulieu and Bonnybridge.

### 4.2 Undergrounding

4.2.1.1 SHETL and SPT considered undergrounding of the proposed transmission line or sections of it. Undergrounding the line would have significant environmental impacts because a wide corridor of land would be cleared (some 25m in width). Taking account of this aspect, a

number of technical considerations (including maintenance, operation and upgrading) and also financial criteria, the decision was taken to develop the project as an overhead transmission line.

## 4.3 Route Selection

4.3.1.1 Route options were examined as part of a process to reduce the overall environmental impact of a technically feasible and economically viable transmission line. Guidelines for the routing of high voltage overhead transmission lines, known as the 'Holford Rules', have been established within the electricity supply industry and a review by SHETL and SPT confirmed that they were appropriate to use for the route selection. The guidelines (which are a set of design principles), together with other environmental and technical criteria were used in the assessment of alternative alignment options for the overhead transmission line.

4.3.1.2 The routing process considered a number of options. Initially broad or strategic route corridors were identified and assessed. This was followed by a more detailed analysis of the options remaining, in the areas between each pair of substations, along the line of the strategic route corridor. The detailed route selection first considered topography and settlement distribution and potential line routes were then devised to achieve the best fit within the landscape, balancing the need to avoid impacts to designated environmental areas and keeping alignments more than 100m from residential buildings as far as possible. The detailed routes were tested against all environmental and technical criteria, to identify a preferred route which was then subject to a major public consultation exercise. Following consultation, an indicative proposed route was identified. Further consultation was undertaken and alternative routes tested. The route was then further refined to arrive at a draft proposed route and, ultimately, the proposed route.

## 4.4 Substation Selection

4.4.1.1 A number of options were considered for the substations:

- connection into and extension of the existing substation location;
- relocation of the existing substation to a new location; and
- construction of a new substation and linking into the existing substation.

4.4.1.2 Supplementary design guidance to the Holford Rules on the siting of substations was used to help identify the preferred site for each substation. Environmental constraints and technical and cost criteria were also taken into account.

# 5 Delivering the Project

## 5.1 Introduction

5.1.1.1 This section describes how the proposed project would be built if the Section 37 application and substation planning applications were approved. SHETL and SPT would appoint contractors for the project, who would be required to deliver the commitments made in the ES to protect the environment. In developing the detailed design for the project the contractors would be required to ensure that the proposed project has no greater negative effects on the environment than those assessed in the ES.

## 5.2 Limits of Deviation

5.2.1.1 In order to allow for refinement of the final positions of the line and access tracks, limits of deviation (LODs), have been defined within which the proposed project would be constructed. The width of the defined LODs varies in different locations based on the environmental and technical constraints that have been identified from field studies and consultation feedback. The final positions of towers and access tracks would be refined as part of the detailed design and to ensure effective environmental mitigation is delivered. All permanent works would be within the defined LODs.

## 5.3 Mitigation

- 5.3.1.1 Overhead electricity transmission lines are large linear structures in the landscape and the scale of the development is such that the visual intrusion resulting from the construction of the line is difficult to reduce. The most effective means of reducing the impact is by careful routing (see Section 4.3).
- 5.3.1.2 Construction and operation of the line also has potential to create a range of other environmental impacts. To ensure these are reduced wherever possible, a series of mitigation measures have been defined. Mitigation measures are measures to prevent, reduce and where possible offset significant adverse effects of the proposed project. These have been defined by the project team and have been agreed with SHETL and SPT. All mitigation measures listed in the ES and any others identified by post application technical and environmental surveys would be included in a Construction Procedures Handbook for the line and contract documents for the substations. Environmental representatives would audit the successful implementation of these committed measures on site. In addition, the successful contractors would be required to produce and implement their own project Environmental Management System (EMS) during construction which takes account of all the mitigation measures and ensures best environmental practice is delivered on site.

## 5.4 Construction Period and Phasing of the Project

- 5.4.1.1 The construction period for the proposed project would be up to four years from the start of the works to the end of the dismantling of the existing 132kV line. In any one location the construction period would be in the order of four to six months although the existing line could be left in place at that location for much longer until the connections required elsewhere were completed. Construction of Beaulieu Substation could take up to three years and the other substation works up to eighteen months at any one site.
- 5.4.1.2 The construction project would be developed following the appointment of contractors and detailed site investigations and surveys. It is likely that the contractors would work in several areas of the line at any one time. Works would be programmed to be safe and cost effective whilst taking account of the required mitigation measures. Work at substations would be programmed to be undertaken in parallel with the line works.

## 5.5 Access for Construction

- 5.5.1.1 Access for construction would be gained wherever feasible from the existing main roads along the line. Tracks would be required from the road network to facilitate construction of the project. Wherever possible existing tracks would be used. The majority of new tracks that need to be constructed would be temporary. All necessary permissions would be acquired for any permanent tracks. An Access Strategy has been defined for the project that would guide the choice and type of track which would be used depending on a variety of factors including location, existing land use and ground conditions. Each track would be defined within its LODs taking account of the mitigation measures which have been defined to ensure that the impacts from construction of the tracks are reduced to the minimum necessary for safe implementation of the project.

## 5.6 Construction Methods

- 5.6.1.1 Following construction of the access tracks the foundations for each tower would be installed. The typical working area for construction of a line tower is approximately 1000m<sup>2</sup> and for an angle tower 2500m<sup>2</sup>. At winch sites (that is tower sites which would be used for stringing the conductors between towers) a larger working area of some 6000m<sup>2</sup> could be required on each side of the tower.
- 5.6.1.2 Excavations would be undertaken for each leg of the tower. The dimensions of the excavation would vary depending on the tower type constructed. A typical leg excavation would be 16m<sup>2</sup> by 4m deep for the line towers, increasing up to and over 25m<sup>2</sup> by 5m deep for angle towers. Some rock breaking might be needed to achieve the required depths for the tower foundations.

- 5.6.1.3 Once the concrete has been poured and set, the excavations would be back-filled using the original materials, if suitable, and compacted in layers. Steelwork for each tower would be delivered to each tower location taking account of any required mitigation. The towers would be part assembled at ground level and the tower would be erected using a crane or, in more environmentally sensitive sites, an erection derrick and winch could be flown to the particular site by helicopter.
- 5.6.1.4 Once a number of sections of towers have been erected, conductors would be strung between them using a winch at one end of the section and a tensioner at the other end. First, a pilot wire would be flown by a helicopter through the section between the winch and the tensioner, placed in blocks on the suspension and tension towers and connected around the winch and tensioner at either end. Using the winch to pull the pilot wires, the conductor would then be drawn through the section under constant tension, allowing the conductor to be controlled without touching the ground. This would avoid damage to the conductor and the underlying ground. Scaffolding would be erected to protect roads, railways and lower voltage lines where the conductor needs to be strung over the top of them.
- 5.6.1.5 Works at substations are varied and depend on the works to be undertaken but would include earthworks, demolition of obsolete buildings and equipment, creating foundations for new buildings and plant, fencing, and transportation of equipment to site (including transformers which weigh up to 170 tonnes).
- 5.6.1.6 Some temporary diversions of existing electricity transmission and distribution lines would be required to enable safe construction of the new line.

## 5.7 Dismantling and Reinstatement

- 5.7.1.1 The existing 132kV line between Beauly and Denny would be removed once the new line was energised. Access for dismantling would make best use of existing roads and the tracks constructed for the 400kV line. In other locations temporary matting would be used wherever possible to reduce the effects from traffic and other dismantling activities.
- 5.7.1.2 Dismantling activities would include: removing conductors (once adequate protection measures were in place) using a winch or a specialist system in particularly sensitive locations where scaffold protection cannot be used; dismantling the towers; removal of scrap for recycling; removal of foundations to below soil level; backfilling the foundations and restoring the site.
- 5.7.1.3 Reinstatement would seek to integrate the work sites (including all temporary access tracks) back into the surrounding landscape by removal of surplus materials and either planting or creating conditions to encourage natural regeneration of habitats.

## 5.8 Maintenance Operations

- 5.8.1.1 Required maintenance activities would be set out in the SHETL and SPT maintenance plans. Maintenance activities would include routine line and substation inspections, tower painting, future refurbishment etc. Access would be required to all tower locations and substations. On average a routine maintenance visit would be required to every tower every two years. Other visits could be required if there were line faults.

## 6 Planning Policy Context & Committed Development

- 6.1.1.1 The proposed project has been considered in terms of relevant national policies and the structure and local plans for the four local planning authority areas through which the line runs: Highland, Perth & Kinross, Stirling and Falkirk and also the policies of Clackmannanshire Council which is adjacent to part of the route. In addition, the Interim Policies of the Cairngorms National Park Authority (CNPA) have been reviewed.
- 6.1.1.2 The overall effect of the proposed project in the CNPA is considered to be beneficial. In particular, the length of proposed transmission line in the CNPA is 8km shorter than the existing 132kV line, it is located closer to the western boundary of the Park and is therefore located further from areas of population and tourism centres. It also involves the dismantling of the existing 132kV line from the Strathspey area.



- 6.1.1.3 It is recognised that the project is of national significance and of a scale whereby it is difficult to comply with all policies. Careful routing of the line (see Section 4) has sought to minimise environmental impacts wherever possible, whilst facilitating energy transfer in key locations.
- 6.1.1.4 The proposed project forms an essential element of investment within Scotland's infrastructure and is in accordance with the Scottish Executive's aims for sustainable development and it would form a key role in facilitating the Renewables Agenda (see Section 2).

## **7 Environmental Effects of the Proposals**

### **7.1 Introduction**

- 7.1.1.1 This section presents the key findings of the assessment of the environmental effects of the proposed project. The significant environmental effects, which are geographically specific, have been illustrated on the plans presented in Figure NTS 3 A to 3 C.

### **7.2 Land Use**

- 7.2.1.1 The long term direct land use effects of the proposed project are limited to the immediate areas underneath the overhead transmission line towers, the areas required for construction or redevelopment of the six substations and the small number of locations where access tracks would be retained for permanent use following the construction phase. In the longer term, removal of the towers for the existing Beauly Denny 132kV overhead transmission line (which would be dismantled) would result in the land reverting to its original use or the existing use of the adjacent land. An existing substation at Braco would be dismantled and the land would be re-used, potentially for recreational or tourism use.
- 7.2.1.2 The routing process for the proposed project has sought to avoid proximity to residential properties as far as possible. There are very few properties located in close proximity to the proposed route, with a total estimate of 10 mainly residential properties located within 100m of either side of the line. This compares with approximately 93 properties which are within 100m of the existing 132kV line.

### **7.3 Forestry**

- 7.3.1.1 The proposed overhead transmission line would pass through 51.7km of woodland and affect 108 woodland sites and up to 447 hectares (ha) of woodland and tree vegetation. This includes areas of both coniferous and broadleaf woodland of which 92ha are designated as ancient or semi-natural<sup>3</sup>.
- 7.3.1.2 The loss of woodland associated with the proposed overhead transmission line is predicted to be 424ha (372ha coniferous and 52ha broadleaved woodland) with the balance of 23ha retained as woodland cover along the route of the proposed overhead line, but subject to some treatment works (eg lopping). This would be off-set in part by SHETL and SPT's commitment to new and replacement mitigation planting of up to 48ha and the potential to establish new woodland along the line of the dismantled existing 132kV line (up to 214ha). The net loss of 162ha, or 0.012%, of Scotland's woodland cover is not considered significant.
- 7.3.1.3 The effect on ancient or semi-natural designated woodland following construction of the 400kV line and dismantling of the 132kV line is a potential net gain in the longer term of 15ha of such woodland (equivalent to 0.01% of such woodland in Scotland). This consists of a loss of 23ha to facilitate construction of the new line but a gain of 38ha in areas where the 132kV line would be removed. These are areas which were previously designated as ancient or semi-natural woodland and where there is potential with agreement of landowners to re-establish

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<sup>3</sup> Ancient woodland has a proven long-term continuity on a site. The habitat stability has allowed the development of a complex ecosystem, with many species of plants and animals found only in these woodlands. Semi natural indicates that a plant community has been modified by human management but that its dominant and constant species are accepted native UK species and that the structure of the community conforms to the range of natural types. In the case of woodland it also implies stands that do not obviously originate from the planting.

woodlands. Initial discussions with many landowners have indicated a willingness to deliver this mitigation.

- 7.3.1.4 The main potential adverse impacts associated with the proposed project would result from the clearance of woodland for the overhead transmission line and the disruption to woodland management and restriction of development of future woodland along the proposed overhead line.
- 7.3.1.5 Mitigation primarily takes the form of careful routeing to avoid forestry plantations or woodlands where significant effects could occur. In addition, various measures to reduce the effects can be implemented including felling to a windfirm forest edge, retaining low growing trees and shrubs within the overhead line corridor and restructuring for visual and nature conservation reasons, with the agreement of the landowner.
- 7.3.1.6 A major residual adverse effect has been predicted at one location at Yellowcraig Wood, Stirling (where 2.7ha of ancient woodland would be lost). Moderate adverse effects have been predicted at a further seventeen locations (totalling 174.9ha) along the proposed route.
- 7.3.1.7 The overall effect on woodlands from the transmission line throughout the route is not considered to be significant.

## 7.4 Agriculture and Sporting Interests

- 7.4.1.1 The proposed project affects a total of 105 estates and farms. These include hunting estates and grazing estates (predominately in the northern part of the route) and pastoral and arable farmland (predominately in the southern part of the route).
- 7.4.1.2 Along the proposed route of the overhead transmission line it is estimated that there would be a loss of 0.20ha of prime agricultural land and 5.04ha of non-prime agricultural land.
- 7.4.1.3 The dismantling of the existing 132kV transmission line would have a beneficial effect with the gain of 0.16ha of prime and 4.41ha of non-prime agricultural land.
- 7.4.1.4 The construction of access tracks would have an impact on agricultural and sporting land with 2.4km of prime and 124km of non-prime agricultural land affected.
- 7.4.1.5 Fourteen estates or land interests are predicted to have significant (five major, four moderate/major and five moderate) adverse effects from the proposed overhead transmission line. Effects include permanent and/or temporary restrictions on activities including deer stalking, grouse and other game shooting, fishing, pastoral and arable farming or holiday accommodation.
- 7.4.1.6 There would be significant beneficial effects to eleven land interests primarily from dismantling of the existing 132kV line.

## 7.5 Geology and Soils

- 7.5.1.1 The proposed route of the overhead transmission line crosses a variety of geological regions. The route is predominately underlain by glacial clays, areas of peat deposits and sands and gravels / alluvium (commonly associated with river valleys). The bedrock of the existing and proposed route comprises metamorphic<sup>4</sup> strata in the northern part of the route, and sandstone strata and carboniferous coal measures in the southern part of the route.
- 7.5.1.2 Mitigation measures have been developed to prevent, reduce or where possible offset impacts such as erosion and soil loss. Mitigation includes construction best practice measures and construction design measures.
- 7.5.1.3 No residual significant beneficial or adverse effects on geology and soils (including designated geological sites), or contaminated land are predicted.

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<sup>4</sup> Rocks that have been altered by heat and/or pressure

## 7.6 Hydrology

- 7.6.1.1 The potential hydrological and water quality impacts of the proposed project have been identified and mitigation measures developed to prevent, reduce or offset the predicted effects. The development of new access tracks was identified as having the potential for significant adverse hydrological effects. Hydrological issues were therefore taken into consideration in the development of the access track strategy to ensure that all opportunities would be taken to mitigate potentially adverse effects.
- 7.6.1.2 Three locations have been identified where there could be potential for significant adverse effects from construction of the new line. These are the Corrieyairack Pass area, the Spey Valley between Corrieyairack and Garvamore, and the Drumochter Pass/Glen Garry area. In these locations site specific detailed mitigation would be developed in consultation with SEPA to ensure that significant residual aquatic effects would be avoided.
- 7.6.1.3 The construction and development of a new substation at Denny North would result in a residual moderate adverse hydrological effect due to the loss of peat (some 125,000m<sup>3</sup>) from the raised mire affected and the subsequent effect on hydrology of local watercourses. The direct effect on the mire would also affect its capacity to store carbon (peat is a recognised carbon sink). However SPT's commitment to support the conservation of another lowland raised bog would help to offset the loss of carbon storage. This is referred to in paragraph 7.7.1.5.
- 7.6.1.4 No significant adverse or beneficial hydrological effects from dismantling of the existing 132kV line are predicted.
- 7.6.1.5 No residual significant adverse or beneficial effects on flooding or private water supplies have been predicted.

## 7.7 Ecology & Nature Conservation

- 7.7.1.1 The proposed project has been assessed for its potential impacts on ecology and nature conservation. Key to reducing significant adverse effects has been the commitment by SHETL and SPT to deliver a suite of mitigation measures.
- 7.7.1.2 Comprehensive desk studies, consultations and a range of baseline ecological studies have identified ecologically sensitive areas which could be impacted upon by construction and operation (and future dismantling) of the proposed 400kV overhead transmission line and associated infrastructure and dismantling of the 132kV line. The assessment has adopted a three stage approach to defining and mitigating impacts on ecology and nature conservation interests. Stage 1 defines sensitive areas (gained from baseline ecological surveys and a comprehensive desk study and consultation), provides an assessment of key effects and provision of mitigation measures. Stage 2 would include additional ecological surveys post submission of the ES to inform detailed mitigation measures. This information would be reported separately to the ES and the mitigation summarised in the Construction Procedures Handbook (see Section 5.3). Finally, Stage 3 would be implemented during the construction and other phases of the project, and would ensure the delivery of all mitigation commitments. SHETL and SPT environmental representatives would audit Stage 3 for successful delivery.
- 7.7.1.3 Routeing has sought to avoid habitats of high conservation value wherever possible. Key to the mitigation strategy is the micro-siting of individual towers and other infrastructure that would seek to avoid habitat loss in these areas wherever possible. In all locations habitat loss would be kept to the minimum necessary for safe construction of the proposed project. Following construction of the 400kV line habitats would be reinstated. All temporary access tracks used for construction and dismantling (of the 132kV line) would be reinstated following best practice guidelines. At Ruttle Wood, near Beauly, a moderate adverse effect is predicted because of long-term habitat loss.
- 7.7.1.4 Where it is not possible to avoid significant disturbance to protected species, works would only be undertaken under the appropriate licence or in consultation with Scottish Natural Heritage (SNH). Agreed mitigation measures would ensure that trees to be felled, or built structures with potential for bat roosts that would be subject to any works, would be surveyed prior to construction for bat interests. If any bat interests are identified appropriate mitigation measures would be agreed with the Scottish Executive in consultation with SNH. Mitigation

measures also include avoidance of construction work in areas where birds are breeding as far as possible.

- 7.7.1.5 Successful implementation of the agreed mitigation measures, would ensure no residual significant long term adverse effects on statutory designated ecological sites or protected species would occur. No residual significant long term adverse ecological effects on vegetation, plants, birds, mammals or aquatic protected species have been predicted. The loss of Torwood Mire Wildlife Site due to the construction of Denny North Substation, would be a moderate adverse effect of local importance. This in part would be offset by SPT's commitment to support the conservation of another Scottish lowland raised bog.
- 7.7.1.6 There would be short term disturbance to breeding birds, some of which are of nature conservation significance, protected mammal species and other animals along the line. Disturbance would be short term and in any one location would be unlikely to be significant.
- 7.7.1.7 The loss of ancient and semi natural woodland (see Section 7.3) is not considered to be significant. Routeing has sought to avoid areas of greatest nature conservation interest.
- 7.7.1.8 Effects on nine sites of European importance for nature conservation are not predicted to be significant.

## 7.8 Landscape Effects

- 7.8.1.1 The assessment of landscape effects has considered the landscape character of the area between Beaulay and Denny, both as a regional resource, as identified by SNH, and at a more local level. This has been undertaken in terms of the sensitivity of the area and the extent to which the landscape is subject to change.
- 7.8.1.2 The comments received at the Scoping stage of the project have been identified and addressed within the assessment of landscape effects. The assessment has identified all designated, statutory and non-statutory areas that could be affected by the proposed 400kV overhead transmission line and the potential for significant adverse effects on the landscape character of these areas has been examined.
- 7.8.1.3 The assessment has examined the potential for adverse and beneficial effects on the landscape character of the corridor between Beaulay and Denny. A summary of the findings is presented below.
- 7.8.1.4 No major adverse effects on the landscape character and resource of the area have been identified.
- 7.8.1.5 Residual moderate adverse effects are predicted for the following locations:
  - from the general presence of the line in eight areas, including areas located within the Cairngorms National Park and one area of wild land<sup>5</sup> in the Corrieyairack Pass. These are: the Beaulay to Eskdale / Cruive area; the western part of the area between Knollbuck and Garva Bridge; between Garva Bridge and Kinloch Laggan; between Kinloch Laggan and Inverpattack Lodge; between Inverpattack Lodge and the A9 at Dalwhinnie; in the area around Muthill; between the proposed Braco substation and Upper Whiteston; and in the area between Upper Whiteston and the forestry at Sheriff Muir. The presence of the proposed line in the area between Beaulay and Eskdale / Cruive would be offset by the removal of the existing 132kV line in this area;
  - within small parts of three National Scenic Areas<sup>6</sup> (NSAs): Kintail and Glen Affric NSA (as indirect effects on the area outside the NSA, in the vicinity of the Tomich Monument); Loch Rannoch and Glen Lyon NSA (as direct effects on the easternmost parts and where the proposed line would be within 2km) and Loch Tummel NSA (as direct effects on the western edges of the NSA and as indirect effects on areas of higher ground to the west, located within the Loch Rannoch and Glen Lyon NSA and close to the proposed line). The proposed line would not adversely affect the integrity of any NSAs and the proposed line would not run within any NSAs;

<sup>5</sup> Areas listed in SNH Policy Statement 02/03: Wildness in Scotland's Countryside

<sup>6</sup> A national landscape designation (statutory)

- within three Historic Gardens and Designed Landscapes<sup>7</sup> (HGDs) at Drummond Castle, Culdees and Braco Castle; and
  - at four areas used for tourism and recreation: within the Corrieyairack Pass; in the Muthill and River Earn area; in the Ashfield and Kinbuck area and in the area of the Hermitage Wood, Bridge of Allan.
- 7.8.1.6 Residual moderate beneficial effects are predicted at the following locations, as a result of the removal of the existing 132kV overhead line. These are:
- within the area between Beauly and Eskadale / Cruive (offset against the presence of the proposed line in this area);
  - within Strathglass;
  - within the Cairngorms National Park, in Strathspey and in Glen Truim;
  - at the western end of the Corrieyairack Pass from removal of the existing 132kV line in that location;
  - within the Drummond Castle HGD, from the removal of the existing 132kV line in the southern part of the estate;
  - in the area between Lurg and Upper Whiteston; and
  - in the area of Bannockburn and to the west of Cowie and Plean.
- 7.8.1.7 Mitigation measures are proposed in order to prevent, reduce or offset adverse effects. Although the main elements of mitigation have been incorporated into the scheme through the development of the proposed route, additional mitigation is proposed in order to ensure that adverse effects are minimised wherever possible. Measures would include careful positioning of towers in the landscape to take advantage of the presence of natural features, and planting of native, small-sized trees and shrubs in order to replace planting removed as a result of the proposed line. Replacement planting would also assist in maintaining the landscape, where planting is a feature of the existing area.
- 7.8.1.8 The residual effects on landscape character would be the presence of the 400kV overhead transmission line within the landscape, in many areas as a replacement for the existing 132kV line, though with larger towers spanning a greater distance and therefore requiring fewer towers overall.
- 7.8.1.9 Changes to the landscape character would be greatest in areas where there is no overhead line at present, as these areas would take longer to adjust to the presence of the proposed line in the landscape. These include the area above the southern valley side at Strathglass, within the Glen Shirra and Kinloch Laggan area, to the east of Muthill, across Coire Odhar and at the southern end of Strathallan, and in the area of Fallin, Cowie and the eastern side of Plean.
- 7.8.1.10 In some areas, such as to the south of Strathglass and in the Coire Odhar areas, the landscape has the capacity to accommodate the proposed overhead transmission line and long term effects on the landscape character would be negligible. In areas such as parts of Glen Shirra and in the area of Fallin, Cowie and Plean, with time it is considered that the long term effects would be no greater than minor adverse (i.e. non-significant). In other areas, at Muthill and in the southern part of Strathallan, the line would alter the landscape character of the area and would give rise to adverse effects, though these are assessed as moderate adverse.
- 7.8.1.11 The proposed route passes through some landscapes where long term, moderate adverse effects on the landscape character would remain, such as around Muthill and within Strathallan. No better alternative route was identified where effects would be less.

## 7.9 Visual Effects

- 7.9.1.1 The potential for significant adverse effects on the visual amenity of the area between Beauly and Denny as a result of the proposed 400kV overhead line has been assessed. Visual effects have been assessed for properties and settlement areas, for roads, railways and other

<sup>7</sup> A non-statutory designation relating to important historic gardens listed in an SNH inventory

rights of way, and for open space and recreation areas. Figures NTS 4A and 4B show computer generated visualisations of what the transmission line would look like. Figure NTS 4A is looking south from Cannich and Figure NTS 4B is looking east from the Wallace Monument.

7.9.1.2 Major adverse visual effects as a result of the operation of the line have been predicted in the following locations:

- within the Beauly – Fort Augustus area at six properties.
- within the Fort Augustus to Tummel area at one property.
- on rights of way in the Glen Shirra / Kinloch Laggan area at three locations.
- within the Tummel to Braco area at eleven properties.
- within the Braco to Denny area at nine properties.

7.9.1.3 Moderate adverse visual effects have been predicted at the following locations:

- within the Beauly to Fort Augustus area on six settlements (overall effects on two of these are neutral as a result of the dismantling of the existing 132kV line), 18 properties, sections of roads in six areas, one access track and at one recreation area.
- within the Fort Augustus to Tummel area on two settlements, two properties, sections of roads in three areas, rights of way in two areas, and the National Cycle Network 7 north of Dalwhinnie.
- within the Tummel to Braco area on one settlement, 25 properties, sections of roads in six areas, rights of way/paths in four areas, and the general areas used for recreation which are located in close proximity to the line.
- within the Braco to Denny area on four settlements, 16 properties, roads in six areas and public rights of way/paths in two areas.

7.9.1.4 Moderate adverse effects on the visual amenity of designated areas have been predicted at the following areas:

- within the Fort Augustus to Tummel area in the Cairngorms National Park.
- within the Tummel to Braco area at three HGDLs (Drummond Castle, Culdees and Braco Castle).
- within the Braco to Denny area indirectly on the Touch Hills AGLV.

7.9.1.5 Moderate beneficial visual effects have been predicted at the following locations, as a result of the dismantling of the existing 132kV overhead line:

- within the Beauly to Fort Augustus area at two settlements (Eskadale and Cannich), (balanced against the moderate adverse effect of the new line), at several individual properties (all located close to the existing 132kV line) and for the recreational use and open space at one location.
- within the Fort Augustus to Tummel area on two settlements (Laggan and Dalwhinnie), several properties (all located close to the existing 132kV line), some public roads (A9 to the north of Dalwhinnie and the A889 in Dalwhinnie), the network of paths in the Strathspey/Laggan area and on the recreational areas in Strathspey.
- within the Tummel to Braco area on two settlements (western side of Muthill and Braco) and several properties (all located close to the existing 132kV line).
- within the Braco to Denny area on one settlement (Greenloaning) and several properties (all located close to the existing 132kV line).

7.9.1.6 Moderate beneficial effects on the visual amenity of designated areas have been predicted at the following locations, as a result of the proposed dismantling of the existing 132kV overhead line:

- within the Fort Augustus to Tummel area in the Cairngorms National Park.
- within the Tummel to Braco area at two HGDLs

- 7.9.1.7 Moderate adverse visual effects would result from the increased number of transmission lines in the area north of the proposed Denny substation.
- 7.9.1.8 Moderate beneficial visual effects would result from the removal of the 132kV line in the Bannockburn area and to the west of Plean.
- 7.9.1.9 Moderate adverse visual effects would occur on four key tourism and recreation sites including within the Corrieyairack Pass, in the Muthill and River Earn area, in the Ashfield and Kinbuck area and at Hermitage Wood adjacent to Airthrey Gardens at the Bridge of Allan.
- 7.9.1.10 Moderate beneficial effects would occur for walks and facilities in the area between Etteridge and Laggan due to dismantling of the existing 132kV transmission line.
- 7.9.1.11 Figures NTS 4 A and 4 B present photomontages of the proposed transmission line at two selected locations (Strathglass near Cannich in the north of the route and around Stirling, from the Wallace Monument, in the south of the route).

## 7.10 Cumulative Visual Effects

- 7.10.1.1 The potential for cumulative effects upon visual amenity has been assessed in accordance with accepted methodology and best practice. This was assisted and directed by the scoping opinion obtained from the Scottish Ministers. Such visual effects result from the additional changes to visual amenity caused by the proposed overhead transmission line acting in conjunction with those of other developments. Cumulative visual effects arise where it is possible to see more than one development on the skyline. SNH guidance on assessing the cumulative visual effects of wind farms (which was followed for this appraisal) requires the study of a zone within 30km radius of the turbines. The committed development studied in detail includes 20 wind farm projects. Hydro electric schemes and several other small electricity transmission lines have also been addressed.
- 7.10.1.2 The potential for cumulative visual effect was studied by preparing plans of the zones of visual influence of these developments and considering whether they overlapped with the visual envelope of the proposed route. Not all of the wind farm developments in the vicinity of the route would necessarily share areas of their visual envelopes with the overhead transmission line, and even if the visual envelopes do overlap, the effects may not be significant. The study considered the potential for combined or simultaneous visibility from individual receptor viewpoints and successive visibility, also from individual viewpoints. The appraisal concluded that there was the potential for significant (moderate) adverse effects in connection with five proposed windfarm developments and the potential for significant (moderate) cumulative visual effects has been identified at six representative viewpoint locations.

## 7.11 Cultural Heritage & Archaeology

- 7.11.1.1 The cultural heritage and archaeological assessment for the proposed Beaulay to Denny overhead transmission line has been conducted in accordance with current planning policy and relevant legislation.
- 7.11.1.2 As a result of mitigation, it is predicted that there would not be any significant direct adverse effects on the known cultural heritage and archaeological remains. Any potential significant effects on unknown remains located in areas deemed sensitive to unknown remains, would be compensated through mitigation.
- 7.11.1.3 If any important unknown remains were uncovered during the construction process, in areas that have not been deemed to be sensitive to unknown remains, (and therefore would not have been subject to the mitigation strategy), there exists the potential that significant direct adverse effects could occur on unknown remains.
- 7.11.1.4 Major adverse effects on the setting of three cultural heritage sites have been predicted (The Listed Building of Garva Barracks and the Scheduled Ancient Monuments of Garva Bridge and Gallamuir Enclosure). Moderate adverse effects have been predicted on the setting of a further 68 sites. Where significant adverse effects on the setting of cultural heritage and archaeological features have been predicted, mitigation would be achieved where possible through micro-siting of tower locations, the location of which would be clarified at Stage 2 survey. With successful mitigation, the number of predicted significant effects would reduce

from three to two major adverse effects (Garva Barracks and Garva Bridge) and from 68 to 36 moderate adverse effects.

## 7.12 Tourism and Recreation

- 7.12.1.1 The tourism and recreation appraisal has considered potential effects to businesses in proximity to the proposed project. The findings have been informed by the survey responses received from 155 businesses.
- 7.12.1.2 Careful routeing of the line has reduced potential effects, although there may be some localised adverse effects particularly during construction (see Section 7.13). Following mitigation, residual adverse effects of the proposed project on tourists, tourism business and recreation are not predicted to be significant.
- 7.12.1.3 There are also predicted to be some beneficial long term effects from the removal of the 132kV line in the Laggan area.

## 7.13 Disruption due to Construction

- 7.13.1.1 The potential for significant adverse disruption and amenity effects has been identified for properties, communities and other road users adjacent to a number of public roads which would be used by heavy goods vehicle traffic during construction. Temporary, moderate adverse disruption effects are predicted as follows:
- Loss of amenity for properties, pedestrians, cyclists and equestrians along several key access routes to construction areas. The principal settlements affected either by potentially significant disruption effects, or exposure to slight disruption effects for more than 12 months, include Cannich, Laggan, Dalwhinnie, Trinafour, Tummel Bridge, Weem, Amulree and Braco.
  - Individual properties and small settlements along several of the minor roads affected by construction vehicle movements would also be subject to significant, temporary disruption effects. These include the road between Kiltarlity Cottages and Eskadale near Beauly, the Cannich to Fasnakyle road in Strath Glass, the access road to Culachy Estate near Fort Augustus, the road from Trinafour to Tummel Bridge, the road along the southern side of Loch Freuchie and the access road to the proposed Braco Substation near Easter Feddal.
  - Use of the A82 between Inverness and Invermoriston during busy summer periods by construction traffic would increase potential conflicts with cyclists and tourists using this route.
  - Pedestrians and recreational walkers using minor roads such as the road between Fort Augustus and Auchteraw, and the road from the A82 to Culachy Estate (which leads to the Corrieyairack Pass) would be subject to some disruption due to construction traffic.
- 7.13.1.2 The adverse environmental effects of proposed improvement works to public roads are predicted to be localised resulting from small scale disturbance to verge habitats, hedges, walls and road edges, and from the temporary amenity effects of the disturbance associated with the construction activity. In most cases these works would not give rise to significant residual adverse effects provided mitigation is successfully implemented. The short term nature of much of this work (a few days) is such that significant noise and amenity effects on nearby properties are not predicted.

## 7.14 Construction Noise and Vibration

- 7.14.1.1 An assessment has been made of the predicted adverse noise effects of construction of the proposed access roads, towers and the substations together with the dismantling of the existing 132kV line. Adverse noise effects were predicted and assessed for the following phases of work:
- transmission line construction sources and dismantling of 132kV line;
  - substations including construction and demolition works;



- construction traffic effects including noise from vehicles using access tracks and the public road system.
- 7.14.1.2 Moderate adverse daytime noise effects from construction have been predicted to affect properties located within 50m of the works in urban areas. In quiet rural areas, moderate adverse residual noise effects are predicted at properties located within 100m of the proposed transmission line and substation construction working areas. These effects would be limited to periods of short duration (usually less than a few weeks) and would affect a small number of properties (less than 20 in total) in the following locations:
- Kiltarlity Cottages and Hughton;
  - Fasnakyle (next to substation);
  - Torgyle Bridge;
  - Glen Almond (northeast and east of Crieff); and
  - Several isolated locations between Manor Powis and Denny.
- 7.14.1.3 Moderate adverse night time noise effects are predicted for a small number of properties located within 100m of the substations at Beauly (in Wester Balblair) and Fasnakyle, due to transformer oil processing activities. These effects would be limited to a maximum of three night time periods.
- 7.14.1.4 Noise effects from construction traffic using public roads have been assessed for roadside properties along key sections of road to be used for access to the overhead transmission line and substation sites. No significant roadside noise effects have been predicted along routes such as trunk roads and well trafficked A and B routes. Significant changes in roadside noise levels have been predicted for public roads which currently carry very little traffic and therefore have low noise levels. Roadside properties along the following routes would be affected:
- the unclassified road from Eskadale to Kiltarlity Cottages;
  - the unclassified road from Fasnakyle to Cannich in Strath Glass;
  - the access road to Culachy Estate from the A82 south of Fort Augustus;
  - the road from Laggan village to Spey Dam;
  - the B847 and unclassified road connecting Trinafour with Tummel Bridge;
  - the A827 road between Croftmoraig and the town of Aberfeldy;
  - the unclassified road along the south side of Loch Freuchie;
  - the B827 road along the north side of the River Knaick north of Braco; and
  - the B8033 between Easter Feddal and Braco village, and the access track from Easter Feddal to the proposed new Braco Substation on Feddal Hill.
- 7.14.1.5 Whilst the noise effects for roadside properties in these locations has been assessed as significant in terms of the predicted change in levels, the resulting roadside levels are generally within or only slightly above the absolute noise criteria of 55dB which has been adopted in the assessment for rural areas (taken from World Health Organisation 'Guidelines for Community Noise'). The noise levels predicted would also not be constant due to fluctuations in construction traffic during the proposed project.
- 7.14.1.6 No significant vibration effects are predicted at properties along the proposed route. One property within 25m of the substation at Fasnakyle may experience some perceptible vibration effects during short periods of construction works to redevelop the substation.

## 7.15 Construction Air Quality

- 7.15.1.1 The greatest potential for dust problems to occur would be within 200m of construction (principally the tower sites and new access roads). However the problem would be temporary, and provided that site specific mitigation measures are successfully implemented, no significant adverse dust effects are predicted at properties within 200m of the proposed project.

- 7.15.1.2 Following mitigation, there would remain the potential for short term releases of particulate matter (PM<sub>10</sub>) from materials handling and site plant. However, by reducing the use and location of site plant equipment near residential properties and other sensitive areas, and by implementing the identified mitigation measures, the impact would be minimised substantially, such that no significant air quality effects are predicted.
- 7.15.1.3 Effects on roadside pollution concentrations as a result of construction traffic would be temporary and are not predicted to be significant.

## 7.16 Operational Noise

- 7.16.1.1 The potential for noise from overhead line operation in dry conditions is considered to be unlikely with correct manufacturing and installation methods and procedures.
- 7.16.1.2 The potential for noise from overhead lines in wet or rainy conditions is considered to be almost imperceptible at the closest dwellings to the proposed line with mitigation consisting of correct manufacturing and installation methods and procedures.
- 7.16.1.3 It is considered unlikely that there would be complaints due to operational noise from new substation equipment with mitigation comprising reduced sound power level from transformers and the construction of acoustic enclosures around transformers where necessary.

## 7.17 Electric and Magnetic Fields

- 7.17.1.1 The magnetic-field strength at 1metre (m) above ground level directly underneath the lowest point of the proposed overhead transmission line is likely to be approximately 30 $\mu$ T<sup>8</sup> under normal load conditions and should not ever exceed 70 $\mu$ T. The electric-field strength should not ever exceed 9800 volts per metre (V/m)<sup>9</sup> and should not exceed 300V/m over areas where people are likely to spend significant periods of time such as homes and gardens. There are no statutory regulations in the UK that limit the exposure of people to power frequency or magnetic fields. On the advice of the Health Protection Agency – Radiological Protection Division<sup>10</sup> (HPA – RPD) in 2004 the Government adopted the guidelines published in 1998 by the International Commission on Non-Ionizing Radiation Protection (ICNIRP). The values predicted for the new line comply with ICNIRP guidance.
- 7.17.1.2 The HPA - RPD's 2004 advice to adopt the ICNIRP levels was reached after extensive review of the evidence for possible health effects of power-frequency fields. The HPA - RPD advise that there is no convincing evidence that electromagnetic fields are a cause of cancer; that no biological mechanism has been established in support of this idea; and that the epidemiological evidence reviewed by them and their Advisory Group on Non-Ionising Radiation cannot be used as a basis for restrictions on exposure to EMFs. This advice has been endorsed by Government ministers.

## 7.18 Radio and TV Interference

- 7.18.1.1 There may be some impact from the overhead transmission line on broadcast radio reception along the route, however the effects would be negligible in most areas and only minor (not significant) in those areas that are affected. The areas affected are likely to be only those where reception is already categorised as beyond the acceptable coverage area.

## 7.19 Cumulative Effects

### 7.19.1 Introduction

- 7.19.1.1 The potential for combined and cumulative environmental effects from the proposed project has been considered at two levels:

<sup>8</sup> Magnetic fields are usually measured in microteslas ( $\mu$ T). The earth's natural magnetic field in Scotland is approximately 50  $\mu$ T

<sup>9</sup> Electric-field strengths are measured in volts per metre (V/m). The atmospheric electric field at ground level is normally about 100V/m in fine weather and may rise to many thousands of V/m during thunderstorms

<sup>10</sup> Formerly known as the National Radiological Protection Board (NRPB)

- the combined and interactive effects of the different aspects of the proposed project on people and the various environmental resources; and
- the cumulative effects of the proposed project with other committed developments in the vicinity of the line.

7.19.1.2 These effects are summarised in the following sections.

## **7.19.2 Combined Effects of the Proposed Project**

7.19.2.1 The proposed Beauly to Denny overhead transmission line project involves the construction of 220km of new 400kV double circuit overhead transmission line, the construction or redevelopment of six substations along the route and dismantling of the existing Beauly to Denny 132kV line. The route passes through a predominantly upland landscape, with lowland areas at the southern end of the route, of significant natural and cultural heritage importance. Although the land take of the various parts of the project is relatively small, the scale of the proposed project is such that it would have significant effects on some aspects of the natural heritage. Economic interests within parts of the project would also be affected. In addition, the proposed project would have several effects on people and property, particularly during construction. The inter-relationship and combination of significant effects of the project in these three areas are considered here.

### **Natural and Cultural Heritage Effects**

7.19.2.2 Cumulative landscape effects are predicted from the proposed project taken as a whole, from the construction and operation of the proposed line, including new access tracks and road improvements combined with the effects of line construction and dismantling of the existing 132kV line. Cumulative landscape effects during the construction phase would be greatest in areas where there would be dismantling works in addition to construction operations. These would be of particular concern in sensitive areas, designated areas including Areas of Great Landscape Value (AGLVs) and Historic Gardens and Designed Landscapes (HGDLS), or in areas where there are nearby properties.

7.19.2.3 The combined effects of landscape change from new transmission line construction and associated development and loss of woodland in key locations is also predicted to result in cumulative effects on the landscape. These effects would be most pronounced in areas where significant tree felling is required to facilitate construction, such as Ruttle Wood, Eskadale Woods, Melgarve, Inverpattack, Feagour, Ben Alder Estate, Over Bohespig, Tay Valley, Glen Quaich, Templemill (Muthill), Cambushinnie Hill and Yellowcraig Wood. In a number of these locations there would also be a localised ecological effect due to the loss of ancient woodland such as at Ruttle Wood, Torgyle, Templemill and Yellowcraig Wood.

7.19.2.4 In locations where the existing 132kV transmission line would be dismantled and removed, there is potential for cumulative beneficial effects on the landscape, and the setting of cultural heritage sites, due to removal of the infrastructure and the potential for release of land for woodland planting. These combined effects, however, would only be predicted in the longer term.

7.19.2.5 Although no significant residual effects on presently known archaeological resources are predicted from construction of the proposed project (see Section 7.11), the transmission line infrastructure would affect the setting of a number of cultural heritage features. In these areas of particularly sensitive landscape, where cultural heritage features contribute to the landscape character and quality, cumulative landscape and cultural heritage setting effects would be predicted.

7.19.2.6 The site of the proposed substation at Denny North is located on a raised lowland bog of local ecological importance (Torwood Mire). The construction of the substation would result in a significant hydrological effect in this location due to the loss of the wetland habitat, carbon storage potential of the peat and the effect on the local hydrology. A local cumulative effect is predicted due to the combined ecological and hydrological effect on the mire. In other locations along the route, no significant hydrological effects are predicted provided that the committed mitigation measures are implemented in accordance with best practice, particularly in the sensitive water catchments identified in the assessment. This mitigation is particularly

important in Strathspey where the transmission line (and temporary access tracks) cross a series of small watercourses on the northern side of the valley which all drain directly to the ecologically sensitive River Spey.

- 7.19.2.7 Similarly, significant adverse long term ecological effects to designated areas, protected species, birds and other habitats and species can be avoided provided that the detailed mitigation measures which have been agreed with SHETL and SPT are implemented. There is potential for some significant short term disturbance effects to wildlife when the cumulative effects of construction of the whole line are considered.

### **Economic and Resource Use Effects**

- 7.19.2.8 The proposed project is predicted to have a number of effects on the economic use of some areas of land along the proposed route which are used for agricultural, sporting and forestry interests. Whilst some significant effects on agricultural and sporting land uses have been predicted, primarily on shooting and stalking interests (see Section 7.4), significant cumulative economic and land resource effects have not been predicted. Similarly, impacts on woodland predominantly relate to landscape, ecological and woodland loss effects rather than any significant economic impacts on a location-specific or cumulative project basis.
- 7.19.2.9 The proposed project would affect some tourism and recreational uses. This is primarily through the perceived effects of reduced income from some tourist related businesses due to a combination of the proximity of the transmission line and/or the visual intrusion of the line to such businesses. There is some potential for cumulative adverse effects, particularly for tourists visiting areas affected by construction of the proposed project with visual impacts and/or disruption from construction traffic. However, the effects of the proposed project on tourism and recreational businesses are not predicted to be significant in the context of the area of assessment as a whole or the Scottish tourist and visitor market.
- 7.19.2.10 There are also predicted to be some beneficial effects from the removal of the 132 kV line in the Laggan area. Further, the economic impact from the construction of the transmission line is likely to be significant for the local labour markets of Inverness, Perth and Stirling and Scotland generally, with significant benefits over a period of 3 years and beyond. Sizeable contracts will be awarded as part of the construction project, and a significant amount of transport and plant will have to be hired and utilised. The multiplier effects of accommodation requirements of contract employees are likely to ensure the creation of a significant number of indirect jobs in accommodation and services during the proposed project.
- 7.19.2.11 At any one time it is likely that on average between 250 and 300 people could be employed on sites along the proposed route and at substations. Employment would be the responsibility of the main contractor but it is likely that a number of people from the local area would be employed on the proposed project. There would also be indirect benefits through spend by the construction work force. This would bring economic benefits to the local communities during the construction period.

### **Effects on People and Property**

- 7.19.2.12 Whilst project construction is a temporary process, it is predicted to last for up to four years in total, and the potential for significant cumulative environmental effects from combined effects during this period has been assessed.
- 7.19.2.13 Construction of the proposed project is predicted to result in some significant disruption effects to local communities and properties close to the working areas along the transmission line. Effects are predicted at some properties situated along public roads which would be used to provide transport access to the transmission line, substation sites and areas where the existing 132kV line would be dismantled. Construction noise for the overhead transmission line is only predicted to significantly affect properties within 100m of the line, and for relatively short periods of time. However, some locations would be subject to the cumulative effects of reductions in amenity, increased severance and increased road traffic and/or construction noise for longer periods of time during the construction phase. The cumulative effects of construction on the amenity of communities are predicted to be greatest in the following locations, where effects are predicted for periods of greater than 12 months:

- Properties along the unclassified road between Eskadale and Kiltarlity Cottages which would experience disruption and noise effects from construction traffic and, in some locations, noise from transmission line construction.
  - Properties between Fasnakyle Substation and the village of Cannich in Strathglass. The property adjacent to the substation would experience significant noise effects during construction and roadside properties along this road and in Cannich village would be subject to disruption and reduced amenity from project construction and dismantling traffic.
  - At Culachy, on the track from the A82 south of Fort Augustus to the route through the Corrieyairack Pass, where a small number of properties would be affected by noise and disruption from construction traffic.
  - Laggan village in Strathspey through which construction traffic would pass en route to Spey Dam, where roadside noise, and vehicle intimidation effects are predicted.
  - Properties in Trinafour and along the public road between Trinafour and Tummel Bridge would be affected by transmission line construction noise and roadside noise effects and disruption from construction traffic.
  - Roadside properties along the road between Amulree and Wester Shian along the south side of Loch Freuchie would be affected by traffic noise and disruption and properties within 100m of the line would also experience some construction noise effects.
  - Isolated properties along the access track from Easter Feddal to the proposed site of a new Braco Substation at Feddal Hill, and roadside properties in Braco village would be affected by reduced amenity and road traffic noise from construction vehicles.
- 7.19.2.14 All of these properties would also experience visual impacts during the construction process from views of construction activities on the overhead transmission line and/or from construction traffic and plant movements in close proximity.
- 7.19.2.15 In addition, a number of communities are predicted to experience significant short term reductions in amenity. This is as a result of disruption from construction traffic due to the strategic nature of the roads passing through these locations, serving large sections of the transmission line route. Settlements such as Dalwhinnie, Tummel Bridge and those between Weem and Grandtully are predicted to experience reductions in amenity due to the cumulative effect of increased levels of road traffic from project construction over relatively long periods of time during the construction programme.
- 7.19.2.16 Following completion of project construction, significant effects on people and property would generally be limited to visual intrusion from properties in proximity to the overhead transmission line and for other groups such as walkers, tourists and users of transport routes. Just 10 properties would be located within 100m of the proposed 400kV overhead transmission line compared to 93 within 100m of the existing 132kV overhead transmission line.
- 7.19.2.17 The operation of the overhead transmission line and substations is not predicted to give rise to significant levels of traffic or any traffic-related environmental effects. No significant noise effects are predicted from the transmission line or substations. The proposed project is not predicted to significantly affect radio or television reception. No significant cumulative effects are therefore predicted from the combined operational effects of the proposed project.

### **7.19.3 Cumulative Effects of Parallel Projects**

- 7.19.3.1 A review of committed developments in the vicinity of the proposed project has been undertaken to identify the potential for cumulative effects arising from simultaneous construction and operation of other significant developments with the proposed Beaulay to Denny overhead transmission line.
- 7.19.3.2 The majority of projects with planning consent are of small scale and no significant cumulative environmental effects would be predicted from their construction or operation in parallel with the proposed overhead transmission line. However, a small number of more significant development proposals have been identified in the vicinity of the overhead transmission line. These projects, which either have planning approval and await construction, or are close to being determined include the following developments (from north to south):

- Upgrading of Fasnakyle Power Station (under construction);
- Eilean Aigas Power Line (33 kV) at Hughton (now complete);
- A Wind Farm proposal south of Glen Moriston;
- A Hydro Electricity Plant at Glen Doe near Fort Augustus;
- Redevelopment of Taymouth Castle near Aberfeldy;
- Wind farm proposals between Aberfeldy and Dunblane at Calliacher, Logiealmond, Abercairney, Braes of Doune and Burnfoot Hill;
- The Stirling-Alloa-Kincardine Railway; and
- The Stirling Major Growth Area.

7.19.3.3 The potential for significant cumulative environmental effects during construction or operation of these projects with the proposed Beaulieu to Denny overhead transmission line project has been identified for landscape and visual impacts and for impacts associated with construction traffic and disruption.

7.19.3.4 The cumulative visual effects of the overhead transmission line with other major development proposals in proximity to the line have been reported in Section 7.10 above. Cumulative landscape effects are predicted in areas where the line would be located in proximity to structures such as telecommunications masts and wind farm developments (whether existing or proposed). These would be permanent effects. Moderate adverse cumulative effects on the landscape character are envisaged from proposed wind farm developments, should these proceed, at Calliacher, Logiealmond and the southern part of the Abercairney wind farm site.

7.19.3.5 During construction of the overhead transmission line, and dismantling of the existing 132kV line, there would be some potential for cumulative disruption effects on roads accessing the proposed project and other committed developments. A number of the projects identified above would require vehicular access for construction purposes along roads identified for transmission line construction access. Where the construction phases for the Beaulieu to Denny overhead transmission line project overlap with those for one or more of the committed developments identified, then significant disruption effects would be predicted for those roads and adjacent communities identified in the assessment of disruption due to construction. Roadside noise levels from construction traffic would also be increased temporarily along these affected routes. The operation of these other developments at the same time as the proposed transmission line is not predicted to result in significant cumulative traffic, disruption or noise effects.

## 8 Conclusion

8.1.1.1 Consideration of the key effects of the proposed project indicates that careful routeing of the new 400kV line through all stages of the development of the project together with identification of a comprehensive set of mitigation measures, which would be implemented, reduces the potential effects of a major transmission line considerably.

8.1.1.2 The findings of the EIA indicate that the project objective of identifying a technically feasible and economically viable route which on balance causes the least disturbance to the environment and the people who live, work and recreate within it has been met.

## 9 Comments

9.1.1.1 Comments on the project or its environmental effects are invited in writing to the Scottish Ministers at the address or email below within the specified period from the publication date of the Notice in local newspapers advertising the publication of the ES.

Scottish Executive  
Energy Consents Unit  
Enterprise, Transport & Lifelong Learning Department  
Meridian Court  
5 Cadogan Street  
Glasgow  
G2 6AT

[Econsents@Scotland.gsi.gov.uk](mailto:Econsents@Scotland.gsi.gov.uk)

The ES has been made available for public consultation at the locations identified in the Notice (see Table 1).

**Table 1: Locations for ES Public Consultation**

<b>Beauly to Fort Augustus</b>
Beauly Post Office, High Street, Beauly, IV4 7BT
Kiltarlity Post Office, Kiltarlity, By Beauly, IV4 7JG
Cannich Post Office, Cannich, By Beauly, IV4 7LN
Tomich Post Office, Tomich, By Beauly, IV4 7LF
Inverness Library, Farraline Park, Inverness, IV1 1NH
The Highland Council, Planning & Development, Glenurquhart Road, Inverness, IV3 5NX
The Highland Council, Drumnadrochit Service Point, The Car Park, Drumnadrochit, IV63 6TX
The Highland Council, Planning & Building Control, 1-3 Church Street, Inverness, IV1 1DY
The Highland Council, Inverness Service Point, 21-23 Church Street, Inverness, IV1 1VY
Glenmoriston Store/ Post Office, Invermoriston, IV63 7YA
<b>Fort Augustus to Tummel Bridge</b>
Laggan Store, Laggan Bridge, Newtonmore, PH20 1AH
The Inn at Loch Ericht, Dalwhinnie, Inverness-shire, PH19 1AG
The Caravan Park Shop, Tummel Bridge, Pitlochry, Perthshire, PH16 5SA
The Highland Council, Fort Augustus Service Point, Memorial Hall, Fort Augustus, PH32 4DJ
The Highland Council, Kingussie Service Point, Ruthven Road, Kingussie, PH21 1EJ
The Highland Council, Aviemore Service Point, The Schoolhouse, Milton Park, Aviemore, PH22 1RR
Newtonmore Craft Centre, Main Street, Newtonmore, PH20 1DA
<b>Tummel Bridge to Braco</b>
Kinloch Rannoch Post Office, The Square, Kinloch Rannoch, Pitlochry, PH16 5PF
Pitlochry Branch Library, 26 Atholl Road, Pitlochry, PH16 5BX
Perth & Kinross Council, Aberfeldy Area Office and Library, Bank Street, Aberfeldy, Perthshire, PH15 2BB
Perth & Kinross Council, Planning and Development Services, Pullar House, 35 Kinnoull Street, Perth, PH1 5GD
The A K Bell Library, 2-8 York Place, Perth, PH2 8EP
Library for the Disabled, 57 West Mill Street, Perth, PH1 5QP
Crieff Branch Library, 6 Comrie Street, Crieff, PH7 4AX
Crieff Scottish Hydro Electric Shop, 7 Hill Street, Crieff, PH7 3BU
Braco Post Office, Front Street, Braco, Dunblane, FK15 9QN
<b>Braco to Denny</b>
Dunblane Branch Library, The Institute, High Street, Dunblane, Perthshire, FK15 0ER
Dunblane Scottish Hydro Electric Shop, 42-44 High Street, Dunblane FK15 0AY
Bridge of Allan Library, Fountain Road, Bridge of Allan, FK9 4AT
Stirling Council, Viewforth, Stirling, FK8 2ET
Stirling Library Headquarters, Borrowmeadow Road, Stirling, FK7 7TN
Stirling Central Lending Library, Corn Exchange Rd, Stirling, FK8 2HX
Fallin Library, Stirling Road, Fallin, FK7 7JE
Bannockburn Library, Greenacre Place, Bannockburn, FK7 8HY
Cowie Branch Library, Burns Terrace, Cowie, FK7 7BS
Plean Library, Main Street, Plean, FK7 8BT
Denny Library, 49 Church Walk, Denny, FK6 6DF
Larbert Library, Main Street, Stenhousemuir, FK5 3JX
Falkirk Library, Hope Street, Falkirk, FK1 5AU
Falkirk Council, Abbotsford House, David's Loan, Falkirk, FK2 7YZ
Clackmannanshire Council, Greenfield House, Alloa, FK10 2AJ
Clackmannan Library, Main Street, Clackmannan, FK10 4JA



- 9.1.1.2 Copies of the Environmental Statement are available from SHETL and SPT at the addresses below for £300 for a paper copy or £50 on CD. The Non-Technical Summary is available free of charge from the same addresses or can be viewed on the project website (<http://www.scottish-southern.co.uk>).

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