SCOTTISHPOWER

SP Transmission Ltd

Black Law Windfarm Extension Grid Connection

Routeing Consultation Report

April 2011

BLACK LAW WINDFARM EXTENSION GRID CONNECTION

ROUTEING CONSULTATION REPORT

Prepared for
ScottishPower Energy Networks
by
Land Use Consultants

April 2011

PREFACE

This Consultation Document has been prepared by Land Use Consultants on behalf of:

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Copies of the Routeing Consultation Document can be obtained from:

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This document is available in hard copy or in electronic format (CD-ROM). The document can also be viewed or downloaded from the SP EnergyNetworks website by using the following link and scrolling down until you reach the Blacklaw Windfarm Routeing Consultation Document:

http://www.spenergynetworks.com/publicinformation/performance.asp

[1] Acting as agents for SP Transmission Ltd (SPT), the Transmission Licence Holder.

This Routeing Consultation Document is also available for viewing at:

North Lanarkshire Council Planning Offices North Lanarkshire Council 303 Brandon Street Motherwell ML1 1RS	West Lothian Council Planning Offices West Lothian Council Country Buildings Linlithgow West Lothian EH49 7EZ
South Lanarkshire Council South Vennel Lanark ML11 7JT	Lanark Library 16 Hope Street Lanark ML11 7LZ
Forth Library / Forth Primary School Main Street Forth ML11 1AE	Lanark Post Office 28 St. Leonards Street Lanark ML11 7AB

Organisations contacted formally by SP Energy Networks (see Appendix 1) and local communities have been asked to respond by **6th May**.

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1. INTRODUCTION

BACKGROUND TO THE PROJECT

1.1. Against a background of strengthening evidence on the nature and extent of climate change caused by emissions of carbon dioxide (CO_2), and increasing concerns about the future security of UK energy supplies, Scottish Government targets seek to provide 50% of Scotland's electricity from renewable energy sources by 2020, with an interim milestone of 31% by 2011.

1.2. Onshore wind is likely to make a significant contribution to Scottish Government targets for renewable energy and this includes schemes such as the recently consented extension to the operational Black Law windfarm ('Black Law Windfarm Extension'). The Extension is located to the north and north-east of the operational windfarm, spanning the North Lanarkshire and West Lothian local authority boundary. This windfarm extension would require connection to the electricity network ('the grid') to enable this renewable energy to be transmitted to electricity customers.

ScottishPowers' Statutory Duties

1.3. ScottishPower, through its electricity transmission licence holder company[2], SP Transmission Ltd (SPT), is responsible for the transmission network from the English/Scottish border to just north of Stirling, an area of some 23,000 square kilometres. As the licence holder, SPT is required under Section 9(2) of the Electricity Act 1989 *"to develop and maintain an efficient, co-ordinated and economical system of electricity transmission"* and *"to facilitate competition in the supply and generation of electricity"*. For SPT to comply with its licence obligations, it must provide this windfarm extension with access to the electricity network.

1.4. All transmission licence holders are required under Paragraph 3 to Schedule 9 and Section 38 of the 1989 Electricity Act to take account of the following factors in formulating proposals for the installation of overhead transmission lines:

> *"(a) to have regard to the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features of special interest and of protecting sites, buildings and objects of architectural, historic or archaeological interest; and,*
>
> *(b) to do what he reasonably can to mitigate any effects which the proposals would have on the natural beauty of the countryside or any such flora, fauna, features, sites, buildings or objectives."*

1.5. As a result, a licence holder is required to consider and then balance technical, economic and environmental issues to identify a proposed route for a grid connection.

[2] As defined in the Electricity Act 1989 (as amended by the Utilities Act 2000).

Options for Connection

1.6. Black Law Windfarm Extension is adjacent to the existing Black Law Windfarm. To determine options for connecting Black Law Windfarm Extension to the electricity transmission system, SPT carried out a technical and economic study to review the capacity of the existing transmission system in the vicinity of the scheme.

1.7. An additional connection capacity of 69 megawatts (MW) of wind generation is required to be connected to the transmission system in Lanarkshire.

1.8. The existing Black Law Windfarm, with 124MW of wind generation, was connected to the transmission system in March 2005 via a 132 kilovolt (kV) circuit to Wishaw grid substation. The capacity is then transformed directly to the 275kV system via a 275/132kV 'auto-transformer'.

1.9. There were two connection options for consideration for Black Law Windfarm Extension:

a) construct a single 132kV line to Wishaw grid substation, similar to the original development; or

b) construct a single 132kV line to Linnmill grid substation.

1.10. The two connection options are very similar in terms of both distance and the proposed combination of overhead and underground construction. The comparable costs for each option are similar. However, the Wishaw option connection costs must include for replacement of the auto-transformer. A further constraint at Wishaw is the practicality of achieving a further 132kV connection into the substation, which technically would be very difficult given that routes into Wishaw are very congested.

1.11. Therefore, following technical appraisal of both options, the preferred connection for Blacklaw Extension Windfarm is via a 132kV line to Linnmill Substation.

THE DEVELOPMENT AND CONSENTING PROCESS

1.12. In 2009, ScottishPower Energy Networks (SPEN), agents for SP Transmission Ltd, commissioned Land Use Consultants (LUC), to provide environmental services in relation to the project. The project comprises two key phases:

- *Phase One Routeing and Consultation*: to undertake a strategic review of technical, economic and environmental constraints and apply a series of established step-by -step routeing principles to identify a 'preferred' route for the connection;

- *Phase Two Environmental Impact Assessment*: following consultation on the 'preferred' route, to undertake an Environmental Impact Assessment (EIA) of the 'proposed' route, culminating in the production of an Environmental Statement (ES) to accompany an application for consent to construct and operate the overhead line.

Phase One: Routeing and Consultation

1.13. This document addresses the identification of a 'preferred route' for the grid connection.

1.14. SPEN is committed to ongoing consultation with interested parties, including statutory and non-statutory consultees for the application and the local community. Whilst there is no statutory requirement to consult during the routeing process, SPEN considers it good practice to introduce formal consultation at this stage.

1.15. Formal consultation will be via provision of this Routeing Consultation Document to Consultees and the local community, who will be invited to make a response to SPEN within a timescale of five weeks. The consultation exercise will be advertised by SPEN via posters and leaflets being distributed within the project study area. The responses to the consultation process will be evaluated and a 'proposed route' then confirmed for progression to EIA.

Phase Two: Environmental Impact Assessment

1.16. SPT will seek consent for an overhead line of approximately 14km in length with a voltage of 132kV. The proposed overhead line is an 'EIA development' in accordance with the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000. Under Regulation 2(1), the preferred route is a Schedule 2 development as Schedule 2(d) *"an electric line installed above ground with a voltage of 132 kilovolts or more, the installation of which (or the keeping installed of which) will require a section 37 consent but which is not Schedule 1 development"*. For Schedule 2 developments, a judgement is required as to the likelihood of significant environmental impacts, depending on the nature, size and location of the proposal.

1.17. Due to the nature of the proposal, it cannot be confirmed at this stage that the development will not have significant effects on the environment, and on this basis SPT proposes to submit an Environmental Statement with the application for consent. In accordance with regulation 3(2), this intention to submit an Environmental Statement confirms the development as an EIA development.

1.18. The EIA will be prepared in accordance with established good practice by LUC, Registered Assessors with the Institute of Environmental Management and Assessment. To identify the key concerns of consultative bodies, including views on assessment methodologies, a request for a Scoping Opinion will be submitted to Scottish Ministers. The project team will also seek views from a range of additional relevant parties.

1.19. The EIA process will seek to prevent, reduce, and where possible, offset likely significant impacts on the environment through an iterative design process for the routeing of the overhead line. The likely impacts of the overhead line on the environment will be presented in an Environmental Statement (ES).

The Application for Consent

1.20. Following completion of the ES, an application for consent to install, and keep installed, a 132kV line will be sought from Scottish Ministers under Section 37 of the Electricity Act 1989. In conjunction with the Section 37 application, an application for deemed planning permission for the line will also be submitted under the Town and Country Planning (Scotland) Act 1997, as amended. The ES will accompany these applications.

1.21. The proposed development will also require approximately 3km of underground cable. Underground cables are considered Permitted Development under the Town and Country Planning (General Permitted Development) (Scotland) Order 1992. Therefore an application will not be required for consent to install, and operate, the underground section of the project. However for robustness, the likely environmental effects of the cable section will also be assessed and the findings reported within the ES.

PURPOSE OF THE REPORT

1.22. The purpose of this Routeing Report is to:

i) outline the methodology adopted for the routeing of the connection including how established guidelines for transmission line routeing have been incorporated into the routeing strategy;

ii) present the findings of the routeing study, culminating in a description of the 'preferred route' for the connection;

iii) provide an opportunity for interested parties to comment on the preferred route and any other related issues which can inform the next stages of the project.

THE STRUCTURE OF THE REPORT

1.23. This report contains seven chapters:

- Chapter 1: Introduction.
- Chapter 2: Project Description.
- Chapter 3: Approach to Routeing.
- Chapter 4: The Study Area.
- Chapter 5: Application of the Routeing Methodology.
- Chapter 6: The Preferred Route.
- Chapter 7: Conclusions and Next Steps.

SP TRANSMISSION

Black Law Grid Connection

Project Location

Study Area

Local Authority Boundary

Map Scale: 1:250,000

Figure 1.1

2. PROJECT DESCRIPTION

PROJECT REQUIREMENTS

2.1. To enable connection of Black Law Windfarm Extension to the electricity network, a new 132 kV overhead line is required. SPT policy seeks to find an overhead line solution for all transmission connections and only where there are exceptional environmental constraints would underground cables be considered as a design alternative. Such constraints can be found in urban areas and in rural areas of the highest scenic and amenity value. There are many technical, environmental and economic disadvantages of underground routeing including:

- the physical extent of land required;
- the fault repair time;
- difficulties associated with general maintenance;
- increased cost;
- greater ground disturbance from excavating trenches;
- the restriction of development and planting within the underground transmission cable corridor;
- requirements for cable sealing end compounds or platforms at each end of each section of underground cable.

2.2. As a consequence, LUC's original remit for this study was to consider routeing options for an overhead line from the Black Law Windfarm Extension substation to the existing substation at Linnmill, west of Lanark as shown on **Figure 2.1**. As outlined in **Chapter 5**, however, to avoid crossing an area of 'highest environmental value' with the overhead line, an underground cable route across the River Clyde valley was identified in the approach to Linnmill substation (technical constraints also prevented the routeing of the overhead line across this steep sided valley). LUC's remit was then amended to consider routeing options for an overhead line to a new terminal pole at this point.

PROJECT DETAILS

2.3. The technical requirement is for a 132 kV 'single circuit' Trident 43-50 construction wood pole transmission line. **Figure 2.2** shows typical components of this type of transmission line. The line will carry a single 3-phase circuit.

2.4. Whilst these wood poles have a standard height above ground of 14 - 16 metres (m), these can be extended or reduced in height, as required, to meet statutory clearance requirements or to address factors such as sloping ground. The basic spacing for these poles accommodates a span length of 120m. However, the spans will vary to accommodate environmental and technical constraints and variations in topography.

2.5. To construct the overhead line a temporary access track will be required to each pole location. A tracked excavator and low ground pressure vehicles, (e.g. tractor, argocat, quad bikes) will be used to deliver, assemble and erect each wood pole

structure at each location. The erection of the wood poles will require an excavation to allow the pole brace block and/or steel foundation braces to be positioned in place. A typical pole excavation will be $3m^2$ by 2m deep. The excavated material will be sorted into appropriate layers and used for backfilling. No concrete will be used. The excavator(s) then hoist the assembled structure into position and once the structure has been braced in position the trench is backfilled.

2.6. Construction of the cable section connecting the overhead line into the existing Linnmill substation will require excavation of a 1 to 1.5m deep trench approximately 1m in width. The cables will be laid on a bed of thermally selected sand and backfilled with the previously extracted material.

2.7. The operational boundary at Linnmill Substation will need to be extended slightly to accommodate the additional switchgear.

3. APPROACH TO ROUTEING

SCOTTISH POWER'S ROUTEING COMMITMENT

3.1. In developing and maintaining an efficient and co-ordinated technically and economically viable transmission system, in accordance with the licence agreement, SPEN is committed to limiting disturbance to people and the environment by its operations.

THE PROJECT ROUTEING OBJECTIVE

3.2. To comply fully with SPEN's Routeing Commitment, the Routeing Objective for this project is:

> *"to identify a technically feasible and economically viable route for the 132kV single circuit wood pole transmission line that meets the technical requirements of the electricity network and causes, on balance, the least disturbance to the environment and the people who live, work and recreate within it".*

BROAD ROUTEING PRINCIPLES

Technical Considerations

3.3. Technical issues to be considered in routeing have been identified by SPEN.

3.4. As outlined in **Chapter 1**, in relation to the connection points at either end, the original project brief identified the Black Law Windfarm Extension on-site substation, identified within the Black Law Windfarm Extension Environmental Statement as being located at approximately NGR 291241 656776 as the connection point from the windfarm. This is the location identified in the application for consent to construct and operate the Windfarm Extension. The point of connection to the electricity transmission network was identified as the existing Linnmill substation, located at approximately NGR 285355 643335.

3.5. SPEN also identified the existing and consented Black Law windfarm turbines as potential technical constraints to routeing. This is because the turbines produce 'wake' (air turbulence) which may damage conductors on the overhead line and could also pose a risk to the security of electricity supply due to potential 'toppling'. In the case of the existing Black Law and recently consented Black Law Extension wind turbines, a buffer of 152m was applied by SPEN, equal to the height of the turbines plus an additional 20 percent.

3.6. At an early stage in the project, it was identified that to connect from the Black Law Windfarm Extension substation to the existing Linnmill substation, the overhead line would need to be routed through the proposed turbines of Black Law Windfarm Extension, and, possibly, through the existing Black Law windfarm. Therefore, due to the potential technical constraint posed by the turbines, an alternative potential location for the Black Law Windfarm Extension substation was considered at the outset of the routeing study, to enable wider consideration of potential route corridors. This was located within a search area identified by SPEN in the commercial forestry of Kingshill Plantation, to the south-west of the existing substation location.

3.7. Other technical issues identified by SPEN included physical constraints to routeing, comprising slope (> 15°) and altitude (>300m AOD) for the construction and operation of a wood pole line respectively. The presence of the steep sided valley of the River Clyde which requires to be crossed, also poses a technical constraint to routeing, due to the number of existing overhead lines spanning the river in this area.

3.8. Additional technical issues, including wood pole design, construction techniques, operational life and maintenance, and compliance with government guidelines, such as for Electro Magnetic Fields (EMF), will be considered once the preferred route has been identified, and will be reported on in the information accompanying the application for consent.

Economic Considerations

3.9. In compliance with Section 9 of the Electricity Act 1989, the Routeing Objective requires the proposed solution to be 'economically viable'. This is interpreted by SPEN as meaning that as far as is reasonably possible, and other things being equal, the line should be as direct as possible and the route should avoid areas where technical difficulty or compensatory requirements would render the scheme unviable on economic grounds.

Environmental Considerations

3.10. Statutory duties imposed by Section 9 of the Electricity Act 1989 require licence holders to seek to preserve features of natural and cultural heritage interest and to mitigate, where possible, any effects which their development may have on such features. The construction and operation of an overhead transmission line will have potential effects on people and the environment, including potential effects on:

- visual amenity;
- landscape character;
- ecology;
- hydrology, hydrogeology and water resources;
- geology and soil;
- cultural heritage including archaeology;
- land uses including mineral operations, agriculture and forestry;
- residential amenity;
- recreation.

3.11. Some effects can be avoided or limited through careful routeing, the subject of this document. Other effects are best mitigated through local deviations of the route, the refining of pole locations and/or specific construction practices. These will be reviewed as part of the EIA process.

The Holford Rules for the Routeing of New High Voltage Overhead Transmission Lines

3.12. It is generally accepted across the electricity industry that the guidelines developed by the late Lord Holford in 1959 for routeing overhead transmission lines, 'The Holford Rules', should continue to be employed as the basis for routeing high voltage overhead transmission lines. The Holford Rules were reviewed circa 1992 by the National Grid Company (NGC) plc (now National Grid Transmission (NGT)) as owner and operator of the electricity transmission network in England and Wales, with notes of clarification added to update the Rules.

3.13. A subsequent review of the Holford Rules (and NGC clarification notes) was undertaken by Scottish Hydro Electric Transmission Limited (SHETL) in 2003 to reflect Scottish circumstances. These guidelines for the routeing of new high voltage overhead transmission lines, with the NGC 1992 and SHETL 2003 notes, form the basis for routeing the Black Law Windfarm Extension overhead line. The Holford Rules are detailed below. The NGC and SHETL clarification notes are included in **Appendix 2**.

3.14. Whilst the Holford Rules relate specifically to high voltage steel tower lines, in the case of lower voltage wood pole lines, many similarities exist with the routeing of tower lines. Therefore, many of the principles contained in the Holford Rules can also be used as a guide to the routeing of wood pole connections. It is also important to note that the Holford Rules are guidelines only and can be adapted to reflect the characteristics of the area in question, provided that this is justified fully.

Rule 1

Avoid altogether, if possible, the major areas of highest amenity value[3], by so planning the general route of the line in the first place, even if the total mileage is somewhat increased in consequence.

Rule 2

Avoid smaller areas of high amenity value, or scientific interest by deviation; provided that this can be done without using too many angle towers, i.e. the more massive structures which are used when lines change direction.

Rule 3

Other things being equal, choose the most direct line, with no sharp changes of direction and thus with few angle towers.

Rule 4

Choose tree and hill backgrounds in preference to sky backgrounds, wherever possible; and when the line has to cross a ridge, secure this opaque background as long as possible and cross obliquely when a dip in the ridge provides an opportunity. Where it does not, cross directly, preferably between belts of trees.

[3] 'Amenity value' includes areas designated for their environmental or cultural/historical interest.

Rule 5

Prefer moderately open valleys with woods where the apparent height of towers will be reduced, and views of the line will be broken by trees.

Rule 6

In country which is flat and sparsely planted, keep the high voltage lines as far as possible independent of smaller lines, converging routes, distribution poles and other masts, wires and cables, so as to avoid a concatenation or 'wirescape'.

Rule 7

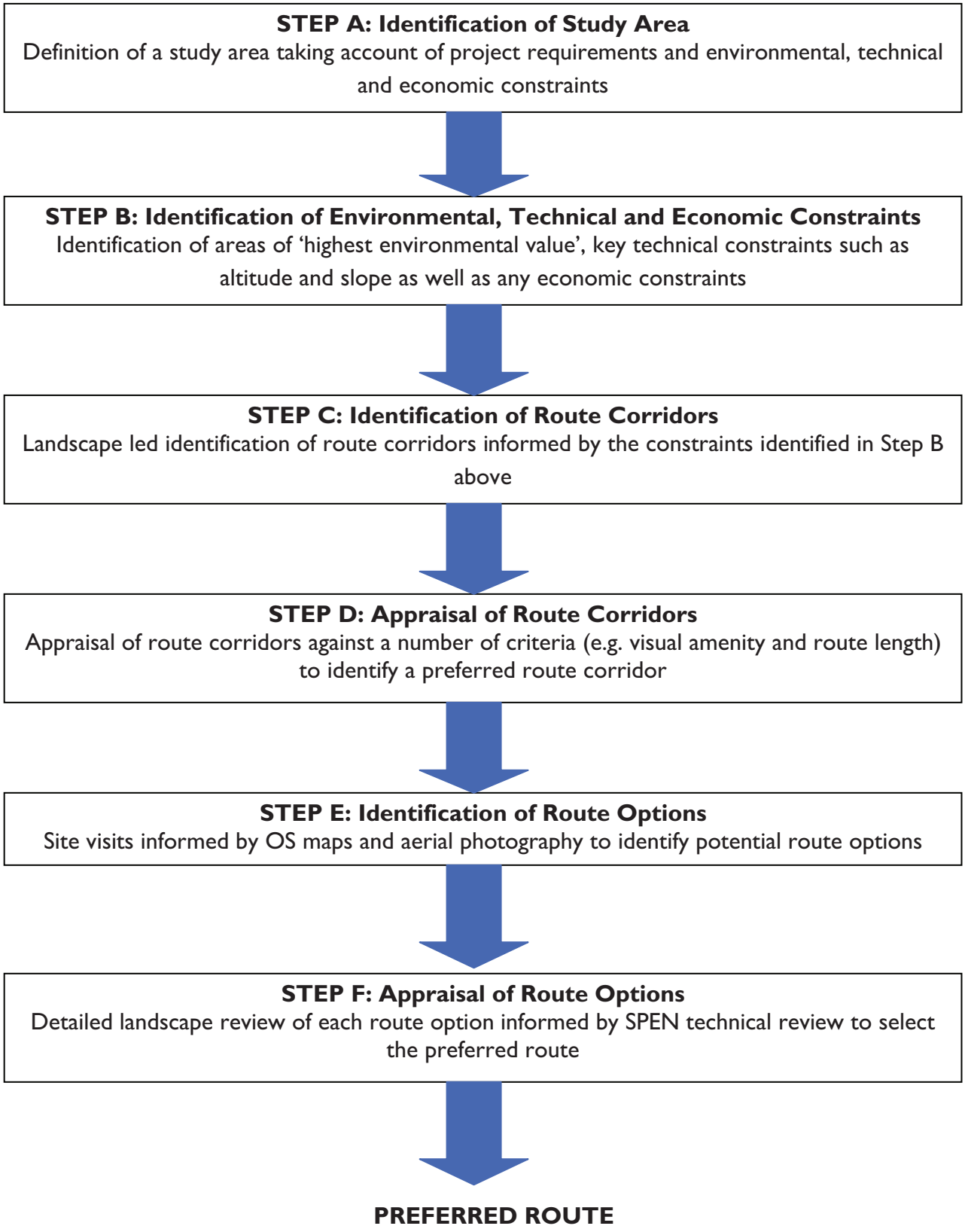
Approach urban areas through industrial zones, where they exist; and when pleasant residential and recreational land intervenes between the approach line and the substation, go carefully into the comparative costs of undergrounding, for lines other than those of the highest voltage.

THE ROUTEING METHODOLOGY

3.15. The steps of the routeing methodology for the Black Law Windfarm Extension connection project are summarised in **Figure 3.1** below.

3.16. The steps of the routeing methodology have been devised on the basis of technical and environmental constraints, informed by the hierarchical Holford Rules. Steps were undertaken sequentially, with one step informing the next step, culminating in the confirmation of the preferred route for the connection. Further information in relation to each of the steps is provided in **Chapters 5**.

Figure 3.1: Routeing Methodology



4. THE STUDY AREA

INTRODUCTION

4.1. The study area extends broadly south from the existing Black Law windfarm and proposed Extension as far as, and including, Lanark, and from eastern fringes of Blackwood in the south-west to outside Carstairs and Hyndford Bridge in the south-east (as shown on **Figure 4.1**). The study area covers approximately 20,000 hectares and has been defined to reflect the requirement to connect Black Law Windfarm Extension into the Linnmill substation west of Lanark.

4.2. This chapter provides an outline of the study area characteristics, with an emphasis on strategic considerations that have informed the overall routeing process. More detailed information will be collected to inform the EIA process.

4.3. The study area is located predominantly within South Lanarkshire, although Black Law Windfarm Extension and the northern extent of the study area are within North Lanarkshire and West Lothian. The relevant Development Plans are also highlighted in this chapter.

STUDY AREA DESCRIPTION

4.4. Much of the study area is predominantly rural in nature, comprising low lying agricultural land with traditional field patterns, mature hedgerows and shelter belts with scattered woodland. The study area also includes areas of commercial forestry and both Lee Castle and The Falls of Clyde designed landscapes. The River Clyde flows through the south-west of the study area from Mauldslie Mains to the Kirkfieldbank Bridge.

4.5. With the exception of the settlements of Carluke (population 13,430) and Lanark (population 8,200), the study area is characterised by small settlements and villages of less than 1000 people. Netherburn (780), Crossford (690), Kirkfieldbank (870) and Carstairs (800) are among the largest[4]. A full list of settlements considered as strategic routeing constraints is provided below. There are also a number of smaller 'clusters' and individual properties dispersed throughout the area. The study area has a transport network comprising major and minor roads which service the main settlements and connect them to the wider area including Edinburgh to the east and Glasgow to the west.

4.6. The study area has been shaped by a history of human activity which will continue to influence the landscape into the future. Coniferous forestry planting has also changed the landscape more recently in the north of the study area, although much of this has been felled to accommodate the existing Black Law Windfarm, with further felling proposed as part of the Black Law Windfarm Extension proposals.

[4] Mid-2006 Population Estimates for Settlements in Scotland (accessed 9th December 2009; available at http://www.gro-scotland.gov.uk/statistics/publications-and-data/settlements-and-localities/mid-2006-population-estimates-for-settlements-in-scotland/list-of-tables.html)

4.7. South Lanarkshire has a long history of coal and other minerals extraction and there are four existing bings (spoil heaps) within the study area. Opencast coal extraction and sand and gravel extraction also currently take place within the study area; further information on this is provided below.

NATURE CONSERVATION DESIGNATIONS

4.8. Many areas which are important for their nature conservation value have been designated at the international, European, national or local level. Whilst designation does not imply a prohibition on development, development proposals have to be assessed for their effects on the conservation interests that the designation is intended to protect. The routeing methodology (as shown in **Figure 3.1**) requires the identification of such designated areas. Those present within the study area (as shown in **Figure 4.2**) are:

- European designations: Special Areas of Conservation (SACs);
- National designations: Sites of Special Scientific Interest (SSSIs) and National Nature Reserves (NNRs);
- Local designations: Scottish Wildlife Trust Reserves (SWTRs);
- Sites of Importance for Nature Conservation (SINCs).

Special Areas of Conservation [Step B]

4.9. Special Areas of Conservation (SACs) are designated under the EC Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (Directive 92/43/EC) (the "Habitats Directive"). Article 3 of the Habitats Directive requires the establishment of a European network of important high quality conservation sites that will make a significant contribution to conserving the 189 habitat types and 788 species identified in Annexes I and II of the Directive (as amended).

4.10. There are two SACs present within the study area, **Clyde Valley Woods SAC** and **Cranley Moss SAC.** Clyde Valley Woods SAC covers several discrete areas located within the south and west of the study area. The size of this SAC within the study area is approximately 280 ha., although there are areas of the same SAC outwith the study area boundary. The primary reason for the designation of Clyde Valley Woods as a SAC is the presence of mixed woodland on base-rich soils associated with rocky slopes. Cranley Moss SAC, an area covering just over 101 ha., is a designated area due to the presence of active and degraded raised bog.

4.11. The conservation objectives associated with these sites are to ensure that the extent, distribution, structure and function of the qualifying habitat are maintained for the long term. Species distribution and viability and prevention of disturbance are also important to maintain favourable conservation status.

Sites of Special Scientific Interest [Step B]

4.12. Sites of Special Scientific Interest (SSSIs) are defined in the Wildlife and Countryside Act 1981 as areas of land or water which are of special interest by reason of their flora, fauna or geological or physiographical features. These sites provide the foundation for a range of additional natural heritage designations, including National

Nature Reserves. There are twelve SSSIs within the study area, all of which, with the exception of Milton Lockhart Wood and the Falls of Clyde, also correspond to the Clyde Valley Woods SAC areas detailed above.

4.13. **Cleghorn Glen** SSSI occupies an area of over 70 ha. and is of biological interest due to the extensive area of riverine and gorge woodland dominated by indigenous broad leaved tree species. One species of endangered caddis fly and a number of locally uncommon beetles have been recorded on the site.

4.14. **Cartland Craigs** SSSI occupies an area of approximately 17 ha. and is considered to be an excellent example of a semi-natural deciduous woodland in the area. The woodland is dominated by elm, ash and oak, and occupies a deeply incised gorge in Old Red Sandstone. It contains a rich variety of ground flora, including a number of flowering plants which have restricted distribution in south-west Scotland.

4.15. **Fiddlers Gill** SSSI is a good example of undisturbed, semi-natural deciduous woodland. The site is of botanical interest due to the variety of woodland plant communities which have developed and the presence of a number of rare and uncommon plant species which occur. A rich breeding bird community is also supported, together with a number of uncommon beetle species. The site is approximately 30 ha. in size.

4.16. Covering an area of approximately 9 ha., the **Gillsburn and Mare Gill** SSSI is designated for its woodland. This steeply sloping valley woodland is typically oak, birch, ash and elm with holly frequently in the shrub layer.

4.17. **Upper Nethan Valley Woods** covers an area of almost 80 ha. and is designated as a good example of riverine/gorge deciduous woodland. Wet, base-enriched mid and lower valley sides support slope alderwood, which is an unusual and restricted habitat. The level ground in the gorge bottom exhibits base-rich springtime alderwoods which are also an unusual woodland habitat type in the district. Ash-elm woodland and oak are prevalent in the drier slopes of the gorge. The woodland and wet river banks also support a diverse flora.

4.18. Located just north of Upper Nethan Valley Woods is **Nethan Gorge** SSSI, also designated for its woodland habitat. The gorge itself is a fine example of a Carboniferous limestone gorge containing semi-natural deciduous woodland with an excellent structure and rich ground flora. A number of uncommon beetles, and one nationally rare species of beetle, have been documented within the site. The area of the site is approximately 40 ha.

4.19. The **Townhead Burn** SSSI is an area of ash-wych elm woodland with particularly rich ground flora, which includes a number of uncommon plant species. The site is over 10 ha. in size.

4.20. At over 55 ha. in size, **Jock's Gill Wood** is one of the largest remaining areas of semi-natural gorge woodland in the Clyde Valley. The site varies considerably in topography, geology and woodland structure and is dominated mainly by mixed deciduous woodland. A number of uncommon plants occur both in the woodland, peripheral scrub and invading coarse grassland.

4.21. **Milton Lockhart Wood** SSSI is almost 12 ha. in size and is considered to be one of the most important sites for woodland beetles in south central Scotland. A number of nationally rare and nationally scarce species in Great Britain and scarce or rare species in Scotland have been noted within the SSSI.

4.22. **Cranley Moss** is located just north of Carstairs, and covers an approximate area of 101 ha. The area supports one of the best examples of raised bog, of both degraded and active variety, in Lanarkshire.

4.23. A small proportion of **Carstairs Kames** is included in the east of the study area. The total area, including that outwith the boundary, covers roughly 162 ha. This is an area of scientific interest due to the presence of unique glacial landforms, which at points reaches up to 25m above the surrounding topography.

4.24. **The Falls of Clyde** offer several natural features and assets of interest. The area covers approximately 18 ha. and has examples of fluvial and glacial geomorphology different to that found elsewhere in Scotland. Several species of tree are present in the forest area, including ash, elm, birch, oak and alder. Nationally scarce grasses grow on the ground forest layer; these include lesser hairy brome *Bromopsis benekenii* and wood fescue *Festuca altissima*.

National Nature Reserves [Step B]

4.25. National Nature Reserves (NNRs) were first designated over 50 years ago as the foundation of nature conservation. All NNRs are now designated as SSSIs to provide them with a higher level of protection. Clyde Valley Woodlands NNR corresponds to Cartland Craigs and Cleghorn Glen SSSIs and is also covered by part of the **Clyde Valley Woods** SAC discussed above.

Scottish Wildlife Trust Reserves [Step B]

4.26. The Scottish Wildlife Trust (SWT) possesses a portfolio of reserves, with the intention of protecting and enhancing locally important habitats identified under the UK Biodiversity Plan.

4.27. The **Lower Nethan Gorge** Reserve overlaps with part of the Nethan Gorge SSSI and is divided in two by the River Nethan. The **Upper Nethan Gorge** is part of the Upper Nethan Valley Woods SSSI.

4.28. **The Falls of Clyde** Reserve occupies an area of 67 ha. and overlaps with the Falls of Clyde SSSI.

Sites of Importance for Nature Conservation[5] [Step B]

4.29. **Fullwood Roadside/ Craigenhill** is located approximately 3km north of Lanark and is designated for its biologically base rich and acid grassland landscape.

[5] South Lanarkshire Council plan to change the system for SINCs to 'Local Nature Conservation Sites'. The process will involve updating the information regarding those sites recognised, for some of which the data is over 20 years out of date. After completion of this process, it may be the case that a number of these sites are no longer designated for the same reason, if at all. However, as this process is still to be carried out, the information provided is the most accurate available.

4.30. **Braxfield – Kirkfieldbank SINC** is recognised for the importance of its woodland and landscape. It is located immediately west of Lanark, progressing to the south and has an area of approximately 50 ha. **Robbiesland Bog** is roughly 1 km south of this SINC and is much smaller with an area of only 2 ha. It is worthy of conservation due to the biological value of the basin mire.

4.31. The **Stonebyres Woodland**, with an area of 41 ha., is located to the west of Lanark and is of importance due to its unique gorge woodland characteristics and landscape value.

4.32. **Old Rockery** is an area designated for the presence of acid grassland and valuable woodland. This SINC covers an area of roughly 6 ha. and is located to the north-west of Lanark.

4.33. **Orchard House** (3 ha.), **Gillfoot – Cozieglen** (10 ha.), **Braidwood Glen** (7 ha.) and **Birkhill Farm and Burnbank Farm** are located close to one another, to the north-west of Lanark. The closest of which to the town is Birkhill Farm and Burnbank, which is also the largest with an area of 31 ha. These are all designated SINCs, recognised for the biological importance of their woodlands. **Upper Gillsburn** located slightly further to the north-west of these sites, designated for the same features, has an area of approximately 3 ha.

4.34. The **St Oswalds Hedgerow** is located approximately 5km north-west of Lanark and the conservation interest of the area relates to the value of the hedgerows and landscape present.

4.35. **Gills SINC** is approximately 5 ha. and has been designated for its woodland and landscape value. It is approximately 3km from Carluke to the south-west.

4.36. **Upper Jock's Gill/Jock's Burn** is located to the south-west of Carluke. It covers and area of 9 ha. and is of interest due to the biological value of the grassland, woodland and invertebrates present there.

4.37. Located slightly further away from Carluke to the south-west, is the **Milton – Lockhart SINC**, designated due to the biological value of its woodlands. The SINC is approximately 28 ha.

4.38. **Undersheildhill Marsh** is located to the south-west of Carluke and is designated for the value of its pond, marsh and swamp habitats. The area measures approximately 4ha.

4.39. The **Marlage Nursery Bing** is approximately 5km to the south-west of Carluke. It covers an area of roughly 24 ha. and is designated for its bing community.

Additional Nature Conservation Interest

4.40. It is important to recognise that nature conservation interest is not confined to designated areas, as recognised in national planning policy and guidance. Further information will be collected and reviewed to inform the EIA for the proposed connection. This will include the South Lanarkshire, North Lanarkshire and West Lothian Local Biodiversity Action Plans, which identify national and local priority habitats and species present in the study area.

BIRDS OF CONSERVATION IMPORTANCE [STEP B]

4.41. Preliminary desk study and bird survey work was undertaken within the study area during Spring 2010 to inform the selection of potential routeing corridors[6]. This included species protected under Annex 1 of the EC Birds Directive, which are internationally protected and form the qualifying species for SPAs. At this stage of the project, the survey work was necessarily 'high level', and undertaken mainly to inform subsequent more detailed surveys. It is also important to note that the weather conditions which prevailed during the survey period, and previously (heavy frost, frozen water and some snow cover) mean that bird activity may not have been be typical of the time of year. Notwithstanding this, the field work did confirm the presence, within the initial study area, of the following species:

- Wildfowl: Pink-footed geese (no other geese or swans were recorded);
- Annex 1 Schedule 1 raptors: Goshawk.

4.42. In relation to other species of potential concern, no black grouse or barn owl were observed. Previous surveys in the area have detected activity by geese but no black grouse in the area. Limited evidence of barn owl in the area has been recorded but no evidence of breeding.

ANCIENT AND SEMI-NATURAL WOODLAND

4.43. In Scotland, ancient woodland is land continuously wooded since 1750AD. Areas of ancient woodland that have never been cleared or replanted are known as semi-natural ancient woodland. Whilst ancient woodlands are not protected by statutory designations, planning authorities should take due cognisance of these woodlands in developing planning policies relating to development which could affect these woodlands. A UK national inventory of ancient woodland has been prepared in recognition of the importance of these areas.

4.44. The study area is intersected by a network of ancient woodland areas. These are located predominately within the south and west of the study area and correspond to the SSSIs and other designated sites discussed above. Where the ancient woodland does not correspond with other designations, it will be considered as a routeing 'deviation' issue at the more detailed stage.

LANDSCAPE DESIGNATIONS

4.45. The Government's commitment to the protection and enhancement of the diversity of Scottish landscapes is reflected in a wide range of policies and initiatives. This includes the designation of areas nationally important for their scenic quality (National Scenic Areas). Planning authorities may also give landscapes a local designation for the purpose of safeguarding locally important areas of outstanding scenic character or quality from inappropriate development. These designations can also play an important role in developing an awareness of the landscape qualities that make particular areas distinctive, and which also give communities a sense of place.

[6] A combination of drive round and walked routes were conducted by Natural Research Projects Ltd (NRP) on 15, 16 and 17 February 2010, totalling 12 hours.

The names used for such local landscape designations currently vary from one local authority to another. For example, they may be termed 'Regional Scenic Areas', 'Areas of Great Landscape Value', 'Special Landscape Areas' or 'Sensitive Landscape Character Areas'[7]. Again, whilst designation does not imply a prohibition on development, development proposals have to be assessed for their effects on the interests that the designation is intended to protect.

4.46. There are no nationally designated landscapes (National Scenic Areas) within the study area.

Areas of Great Landscape Value and Regional Scenic Areas [Step B]

4.47. Locally valued landscapes within South Lanarkshire have been designated as Regional Scenic Areas (RSAs) and Areas of Great Landscape Value (AGLVs). These are identified in the South Lanarkshire Local Plan and development proposals will be subject to Local Plan policies designed to protect, and where possible, enhance these landscapes. There are no locally designated landscape areas within the study area which fall within either the North Lanarkshire or West Lothian boundaries.

4.48. A significant section of the study area within the south and west is designated as an AGLV (see **Figure 4.3**). This area has not been named individually in the Local Plan. It should be noted that whilst this designation is current, policy ENV 9 *Review of Landscape Character Proposal* of the South Lanarkshire Local Plan 2009 makes a commitment to re-evaluating landscape designations within the Council area. As the Linnmill substation is located within this area, the overhead line will be located within this designation for at least part of the route

Gardens and Designed Landscapes [Step B]

4.49. Gardens and Designed Landscapes (GDLs) which are particularly important for their scenic quality and historic interest are identified in the Inventory of Gardens and Designed Landscapes in Scotland, which is compiled and maintained by Historic Scotland. Whilst these are not currently afforded statutory protection, planning authorities are required to consult Historic Scotland in relation to potential effects of a development on a GDL.

4.50. There are two Garden and Designed Landscapes within the study area, as shown on **Figure 4.3**. These are described in Volume 2 of the Inventory (Glasgow, Clyde and Ayrshire) as outlined below.

4.51. **Lee Castle** occupies approximately 375 ha. and is located to the north-west of Lanark. The GDL components include outstanding architectural features (Lee Castle and the Doocot, both category B Listed Buildings), as well as a walled garden, formal garden, parkland and woodland of high scenic value. The site is also considered to be of outstanding nature conservation value.

[7] Guidance published by Scottish Natural Heritage and Historic Scotland (2004) suggests the name be standardised to 'Special Landscape Area'.

4.52. The southern part of the study area includes **The Falls of Clyde** GDL. The area occupies approximately 399 ha. and incorporates the Falls of Clyde SSSI and SWT Reserve. The historic village of New Lanark is also within this area, comprising a number of Grade A Listed Buildings adding to the archaeological value of the area. The Falls of Clyde GDL has outstanding scenic value and is host to sites of horticultural value including Castlebank Park, Corehouse and Braxfield.

LANDSCAPE CHARACTER [STEPS C TO F]

Introduction

4.53. Landscape character reflects the interaction between physical factors (e.g. geology, soils, vegetation and climate), natural processes (e.g. erosion and flooding) and human influence (e.g. agriculture, forestry, settlements and development). The principle sources of information about the landscape character of Scotland are the suite of Landscape Character Assessments (LCAs) published by SNH. These are systematic assessments of the landscape of Scotland, and are carried out at a regional scale. They include descriptions of the landscape, including its key characteristics and sensitivities, and provide guidance for the integration of different types of development. The LCA that covers most of the study area is the Glasgow and Clyde Valley Landscape Character Assessment (GCVLCA) which was published in 1999. As is the case for landscape designations discussed above, policy ENV 9 *Review of Landscape Character Proposal* of the South Lanarkshire Local Plan 2009 makes a commitment to review this assessment. A very small part of the study area in the north-east is covered by The Lothians Landscape Character Assessment (LLCA); several of the Black Law Windfarm Extension turbines are within this area.

4.54. Each LCA categorises the landscape region covered by the assessment into distinct groups that have commonalities in their pattern of geology, landform, and settlement. The GCVLCA defines three 'tiers' of landscape character:

i) Regional Character Areas;

ii) Landscape Types (and Sub Types);

iii) Landscape Units.

The LLCA defines only two tiers of landscape character:

i) Regional Character Areas; and

ii) Landscape Types

Glasgow and the Clyde Valley Landscape Character Assessment

Regional Character Areas

4.55. Regional Character Areas (RCAs) are recognisable as distinct landscape 'regions' at a broad scale, based on general characteristics such as geology, landform, soils, ecological associations, land cover and historical patterns of settlement and land use. The GCVLCA categorises Glasgow and the Clyde Valley into ten RCAs.

Landscape Character Types

4.56. Landscape Character Types (LCTs) are tracts of landscape which have a unity of character due to particular combinations of landform, landcover and a consistent and distinct pattern of constituent elements. The GCVLCA identifies 21 LCTs. The LCTs within the study area (as shown in **Figure 4.3**) are:

- STC4: Rolling Farmland;
- STC5: Plateau Farmland;
- STC8: Incised River Valleys;
- STC13: Broad Valley Uplands;
- STC15: Foothills;
- STC18: Plateau Moorland.

4.57. Landscape Character Units (LCUs) are discreet geographic areas of relatively uniform character, which fall within particular LCTs. LCUs are not discussed in the relevant text for any of the GCVLCA LCTs in the study area.

4.58. A summary of the location, extent, and key patterns of land use, cover and settlement of the main LCTs (STC4, STC5, STC8 and STC18) are discussed below. STCs 13 and 15 are omitted as they just clip the southern edge of the study area.

Rolling Farmland

4.59. Rolling Farmlands are distinguished from Plateau Farmlands, discussed below, by their lower altitude and their more undulating landform. The topography of this LCT consists of elongated hillocks, with mounds and ridges of sands and gravels in lower lying areas. As the name suggests, the predominant land use within the Rolling Farmlands is agriculture; this mainly comprises pastoral farming although small areas of arable farming occur on better quality and well drained areas. Tree cover consists of mainly coniferous plantations and shelterbelts although there are also farm woodlands, field boundary trees and isolated stands of scotch pine and beech which form strong landmarks and distinctive patters in the landscape. The settlement pattern within the LCT is limited to a scattering of farms and hamlets, although there are small towns in some areas including Lanark which borders the study area to the south.

Plateau Farmland

4.60. This landscape type covers an extensive area of the GCVLCA area and is mainly situated on the lower slopes encircling Glasgow and the conurbation. The underlying geology of this LCT is predominantly carboniferous millstone grit and carboniferous limestone. The landform is uniform and predominantly flat, gently sloping or slightly undulating. Agricultural land use is dominated by sheep and cattle farming. Tree cover is limited to a few windblown trees along field boundaries with some deciduous and coniferous shelterbelts which define and shelter the fields; there are also large areas of forestry plantation within this LCT. Settlement pattern is sparse and confined to a pattern of farmsteads with only a few larger settlements, including Carluke which is in the study area.

Incised River Valleys

4.61. The incised river valley of the Clyde passes through central Scotland and south-eastwards to the Falls of Clyde. The valley sides are generally steep and well defined although there are also gorge areas where vertical cliffs have been created by the passage of burns and rivers through harder rocks. The wider incised valley of the Clyde has traditionally been used for orchard fruit production and market gardening and orchard remnants make up a significant percentage of land cover. Agriculture tends to comprise arable cultivation or market gardening on the flatter valley floors with orchards found on valley slopes in parts of the main Clyde Valley, particularly around Kirkfieldbank. Several small villages occur in this LCT and these are a dominant feature in the landscape. The combination of physical features, woodland, land use and settlement has created a distinctive and high quality landscape.

Plateau Moorland

4.62. Plateau Moorland occurs in two parts of Glasgow and the Clyde Valley, which are geologically different. The Central Plateau occurs in the north-east of the study area and it is within this LCT that both the existing Black Law Windfarm and the proposed Extension are located. The Central Plateau is dominated by coal measures with a number of igneous intrusions and dykes. The LCT consists of blanket bog, heather and grass moorland and farmland extends onto the lower slopes, particularly on the Central Plateau. Settlement is relatively extensive, due in part to the presence of transport links between Glasgow and Edinburgh. The presence of coal and hard rock deposits has had a major effect on the landscape within the Central Plateau area. A 'subset' of the Plateau Moorlands LCT 'Plateau Moorlands with Forest' occurs where significant afforestation has taken place; this includes the Kingshill Plantation within which the Black Law turbines are located.

Lothians Landscape Character Assessment

4.63. As noted above, only a very small part of the study area is covered by the Lothians Landscape Character Assessment. The LCT in the study area is Upland Fringes which is a large-scale landscape characterised by a range of land cover types including improved grassland, arable land and, as is the case for the area within the study area, coniferous woodland.

LANDFORM/TOPOGRAPHY [STEP C]

4.64. Current guidelines on routeing overhead transmission lines stress that routeing should take advantage of, and respond to, opportunities for screening provided by landform. Therefore, broad patterns of topography have been considered over the study area, with, as a starting point, 'regional' scale and 'local' scale topography in the area identified. Topography is shown on **Figure 4.3**.

4.65. For this study, the term 'regional' has been used to describe landform, and summits in the landscape, considered to contribute to the wider visual and physical setting of the study area because of their larger scale. 'Regional' scale landform has been defined as being in excess of 250m AOD, such as Stannery Knowe, and occurs typically in the west, south and east of the southern part of the study area. The summits range in height from Carsgailoch Hill (364m) to Peat Hill (385m) in the south, and to Avisyard Hill (330m) in the east.

4.66. 'Local' scale topography in the landscape is of a smaller scale, and can contribute to the immediate setting of the scattered pockets of dwellings and smaller settlements characteristic of the study area. This has been defined as occurring between 150m AOD and 250m AOD, and typically occurs to the north and in the centre of the study area.

4.67. A large proportion of the study area is covered by 'regional' scale topography (above 250m AOD). This elevated landform is situated centrally in the study area with lower land to the northern, western and southern edges. A group of hills contributes to the regional landform of the area, with the summits of Ewe Hill (379m), Kilmein Hill (429m), Benquhat Hill (435m), Benbain (407m) and Benbeoch (463m) offering several high points. The southern exposed rocky cliff face of the highest summit, Benbeoch, is a key feature in the landscape in views to the north of the B741 road.

4.68. To the western edge of the study area, the level change from the 400m plus summits to the lower lying land of the River Doon Valley at 150m AOD is notable.

CULTURAL HERITAGE

4.69. The 'cultural heritage' of an area comprises archaeological sites, historic buildings and other features in the landscape that have the capacity to provide information about past human activity, or which have cultural relevance due to associations with folklore or historic events. Sites of cultural heritage interest may also be informed by their 'setting' within a wider landscape.

4.70. National planning policy and guidance recognises that Scotland's cultural heritage is a finite and non-renewable resource which needs to be protected, conserved and enhanced accordingly.

4.71. Within the study area, the cultural heritage features outlined below have been identified at this stage (see **Figure 4.4**). Further, more detailed, work will be undertaken to inform the EIA.

Scheduled Monuments [Step B]

4.72. Scheduled Monuments (SMs) are designated under the Ancient Monuments and Archaeological Areas Act 1979 and are defined as monuments of national importance whose preservation in situ, and within an appropriate setting, is important. The SMs within the study area comprise:

- Collielaw Wood;
- Hallbar Tower;
- Camp Wood;
- Castle Qua;
- Blackhill;
- Auchenglen;

- Craignethan Castle;
- Castle Hill;
- St. Kentigern's Church;
- Hyndford House;
- Corra Castle;
- Tenement stair at 11 Double Row, Rosedale Street, New Lanark;
- Castledykes Roman Camps and Fort; and
- Brewshott.

Listed Buildings [Step B]

4.73. Listed Buildings are protected under the Listed Buildings and Conservation Areas (Scotland) Act 1997. The purpose of listing is to ensure that any demolition, alteration, repair or extension that would affect the building's special architectural or historic interest is controlled. The term 'building' is defined broadly and can include, for example, walls and bridges. Protection also extends to the interior of Listed Buildings and to all buildings within the curtilage of the Listed Building and which have formed part of the land since before 1st July 1948.

4.74. Buildings of special architectural or historic interest are divided into three categories to reflect their degree of interest:

- Category A: buildings of national or international importance;
- Category B: buildings of regional or more than local importance;
- Category C: Buildings of local importance;

However, all Listed Buildings receive equal legal protection.

4.75. The Listed Buildings within the study area are located predominantly in the west and the south of the study area. As there are approximately 375 of these, these are not discussed individually in this report but are represented graphically on **Figure 4.4**.

Conservation Areas [Step B]

4.76. Conservation Areas are protected under the same legislation as Listed Buildings and are areas of special architectural or historic interest, the character or appearance of which it is desirable to preserve or enhance. The following Conservation Areas are located within the study area:

- Conservation Area near Rosebank;
- Conservation Area of Lanark;
- New Lanark and the Falls of Clyde Conservation Area.

LAND USE

4.77. Key land uses within the study area are detailed below; these include forestry, opencast coal extraction, agriculture, settlements and infrastructure.

Forestry [Step D]

4.78. There are small areas of commercial forestry within the study area; the objective being to avoid these where possible through the routeing process in accordance with the guidance for routeing overhead lines. Some of this forestry is owned/managed by the Forestry Commission Scotland, with other areas being privately owned/managed.

Coal Extraction [Step D]

4.79. Opencast coal extraction accounts for a major proportion of the ongoing mineral extraction within South Lanarkshire and the area presently supplies around 2 million tonnes of coal per year to Scotland and England. There is a significant known coal deposit at Climpy in the north-east of the study area and this site is currently a consented opencast coal extraction site. It is likely that in the future this area will continue to be worked as an opencast site. There is also a smaller working mineral site at Mousewater in the east, with Ravensthruther coal terminal located close by. No deep mining currently takes place within South Lanarkshire. There are also four bings within the study area at Kilncadzow (Gateside, Drums and Leemuir) and Carluke (Castlehill).

Agriculture [Step D]

4.80. The Macaulay Institute has developed a series of 'land capability for agriculture' classification groups, based on the degree of limitation that biophysical factors can impose on agriculture. On the basis of the Institute's 'Soil Survey of Scotland (Sheet 7): South East Scotland', the main land capability classes within the study area are:

- 3_2: land capable of producing a moderate range of crops;
- 4_1: land capable of producing a narrow range of crops;
- 5: land capable of use as improved grassland;
- 7: land of very limited agricultural value.

4.81. The study area can be divided broadly into areas where a certain land capability for agriculture class is prevalent. On this basis, the northern section of the study area comprises solely of land capability class 5_1, 5_2 and 5_3 (broadly encompassing the area between Gladsmuir Hills and Springfield Reservoir). The remaining land in the study area is mainly within capability class 4_1, with an area covering Kilcadzow within land of capability class 5_1. There are also a few small patches of class 5 land, and two areas of class 7 land within Carluke and Lanark. The majority of the land around Lanark, in the south-eastern extent of the study area, is within class 3_2 land. There is another stretch of the same class land in the south-west, following the flow route of the River Clyde. The quality of agricultural land appears to increase towards the southern extents of the study area.

4.82. Given the limited extent of 'best and most versatile' agricultural land (classes 1, 2 and 3_1) within the study area, the project team agreed that this would be considered as a potential deviation issue if present in proximity to the preferred route.

Settlements [Step B]

4.83. For the purposes of routeing, the definition of 'settlement' has been taken from the relevant Local Plan, where areas with their own Local Plan Map are considered as strategic routeing constraints. Based on this approach, 16 settlements fall into this category within the study area:

- Auchenheath;
- Hazelbank;
- Rosebank;
- Crossford;
- Netherburn;
- Braidwood;
- Kirkfieldbank;
- Cartland;
- Carluke;
- Kilncadzow;
- Cleghorn;
- Lanark;
- New Lanark;
- Carstairs;
- Hyndford;
- Ravenstruther.

4.84. In addition to these settlements, there are many smaller 'clusters' and individual properties throughout the study area.

Infrastructure [Step D]

4.85. The road and rail network influences the movement of people across the study area. The main roads within the study area are the A72, A73 and A721. The A721 splits from the A73 at Carluke and links to Carstairs in the east. The A73 continues south from Carluke down to Lanark. The A72 runs through the western section of the study area and joins up with the A73 in Lanark. There are also several minor roads

within the study area which link to the main road network, including the B7086, B7056 and B7016.

4.86. Carluke and Lanark are also served by the rail network.

ADDITIONAL CONSIDERATIONS

4.87. Geology and soils and recreational and tourism activities have not been considered to represent strategic routeing constraints for this routeing study. However, these topic areas will be considered in detail in the EIA.

PLANNING POLICY CONTEXT

4.88. Whilst the study area is located predominantly within South Lanarkshire, the most northerly extent extends into North Lanarkshire and West Lothian and this is also where the Black Law Windfarm Extension will be located. The Structure and Local Plans covering the study area therefore comprise:

South Lanarkshire

- Glasgow and the Clyde Valley Structure Plan (adopted 2008).
- South Lanarkshire Local Plan Volumes 1 and 2 (adopted 2009).

North Lanarkshire

- Glasgow and the Clyde Valley Structure Plan (adopted 2008).
- Finalised Draft North Lanarkshire Local Plan (approved October 2008, currently undergoing post Inquiry modifications).

West Lothian

- Edinburgh and Lothians Structure Plan (adopted 2004).
- West Lothian Local Plan (adopted 2009).

National Planning Framework for Scotland 2

4.89. The National Planning Framework for Scotland (NPF) 2 is a strategy for Scotland's long term spatial development. Within the Framework, the need for key improvements to the electricity transmission system to facilitate the development of Scotland's renewable energy resources is highlighted. The document outlines the need for, and consideration of, upgrading, reinforcing, replacing and re-building a number of existing routes, whilst recognising the necessity for new connections and route modifications, taking account of opportunities for unlocking the potential of additional renewable energy resources.

Scottish Planning Policy

4.90. Scottish Planning Policy (SPP) was published in February 2010 and is a statement of the Scottish Government's policy on land use planning matters of national importance. This replaces Scottish Planning Policy 6 'Renewable Energy' which has now been revoked. Paragraph 182 of SPP states that increasing the amount of energy

generated from renewable energy “is a vital part of the response to climate change” and that current Scottish Government targets (50% of Scotland's electricity and 11% of heat demand to be met by renewable energy by 2020) should not be viewed as a cap. Paragraph 184 continues to state that “planning authorities should support the development of a diverse range of renewable energy technologies, guide development to appropriate locations and provide clarity on the issues that will be taken into account when specific proposals are assessed. Development plans should support all scales of development associated with the generation of energy and heat from renewable sources, ensuring that an area’s renewable energy potential is realised and optimised in a way that takes account of relevant economic, social, environmental and transport issues and maximises benefits".

SP TRANSMISSION

Black Law Grid Connection

LUCGL Fig04-01_4770_0015_r1_Study_Area 01/04/2011

Study Area

Study Area

Local Authority Boundary

Black Law Windfarm Extension Substation

Linnmill Substation

Map Scale: 1:75,000

Figure 4.1

SP TRANSMISSION

Black Law Grid Connection

Nature Conservation Designations

- Study Area
- Special Area of Conservation (SAC)
- Site of Special Scientific Interest (SSSI)
- National Nature Reserve (NNR)
- Sites of Importance for Nature Conservation (SINC)
- Scottish Wildlife Trust Reserve (SWTR)

Map Scale: 1:75,000

Figure 4.2

SP TRANSMISSION

Black Law Grid Connection

Landscape Designations, Character Types and Topography

Study Area

Landscape Designations

Area of Great Landscape Value

Regional Scenic Area

Other Designations

Garden & Designed Landscape

Landscape Character Types

LTH2 - Upland Fringes
STC4 - Rolling Farmland
STC5 - Plateau Farmland
STC8 - Incised River Valleys
STC13 - Broad Valley Upland
STC15 - Foothills

Topography

1 - 50m
51 - 100m
101 - 150m
151 - 200m
201 - 250m
251 - 300m
301 - 350m
351 - 400m

Map Scale: 1:75,000

Figure 4.3

SP TRANSMISSION

Black Law Grid Connection

Cultural Heritage Features

- Study Area
- Listed Building
- Scheduled Monument
- Conservation Area

Map Scale: 1:75,000

Figure 4.4

5. APPLICATION OF THE ROUTEING METHODOLOGY

INTRODUCTION

5.1. Following the steps in the routeing process, as outlined in **Chapter 3**, this chapter details the findings of each step, culminating in the identification of the preferred route.

STEP A: IDENTIFICATION OF STUDY AREA

5.2. The first step of the routeing process is to identify a study area, predominantly for the purposes of gathering data specific to the project area. In identifying the study area, it is important that this reflects known technical, economic and environmental parameters at the outset whilst retaining the flexibility to ensure that routeing is not constrained in any way by these parameters, through application of the iterative routeing process.

5.3. The study area has been identified to reflect the technical considerations relating to the location of the Black Law Windfarm Extension substation (as included within the application for consent, the potential alternative substation location (see **Chapter 3**) and the existing substation location at Linnmill. The extent of the study area has been informed by environmental considerations, with the approach being to map the topography of the area and identify the maximum area across which the connection is likely to be routed.

5.4. The study area, as shown on **Figure 5.1**, is predominantly located within South Lanarkshire, with the exception of a small area of the northern extent which is in North Lanarkshire and West Lothian. The study area extends from the proposed substation within the Black Law Windfarm Extension site in the north to the high ground south of the Linnmill substation in the south, and from Forth and Lanark in the east to west of the settlement of Netherburn in the west.

STEP B: IDENTIFICATION OF ENVIRONMENTAL, TECHNICAL AND ECONOMIC CONSTRAINTS

5.5. Environmental, technical and economic constraints were identified to focus the study area, highlight potential search areas for route corridors and identify potential 'pinch points'. This approach reflects the guidelines presented in '*The Holford Rules*', which have been adapted to reflect the characteristics of the study area for this project as described below.

Environmental Constraints

5.6. The Holford Rules are broadly hierarchical, with Rule 1 deemed the first rule to be considered in routeing. Rule 1 relates to the avoidance, where possible, of *"major areas of highest amenity value"*. Holford Rule 2 makes the following recommendation: *"avoid smaller areas of high amenity value or scientific interest by means of deviation"*. As the Holford Rules do not define what constitutes a major area (Rule 1), and the importance of the area is irrespective of size, smaller areas (Rule 2), such as individual

buildings or linear environmental features, are mapped at this stage alongside the larger areas.

5.7. The Rules do not identify which designated areas constitute areas of *highest amenity value*. However, SHETL clarification note b) states that areas of highest amenity value *"require to be established on a project-by-project basis considering Schedule 9 of the Electricity Act, 1989"*, and provides examples to be considered.

5.8. In this routeing study, the term 'environmental' has been used in place of 'amenity' to reflect more recent thinking which also seeks to recognise the intrinsic value of such areas.

5.9. On this basis, areas of highest environmental value located within the study area, and therefore considered within this stage of the routeing process, comprise the international, European, national level designations listed below and shown on **Figure 5.2**:

- Special Areas of Conservation (SACs);
- Sites of Special Scientific Interest (SSSIs);
- National Nature Reserves (NNRs);
- Scheduled Monuments (SAMs);
- Gardens and Designed Landscapes (GDLs);
- Conservation Areas (CAs);
- Listed Buildings (LBs) (clusters only).

5.10. Whilst GDLs are non-statutory designations, they are also referred to in the notes accompanying Holford Rule 1. On this basis, these designated areas are included as areas of highest environmental value.

5.11. Conservation Areas are also included as areas of highest environmental value as although a local level designation, these correspond generally with population centres and are listed in the SHETL notes accompanying Holford Rule 1, as an example of areas of highest amenity value. Groupings or clusters of Listed Buildings, which generally correspond to population centres, were also highlighted as being areas of highest environmental value, although it was agreed that individual sites would be considered in further detail during the later routeing stages when deviation around them would be required.

5.12. Supplementary Note a) of the Rules relates to residential areas, stating *"avoid routeing close to residential areas as far as possible on grounds of general amenity"*. In this routeing study, settlements are considered to be towns and villages which have their own Local Plan Map in the South Lanarkshire Local Plan and these have been mapped and included as areas of highest environmental value.

5.13. As discussed above, small areas of highest amenity (environmental) value, as defined by Rule 2 of the Holford Rules, have been mapped and included in this stage of the routeing study. The SHETL note a) on Holford Rule 2 also states that other areas of *"regional or local high amenity value"* should be identified from Development Plans. For this routeing study, these other areas which have been included as areas of highest environmental value are considered to comprise Scottish Wildlife Trust Reserves (SWTRs) and Site of Importance for Nature Conservation (SINCs).

Technical Constraints

5.14. Technical issues to be considered in routeing have been identified by SPEN. As outlined in **Chapter 3** these include slope angle, altitude and proximity to turbines. These constraints are outlined further below and shown on **Figure 5.2**.

5.15. Slope angles of greater than 15° present a technical constraint to routeing, particularly for construction purposes. Altitude also presents a technical constraint to routeing with 'heavier duty' wood poles required should the connection cross altitudes greater than 300m AOD.

5.16. SPEN also identified the existing and consented Black Law windfarm turbines as potential technical constraints to routeing (see **Chapter 3**), whereby a buffer of 152m was applied by SPEN, equal to the height of the turbines plus an additional 20 percent.

Economic Considerations

5.17. In terms of the Routeing Objective for this project, current and potential future mineral extraction activity is considered to present an environmental (resource conservation) and an economic constraint, but not a technical constraint.

5.18. At this stage, in accordance with the Holford Rules and due to the geographic spread of these environmental, technical and economic constraints, it is considered likely that these constraints can be 'avoided where possible' in routeing.

STEP C: IDENTIFICATION OF ROUTE CORRIDORS

5.19. As landscape and visual effects are difficult to avoid, the best way to minimise these is by careful line routeing. On this basis, identification of route corridors involves a landscape led appraisal of the study area using the environmental, technical and economic constraints information gathered in Step B to identify potential route corridors. Holford Rule 3 which states that, other things being equal, the most direct line should be chosen, with no sharp changes in direction, is also taken account of in identifying route corridors.

5.20. The landscape led process identified ten corridors as shown on **Figure 5.3**. These took account of both the existing substation location and the alternative potential location within Kingshill Plantation, with the latter considered given the technical constraint posed by routeing an overhead line between wind turbines. It is important to note that these corridors are shown simply as indicative lines connecting 'A' to 'B', and that these lines are not representative of potential corridor width.

Corridor 1

5.21. The route corridor extends out of Kingshill Plantation south-westward from the alternative substation location, remaining north of Carluke. The corridor includes Law Hill and crosses the Clyde Valley north of Rosebank before continuing southward, keeping west of Netherburn. Immediately west of Netherburn, the corridor continues south-eastward crossing the River Nethan valley and covering the north slope of Blackhill to reach Linnmill substation.

Corridor 2

5.22. The route corridor extends out of Kingshill Plantation south-westward from the alternative substation location, remaining north of Carluke. As the corridor covers Law Hill it continues southward immediately west of Carluke and Braidwood, keeping east of the River Clyde valley. The corridor crosses Fiddler Burn west of Hamper Hill and continues southward bordering the west boundary of Lee Castle GDL before crossing the River Clyde valley south of Nemphlar to reach Linnmill substation.

Corridor 3

5.23. The route corridor extends out of Kingshill Plantation southward from the alternative substation location remaining east of Carluke. The corridor crosses the south-west area of Thornmuir Plantation and continues either side of Yellowshields. Continuing southward, the corridor remains south of Fiddler Burn and covers Cartland Muir Plantation. South of Cartland Muir Plantation, the corridor continues south-westward across Auchenglen and covering Lee Castle GDL. South of Hazelbank, the corridor continues south crossing the River Clyde valley south of Nemphlar to reach Linnmill substation.

Corridor 4

5.24. The route corridor extends out of Kingshill Plantation southward from the alternative substation location remaining east of Carluke. The corridor crosses the south-west area of Thornmuir Plantation and continues either side of Yellowshields. Continuing southward, the corridor remains south of Fiddler Burn and covers Cartland Muir Plantation. South of Cartland Muir Plantation, the corridor continues south-eastward passing east of Cartland. The corridor crosses Auchenglen at the southern tip of Burgh Wood (west of Lanark). When south of West Nemphlar Road, the corridor continues west covering the north slope of the River Clyde valley. On reaching the power station north of the River Clyde, the broad route corridor continues south crossing the river to reach Linnmill substation.

Corridor 5

5.25. The route corridor extends south-westward from the proposed substation, keeping north of the existing Black Law Windfarm and south of an existing transmission line. At the north area of Kingshill Plantation, the corridor continues southward remaining east of Carluke. The corridor crosses the south-west area of Thornmuir Plantation and continues either side of Yellowshields. Continuing southward, the corridor remains south of Fiddler Burn and covers Cartland Muir Plantation. South of Cartland Muir Plantation, the corridor continues south-eastward passing east of Cartland. The corridor crosses Auchenglen at the southern tip of Burgh Wood (west of Lanark).

When south of West Nemphlar Road, the corridor continues west covering the north slope of the River Clyde valley. On reaching the power station north of the River Clyde, the route corridor continues south crossing the river to reach Linnmill substation.

Corridor 6

5.26. The route corridor extends south-westward from the proposed substation, keeping north of the existing Black Law Windfarm and south of an existing transmission line. At the north area of Kingshill Plantation, the corridor continues southward remaining east of Carluke. The corridor crosses the south-west area of Thornmuir Plantation and continues either side of Yellowshields. Continuing southward, the corridor remains south of Fiddler Burn and covers Cartland Muir Plantation. South of Cartland Muir Plantation, the corridor continues south-westward across Auchenglen and covering Lee Castle GDL. South of Hazelbank, the corridor continues south crossing the River Clyde valley south of Nemphlar to reach Linnmill substation.

Corridor 7

5.27. The route corridor extends south-eastward through the coniferous plantation from the proposed substation, keeping east of the existing Black Law Windfarm. Once west of Climpy, the corridor continues southward keeping west of Forth. East of Springfield Reservoir, the corridor continues westward covering Coldstream Burn valley. East of Yellowshields, the corridor extends southward remaining south of Fiddler Burn and covering Cartland Muir Plantation. South of Cartland Muir Plantation, the corridor continues south-eastward passing east of Cartland. The corridor crosses Auchenglen at the southern tip of Burgh Wood (west of Lanark). When south of West Nemphlar Road, the corridor continues west covering the north slope of the River Clyde valley. On reaching the power station north of the River Clyde, the route corridor continues south crossing the river to reach Linnmill substation.

Corridor 8

5.28. The route corridor extends south-eastward through the coniferous plantation from the proposed substation, keeping east of the existing Black Law Windfarm. Once west of Climpy, the corridor continues southward keeping west of Forth. Continuing southward, the corridor covers the east slope of Hill Rig. At Birkenhead, the corridor extends west partly covering Cartland Muir Plantation. South of Cartland Muir Plantation, the corridor continues south-eastward passing east of Cartland. The corridor crosses Auchenglen at the southern tip of Burgh Wood (west of Lanark). When south of West Nemphlar Road, the corridor continues west covering the north slope of the River Clyde valley. On reaching the power station north of the River Clyde, the route corridor continues south crossing the river to reach Linnmill

Corridor 9

5.29. The route corridor extends south-eastward through the coniferous plantation from the proposed substation, keeping east of the existing Black Law Windfarm. Once west of Climpy, the corridor continues southward keeping west of Forth. Continuing southward, the corridor covers the east slope of Hill Rig. At Birkenhead,

the corridor extends west partly covering Cartland Muir Plantation. South of Cartland Muir Plantation, the corridor continues south-westward across Auchenglen and covering Lee Castle GDL. South of Hazelbank, the corridor continues south crossing the River Clyde valley south of Nemphlar to reach Linnmill substation.

Corridor 10

5.30. The route corridor extends south-eastward through the coniferous plantation from the proposed substation, keeping east of the existing Black Law Windfarm. Once west of Climpy, the corridor continues southward keeping west of Forth. East of Springfield Reservoir, the corridor continues westward covering Coldstream Burn valley. East of Yellowshields, the corridor extends southward remaining south of Fiddler Burn and covering Cartland Muir Plantation. South of Cartland Muir Plantation, the corridor continues south-westward across Auchenglen and covering Lee Castle GDL. South of Hazelbank, the corridor continues south crossing the River Clyde valley south of Nemphlar to reach Linnmill substation.

Further Consideration of Connection Points and Corridors

5.31. At this stage, SPEN confirmed that the alternative substation location within the Kingshill Plantation, and therefore Corridors 1to 4, would not be considered further, for the following reasons:

(i) potentially viable corridors (6 to 10) had been identified from the substation location included in the Black Law Windfarm Extension application; and

(ii) whilst corridors 6 to 10 were longer than corridors 1 to 4, this was not felt to be a material environmental, technical or economic issue for consideration, particularly as there would still be a requirement for some form of connection from the Windfarm Extension to the alternative substation location within the Kingshill Plantation.

5.32. A technical review of the route corridors by SPEN identified significant constraints where a number of these crossed the steep sided River Clyde valley in the approach to Linnmill substation (route corridors 5, 7 and 8). However, SPEN subsequently identified that the connection could be cabled underground as it crosses the River Clyde valley, with a new terminal point for the wood pole overhead identified at this point, as shown on **Figure 5.4**. On this basis, it was considered that there was no over-riding reason for progressing with Corridors 6, 9 and 10 as these cross an 'avoid where possible' environmental constraint (Garden and Designed Landscape).

STEP D: APPRAISAL OF ROUTE CORRIDORS

5.33. As outlined in Step C, three route corridors (5, 7 and 8) were progressed to Step D for detailed appraisal as illustrated on **Figure 5.4**.

5.34. The objective of the appraisal of the route corridors was to examine each corridor in a comparable, documented and transparent way to identify a preferred route corridor. The criteria and related objectives applied to allow comparison of the corridors were selected:

(i) to continue to reflect both the overall Routeing Objective and the published guidelines for routeing (The Holford Rules);

(ii) to draw out distinctions between the corridors to enable the relative strengths and weaknesses of each to be identified.

5.35. Six criteria were applied at the route corridor appraisal stage as outlined in **Table 5.1** below.

Table 5.1: Appraisal Criteria for Route Corridors

Criterion	Objective	Appraisal Indicator
1: Landscape Sensitivity	To find the best possible landscape 'fit'. To avoid landscapes with greatest potential sensitivity to change (from overhead lines).	Approximate proportion of corridor within each landscape sensitivity category Potential impact of introducing overhead line into LCT.
2: Residential Amenity	To avoid proximity to residential properties as far as possible on the grounds of general amenity including views from private property[8].	Likelihood of finding a route that will be a minimum 100m from any residential property.
3: Visual Amenity	To minimise impacts on public visual amenity, including residents in settlements, users of main transport routes, and users of key recreational areas.	Visibility of corridor from key receptors including likelihood of being affected.
4: Landscape Designations	To minimise impacts on areas designated for their landscape value.	Approximate proportion of corridor within a designated landscape.
5: Length of corridor	To minimise impacts on the landscape, all else being equal.	Length of corridor.
6: Forestry	To avoid areas of existing forestry where there is no reasonable alternative.	Approximate proportion of corridor within forestry.

Criterion 1: Landscape Sensitivity

5.36. Landscape attributes/characteristics may indicate the ability of a landscape to accommodate a wood pole overhead line. In devising criteria for judging sensitivity, account was taken of recommendations and guidance contained in the Landscape Character Assessment Guidance, including Topic Paper 6[9], that accompanies the guidance. Definitions of landscape character and sensitivity have been drawn from this guidance, with the former defined as *"the distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape, and how these are perceived by people. It reflects particular combinations of geology, landform, soils, vegetation, land use and human settlement"*.

5.37. Topic Paper 6 distinguishes between 'inherent' landscape sensitivity, also known as overall landscape sensitivity, and landscape sensitivity to a specific type of change.

[8] A 100m radius has been adopted to act as a starting point for further investigation.

[9] Swanwick, C. and Land Use Consultants (2002). *Landscape Character Assessment: Guidance for England and Scotland, including TOPIC PAPER 6: Techniques and Criteria for Judging Capacity and Sensitivity*.

Inherent Landscape Sensitivity

5.38. Most published landscape assessments include references to landscape sensitivity. This often relates to 'inherent' landscape sensitivity, regardless of the type of development being considered. As a starting point, 'inherent' or 'overall' landscape sensitivity has therefore been derived from the published suite of landscape character assessments, supplemented by field work.

Landscape Sensitivity to Overhead Line Connections

5.39. According to the guidance, landscape sensitivity to a specific type of change *"should be used where it is necessary to assess the sensitivity of the landscape to a particular type of change or development. It should be defined in terms of the interactions between the landscape itself, the way that it is perceived and the particular nature of the type of change of development in question"*[10].

5.40. In devising criteria for judging sensitivity to wood pole overhead line connections, account was taken of Topic Paper 6 which suggests that *"judging landscape character sensitivity requires professional judgement about the degree to which the landscape in question is robust, in that it is able to accommodate change without adverse impacts on character. This involves making decisions about whether or not significant characteristic elements of the landscape will be liable to loss…and whether important aesthetic aspects of character will be liable to change"*[11].

5.41. Attributes of the landscape that may indicate landscape character sensitivity to overhead line connections may include the following:

- landform and scale;
- landcover;
- settlement and land use;
- aesthetic, perceptual and sensory aspects;
- skylines, intervisibility and enclosure;
- landscape features; and
- key views and skylines.

5.42. These are discussed briefly below with reference to wood poles as proposed for this project.

Wood Pole Overhead Lines

5.43. It is important to recognise that the weathering effect on wood pole structures result in a colour variation over time. At construction, the wood poles are dark brown in colour, however, over time the effect of weathering results in them fading to a lighter

[10] Ibid, p.4
[11] Ibid, p.6

silver-grey colour. This is likely to reduce the effectiveness of a backclothing landscape, or landscape elements. Conversely, the weathering effect is likely to reduce visibility of poles when skylined, as they will be more easily absorbed into the sky backdrop. If required, steelwork on the top of wood pole structures will initially be bright galvanised steel which, in time will weather and become less visible.

5.44. Potential effects on landscape attributes are outlined below:

- *Landform and scale* - Steep, elevated landforms are generally more sensitive to overhead lines due to their visual prominence. Valleys are generally less sensitive because infrastructure may be backclothed by surrounding high ground. Larger scale landscapes may be able to accommodate bigger structures more easily than smaller scale landscapes.

- *Landcover* - The existing landcover may indicate which landscapes could accommodate overhead lines with least change. The presence of some woods, trees and hedgerows may reduce the visibility of lines, but continuous woodland increases sensitivity since a wayleave may have to be cut through the woodlands which could be intrusive in views.

- *Settlement and land use* - Residential areas and areas used for recreation are generally considered more sensitive to overhead lines given potential effects on local visual amenity and the resultant effect on the perception of the landscape. Industrial and arable areas are considered less sensitive.

- *Landscape features* - Landscapes with a high density of characteristic or sensitive landscape features, e.g. trees, native woodland, hedgerows, which may be lost due to overhead line routeing, are more sensitive than landscapes with a low density of characteristic landscape features.

- *Aesthetic, perceptual and sensory aspects* - Areas with characteristics of relative remoteness[12]/wildness/tranquillity etc are considered to be more sensitive to overhead lines.

- *Skylines, intervisibility and enclosure* - Open landscapes are more susceptible to change from overhead lines as they are potentially more visible in these landscapes. Semi-enclosed landscapes are likely to have more restricted intervisibility and are therefore considered to be less sensitive. However, in more intimate and enclosed landscapes, overhead lines may affect individual landscape features such as hedgerows and trees. Some areas may be more sensitive because they are intervisible with other areas, are overlooked, or part of the view as experienced from frequented viewpoints.

- *Key views and skylines* – Some areas may be more sensitive because they are overlooked, or part of the view as experienced from frequented key viewpoints, e.g. settlements, main transport routes and key recreational areas. Key skylines

[12] The relative sense of remoteness is informed, for the purposes of this study, by the presence of semi-natural habitats, the presence or absence of settlement, ease of access, and the influence of human activity.

are more susceptible to change from overhead lines as they potentially increase the extent of visibility when crossed.

5.45. Taking account of the key characteristics identified above, three levels of landscape sensitivity have been defined for this routeing study as outlined in **Table 5.2** below.

Table 5.2: Defining Landscape Sensitivity

Sensitivity Level	Definition
High	A landscape of particularly distinctive character, which may be nationally designated for its scenic quality, or where its character, land use, pattern and scale offer very limited opportunities for the accommodation of change due to overhead lines. Landscape character and attributes are vulnerable to change or loss as a result of the introduction of overhead lines.
Medium	A landscape of notable character, where its nature, land use, pattern and scale offer some opportunities for the accommodation of change due to overhead lines. The landscape has some robustness of landscape character and attributes and is not especially vulnerable to change as a result of the introduction of overhead lines.
Low	A landscape which is of low quality or where its character, existing land use, pattern, scale and attributes are tolerant of change due to overhead lines, and are robust, in that change could be accommodated without loss of important attributes or the key characteristics being fundamentally altered as a result of the introduction of overhead lines.

5.46. For the purposes of appraising the route corridors, the relevant LCTs were subdivided into a total of 13 'Local' Landscape Character Types (LLCTs) by LUC. **Figure 5.5** illustrates the judged landscape sensitivity of each Local Landscape Character Type (LLCT) covering the route corridors. It is important to note that, in reality, the boundaries between these LLCTS are less defined and more graded than can be shown on the plan. LLCT 2 has no sensitivity attached to it as the route corridors do not cross this LLCT.

Criterion 2: Residential Amenity

5.47. Supplementary Note A of the Holford Rules states *"avoid routeing close to residential areas as far as possible on grounds of general amenity"*. For this study, a point location with a 100 metre radius was placed around each residential property as a starting point for a strategic level comparison of the route corridors. These are shown on **Figure 5.6**.

Criterion 3: Visual Amenity

5.48. In addition to *"avoid routeing close to residential areas as far as possible on grounds of general amenity"*, Supplementary Note A of the Holford Rules states *"minimise the visual effect perceived by users of roads and public rights of way, paying particular attention to the effects of recreational, tourist and other well-used routes"*.

5.49. 'Close to' has been defined as a distance of 2km or less. According to perceptibility studies undertaken by the Turnbull Jeffrey Partnership[13], 2km is the distance at which a fully backclothed wood pole ceases to be perceptible. At distances greater than

[13] Turnbull Jeffrey Partnership (January 1993) *Visibility Cut-Off.*

2km, the studies state that wood poles would only be perceptible when located on a skyline.

Criterion 4: Landscape Designations

5.50. Supplementary Note B of the Holford Rules states *"where possible choose routes which cause the least disturbance to Areas of Great Landscape Value and other similar designations of Regional or Local importance"*. For this study, the designations of relevance are Areas of Great Landscape Value (AGLVs) and Gardens and Designed Landscapes (GDLs).

Criterion 5: Length of Corridor

5.51. Holford Rule 3 states that *"other things being equal, choose the most direct line"*. This indicates that 'other things being equal', a shorter length of corridor is likely to lead to fewer potential impacts than a longer route.

Criterion 6: Forestry

5.52. Note c) to Rules 4 and 5 of the Holford Rules states *"where possible follow open space and run alongside not through woodland or commercial forestry, and consider opportunities for skirting edges of copse and woods"*. For this study, the objective has been to avoid routeing through blocks of woodland where possible.

Appraisal Findings

5.53. The relative strengths and weaknesses of each route corridor are presented in **Table 5.3**. The corridor that scores the best against the criterion in question is shown in **bold** text.

Table 5.3: Appraisal of Route Corridors

Criterion	Route Corridor 5	Route Corridor 7	Route Corridor 8
1: Landscape Sensitivity	**The route corridor is within Lark Law, Yellowshields and Kingshaw Moss LLCTs (all of low sensitivity) and Lee Muir, Hare Hill South Slopes, Hill Rig/Kinkadzow Law and Cartland Muir Plantation LLCTs (all of medium sensitivity). The route corridor also crosses Thornmuir and Cartland LLCTs (both of high sensitivity), however Thornmuir LLCT is avoidable by routeing through Yellowshields LLCT. It would be possible to avoid routeing through Cartland Muir Plantation and Hill**	**The route corridor is within Lark Law, Yellowshields and Hare Hill East Slopes LLCTs (all of low sensitivity), Hare Hill South Slopes, Abbey Burn Valley, Lee Muir, Hill Rig/Kinkadzow Law and Cartland Muir Plantation LLCTs (all of medium sensitivity). The route corridor also crosses Thornmuir and Cartland LLCTs (both of high sensitivity), however Thornmuir LLCT is avoidable by routeing through Yellowshields LLCT. It would be possible to avoid routeing through Cartland Muir**	The route corridor is within Lark Law and Hare Hill East Slopes LLCTs (both of low sensitivity), and Hare Hill South Slopes, Hill Rig/Kinkadzow Law, Muirhead and Cartland Muir Plantation LLCTs (all of medium sensitivity). The route corridor is also within Cartland (high sensitivity). It would be possible to avoid routeing through Muirhead LLCT albeit through a LLCT of equal sensitivity.

Criterion	Route Corridor 5	Route Corridor 7	Route Corridor 8
	Rig/Kinkadzow Law LLCTs albeit through LLCTs of equal sensitivity.	**Plantation and Hill Rig/Kinkadzow Law LLCTs albeit through LLCTs of equal sensitivity.**	
2: Residential Amenity	There are a total of 52 properties within route corridor 5. The majority of these are in the section of route shared with route corridor 7 to the east of Carluke, the main settlement having been avoided as a strategic routeing constraint. The western extent of the corridor is within 100m of several additional properties in the north-east of Carluke. Cartland, at the southern end of the route corridor (in the section shared with corridors 7 and 8) has also been avoided as a strategic routeing constraint. The village of Yieldshields is within route corridor 5 and has been excluded from the corridor.	There are a total of 53 properties within route corridor 7. The majority of these are in the section of route shared with route corridor 5 to the east of Carluke, the main settlement having been avoided as a strategic routeing constraint. Cartland, at the southern end of the route corridor (in the section shared with corridors 5 and 8) has also been avoided as a strategic routeing constraint. The village of Yieldshields is within route corridor 5 and has been excluded from the corridor.	**There are a total of 13 properties distributed throughout route corridor 8. Cartland, at the southern end of the route corridor (in the section shared with corridors 5 and 7) has been avoided as a strategic routeing constraint.**
3: Visual Amenity	There is close inter-visibility with Carluke, Cartland, Yellowshields and the elevated section of the A721 as it descends Kilnkadzow Law. The relatively open area at Kingshaw Moss allows elevated distant views north-westward. Coniferous plantation (Kingshill and Cartland Muir) encloses visibility and creates some opportunities for screening. Views into the corridor from Carluke and west of Kingshaw Moss include the prominent backdrop of Black Law turbines. Field boundaries and landform undulations in the central and southern areas provide opportunities for	**There is inter-visibility with Carluke, Forth, the B715 to the north-east and the elevated section of the A721 as it descends Kilnkadzow Law.** **Views into the corridor from Forth include the prominent backdrop of Black Law turbines.** **The relatively open area across the east slopes of Hare Hill provides limited opportunities for screening an overhead line.** **Coniferous plantation (across Gladsmuir Hills and Cartland Muir) limits inter-visibility and provides opportunities for screening.** **Field boundaries and**	There is inter-visibility with the north-east edge of Forth, the B715 to the north-east, however there is limited inter-visibility with the A706 which passes parallel to the north and central corridor section. Views into the corridor from Forth include the prominent backdrop of Black Law turbines. The relatively open area across the east slopes of Hare Hill and Hill Rig provide limited opportunities for screening an overhead line. There are elevated views of the open section of the route corridor from the A721 east of Kilnkadzow. Coniferous plantation (across Gladsmuir Hills

Criterion	Route Corridor 5	Route Corridor 7	Route Corridor 8
	intermittently screening an overhead line (including limiting visibility from the east edge of Carluke). The Cartland area has scenic southward views across the Clyde valley and beyond and is inter-visible with the north edge of Lanark.	**landform undulations in the central and southern areas provide opportunities for intermittently screening an overhead line (including limiting visibility from the east edge of Carluke). The Cartland area has scenic southward views across the Clyde valley and beyond and is inter-visible with the north edge of Lanark.**	and Cartland Muir) encloses visibility and creates some opportunities for screening. Some field boundaries and landform undulations in central areas provide opportunities for intermittently screening an overhead line for relatively short sections. The Cartland area has scenic southward views across the Clyde valley and beyond and is inter-visible with the north edge of Lanark.
4: Landscape Designations	**Approximately 3km of route corridor 5 is within the AGLV, the majority of which is in the section shared by all three corridors.**	**Approximately 3km of route corridor 7 is within the AGLV, the majority of which is in the section shared by all three corridors.**	Approximately 3.5km of route corridor 8 is within the AGLV, the majority of which is in the section shared by all three corridors.
5: Length of corridor[14]	Route corridor 5 is approximately 16km.	**Route corridor 7 is approximately 15km.**	**Route corridor 8 is approximately 14.5km.**
6: Forestry[15]	A significant section of route corridor 5 is within forestry. To the north-west of the operational Black Law windfarm, the corridor is directly adjacent to the windfarm transmission lines and is within this block of forestry for approximately 4.5km before entering the Kingshill plantation for approximately 1.4km. A review of the 1:25000 OS map indicates that route corridor 5 then enters another area of forestry/ woodland to the north of Yieldshields; however aerial photography indicates that this area is much less extensive than is suggested on the OS map. In addition, the Cartland Muir forestry plantation is almost	In the section shared with route corridor 8, route corridor 7 passes an area of forestry to the west of the B715 road for approximately 1.3km. This area of forestry is within the Black Law Windfarm Extension site. The OS map indicates that there is another area of forestry to the west of Forth through which corridor 7 passes; large areas of this forestry have recently been felled and replanted. The section of corridor shared with route corridor 7 contains the Cartland Muir forestry plantation.	**In the section shared with route corridor 7, route corridor 8 passes an area of forestry to the west of the B715 road for approximately 1.3km. This area of forestry is within the Black Law Windfarm Extension site. The OS map indicates that there is another area of forestry to the west of Forth through which corridor 8 passes; large areas of this forestry have recently been felled and replanted. The remainder of the corridor is relatively free from forestry/ woodland with the exception of some small stands near Birkenhead and Cartland. It is**

[14] Approximately length assumes a route through the centre of each corridor.
[15] Where reference is made to aerial photography, this has been viewed at the following websites http://maps.google.co.uk/maps and http://www.bing.com/maps/ .

Criterion	Route Corridor 5	Route Corridor 7	Route Corridor 8
	entirely within route corridor 5 (within the section shared with route corridor 7).		**anticipated that these areas could be avoided through detailed routeing.**
7: Other Issues (slope, topography, other designations)	The majority of corridor 5 is between 200-250m AOD and 250-300m AOD. There is a small area north of Kirkfieldbank in the section of corridor shared by all three corridors which is lower and which corresponds with areas of slope >15°.	The majority of corridor 7 is between 200-250m AOD and 250-300m AOD with a small area 300-350m AOD at Middlehope Farm. There is a small area north of Kirkfieldbank in the section of corridor shared by all three corridors which is lower and which corresponds with areas of slope >15°.	The majority of corridor 8 is between 200-250m AOD and 250-300m AOD with a small area 300-350m AOD at Hill Rig. There is a small area north of Kirkfieldbank in the section of corridor shared by all three corridors which is lower and which corresponds with areas of slope >15°.

5.54. The appraisal results indicated that for four out of the six criteria, route corridor 7 performed most strongly either in isolation, or in combination with one of the other two corridors. On this basis, route corridor 7 was identified as the 'preferred corridor', with corridor 8 forming the alternative 'preferred' corridor option.

STEP E: IDENTIFICATION OF ROUTE OPTIONS

Methodology for Identification of Route Options

5.55. Further site visits to the accessible areas of the preferred corridor were undertaken to:

- identify localised topography and become familiar with the landscape within the route corridor;
- identify potential infrastructure crossing points (or constraints) such as roads and railways;
- verify the approximate location of any residential properties;
- identify/verify any physical constraints (e.g. watercourses, steep gradients);
- identify potentially sensitive views;
- identify potential route sections.

5.56. To inform the identification of route options, aerial photographs were overlaid with the 1:25 000 maps, residential properties (using the 100m as a guideline figure), and other identified constraints as discussed above. Potential route options were then generated, taking account of the following criteria:

- local topography (e.g. key skylines/ridges, valleys);
- forestry;
- distance and orientation of residences;

- field patterns and boundaries;
- infrastructure (including roads and railways);
- existing and proposed wind turbines (with a 152m buffer applied around outer turbines);
- the location of other overhead transmission lines;
- technical requirements (e.g. angle of poles required and ground conditions).

5.57. Infrastructure was crossed at right angles where possible and efforts were also made to minimise the number, and angle, of changes in the direction of route sections. Holford Rule 3 which states that "other things being equal, the most direct line should be chosen, with no sharp changes in direction" was also taken account of in identifying route sections/options.

Identified Route Options

5.58. On the basis of the criteria above, only one overall route was identified, divided into four sections (sections 1 to 4). For two sections (sections 2 and 4), alternative options (options 'a' and 'b') were identified. These are shown on **Figure 5.7** and detailed below. Key landscape and visibility issues associated with each route section, including visibility from residential properties, were considered, and are discussed below, as landscape and visual effects are most effectively avoided and /or reduced at the routeing stage.

Route Section 1

5.59. This extends south-eastward from Black Law Windfarm substation through the coniferous plantation for approximately 0.8km. Outwith the coniferous plantation, the route continues south-eastward through rough open grassland keeping east of the existing Black Law turbines. Approximately 1.0km west of Climpy, the route extends southward for approximately 1.0km, continuing to remain east of the eastern most Black Law turbines. Approximately 1.5km west of Wester Greenwall, the route extends south-westward for approximately 3km around the southern extent of Black Law Windfarm. This 3km route section passes through rough grassland with the exception of a 50m section immediately south of Hare Hill mast, which passes through coniferous plantation. Around 0.3km north-east of Middlehope Farm, the route extends southward through pastoral fields between field boundaries. Approximately 0.2km south-east of Middlehope Farm, the route extends southwest-ward continuing through pastoral fields keeping north of Middlehouse and south of Middlehope Farm. Around 0.3km west of Middlehouse, the route diverts southward for approximately 0.4km crossing the B7056 road at a right angle. When approximately 0.4km south-west of Middlehouse the route extends south-westward for around 1.0km, through rough open grassland, keeping north of Coldstream Burn until 0.8km south of West Highcross.

5.60. Whilst complying most strongly with the criteria adopted at this stage of the routeing process, a number of landscape and visibility issues associated with this route section were identified, as follows:

- The removal of coniferous plantation will be required to create a wayleave, south of Black Law Windfarm and Extension and south of Hare Hill mast. However, the plantation will provide an opportunity to screen and backcloth the overhead line in a number of views.

- The northern end of this route section will be visible from the adjacent section of the B715 road, and settlement clustered along it, including Climpy and Wester Greenwall.

- The northern end of this route section will be visible from the north edge of Forth, albeit at almost 2km distance.

- The section of route between Middlehope Farm and Middlehouse will be visible from these residential properties at approximately 200m distance.

- Visibility of the route from the B7056 road, and the scattered properties along it, will be limited to the southern end of the route section as it crosses the road and passes southward.

- The route section will need to cross several existing wood pole lines across the slopes of Hare Hill.

Route Section 2a

5.61. This extends westward for approximately 0.3km until it continues in a south-westward direction for approximately 0.6km keeping north of Coldstream Reservoir and crossing the A721 road near Burnhead Farm. Approximately 0.3km east of Headsmuir Farm, the route continues southward for approximately 0.5km, keeping east but running parallel with an existing wood pole overhead line.

5.62. The key landscape and visibility issues associated with this route section were identified as follows:

- this route section crosses the relatively open valley of the Coldstream Burn;

- as the route section crosses several tree line field boundaries, the removal of trees is likely to be required;

- this route section is likely to be skylined in views from the A721 road and Kilnkadzow as it crosses high ground east of Headsmuir Farm;

- the overlapping of overhead lines in views will occur as the route section passes parallel to an existing wood pole overhead line. This will also occur when the route is skylined in views from the A721;

- the route section passes in relative proximity to the residential properties of Burnhead Farm and Headsmuir Farm. However, the orientation of these properties is not towards the route, and both properties include outbuildings which would partially screen views of the overhead line.

Route Section 2b

5.63. This extends south-westward crossing Coldstream Burn 0.4km north of Mid-Coldstream. The route continues in a south-west direction, crossing an unclassified road at a right-angle. South of the road, the route extends in a more southerly direction keeping east of Coldstream Burn. North-west of West Coldstream, the route continues south-eastwards between the property of West Coldstream and a shelter belt of mixed woodland. Approximately 0.3km south of West Coldstream, the route extends south-westward around the southerly end of the shelter belt woodland. Continuing south-westward for approximately 1.0km, the route crosses the A721 road and passes through pastoral fields and an area of restored land whilst keeping north of several waterbodies until north-west of Leemuir.

5.64. The key landscape and visibility issues associated with this route section were identified as follows:

- the line will be visible at approximately 300m distance from the residential property of Mid Coldstream; however the route will be backclothed by a tree line at this section;
- this section routes to the north and west of the residential property of West Coldstream, however mixed woodland surrounding the north and east of the property will limit visibility;
- tree removal will be required as the route crosses two tree lines to the south-west of West Coldstream;
- as this route section extends south of the A721 road, it will remain at a lower elevation in comparison to option 2a. Poles will therefore be backclothed in views from the surrounding landscape such as the A72road;
- this route section will be visible from the residential property of Leemuir; however garden vegetation and surrounding farm outbuildings will limit visibility.

Route Section 3

5.65. The route continues southward for approximately 0.5km through rough pasture keeping east of an existing wood pole overhead line but running parallel with it. Continuing southward, this route section extends through the coniferous forestry of Cartland Muir Plantation for approximately 1.2km. Outwith the plantation, the route section extends south-eastwards through farmland crossing a railway line and keeping north-east of New Greentowers Farm. The route crosses Moor Road and remains north-east of a pocket of coniferous shelter belt woodland. East of the shelter belt woodland, the route section extends southward around the southerly extent of woodland for approximately 0.1km.

5.66. The key landscape and visibility issues associated with this route section were identified as follows:

- the northern end of the route section passes approximately 200m distance from the property of Leemuir;

- although there is an existing wayleave through the plantation for an existing overhead line, felling of trees will be required to increase the width of the wayleave to accommodate the Black Law Windfarm Extension overhead line;

- this route section crosses a railway line and will be required to clear any related overhead structures;

- the overlapping of overhead lines and a wirescape in views will occur as the route section passes parallel to the existing wood pole overhead line. However, coniferous plantation will limit locations with views of the two lines in combination;

- New Greentowers Farm is located in proximity to this route section; however farm outbuildings will limit views of the overhead line;

- the shelter belt of woodland to the south-east of New Greentowers Farm will screen some views of the overhead line, including views from Cartland, and will provide a backcloth to the poles in views south of Cartland Muir Plantation.

Route Section 4a

5.67. This extends south-westward for approximately 0.5km keeping north of Greentowers. The route section crosses Greentowers Road north-west of Greentowers and south of Cartland. South of the road, the route continues southward for approximately 0.8km, remaining east of Cartland Mains. The route remains east of Burgh Wood to reach the terminal pole location.

5.68. The key landscape and visibility issues associated with this route section were identified as follows:

- this route section crosses a relatively open landscape of grazed and arable fields;

- it is likely that the removal of trees will be required as the route crosses the tree-lined Greentowers Road;

- this route section will be seen in views from the east facing property of Greentowers. However, outbuildings will limit views from other areas and buildings which comprise Greentowers;

- the overhead line will be seen in north-west views from Clencotto. However, the lower elevation of the property and garden vegetation within Clencotto will limit visibility of the overhead line;

- this route section passes over comparatively lower ground than route option 4a, therefore reducing the opportunity for the overhead line to be skylined in views;

- the route section passes in relative proximity north-east of Newsteadings. However, the main views from Newsteadings are south-east and therefore not towards this route section.

Route Section 4b

5.69. This extends southward through pastoral and arable farmland, keeping east of Greentowers, and crossing Greentowers road between Greentowers and Glencotho. This route section then extends south-westward across pastoral farmland, remaining west of Newsteadings. The route continues south-westward across the north slope of Mouse Water and Cartland Craigs toward the terminal pole location to the east of Burgh Wood.

5.70. The key landscape and visibility issues associated with this route section were identified as follows:

- this route section crosses a relatively open landscape of grazed and arable fields;
- the route section passes over comparatively higher ground than option 4b (see below), therefore increasing locations where the overhead line will be seen against the skyline;
- it is likely that the overhead line will be seen against the skyline from the east edge of Cartland and Cartland Mains;
- the direction of main views from properties within Cartland and Cartland Mains is eastward towards this route section;
- the overhead line will be visible in proximity from Greentowers against the skyline.

STEP F: APPRAISAL OF ROUTE OPTIONS

Landscape Appraisal

5.71. Whilst the emphasis was on route sections with two alternative options, all route sections were subject to a further detailed landscape and visual review including a desk study of aerial photos and OS maps supplemented by site visits carried out by LUC's landscape team in fair weather conditions during June and July 2010. Route sections and the surrounding terrain were also modelled in 3D using Topos Software which allowed OS maps and aerial photography to be overlaid. This review considered the relative sensitivity of the landscape to overhead lines, the perception of the landscape from key transport routes, the relative speed of past, and continuing, landscape change and the visibility of the route from key views, routes and residences.

5.72. The findings of the detailed landscape and visual review were used to:

(i) inform modifications to a number of route sections to further avoid or reduce likely landscape and visual effects;

(ii) inform the identification of route sections where two options existed.

Point (ii) is discussed further below.

5.73. The appraisal of route options 2a (north of Coldstream Reservoir) and 2b (south of Coldstream Reservoir) identified that:

- both options cross field/road tree-lines and are therefore likely to require tree removal;
- both options route in relative proximity to existing residential properties;
- route option 2b crosses ground of lower elevation than route option 2a, therefore limiting opportunities for the overhead line to be skylined in views.

On the basis of the above, route option 2b was selected.

5.74. The appraisal of route options 4a (west of Greentowers) and 4b (east of Greentowers) identified that:

- route option 4a would be inter-visible for much of its length from Cartland and Cartland Mains;
- route option 4b crosses over ground of lower elevation than option 4a leading to fewer opportunities for the overhead line to be skylined in views.

On the basis of the above, route option 4b was selected.

Technical Appraisal

5.75. At this stage, SPEN's technical design team undertook an appraisal of the route options in relation to the following technical criteria:

- height and slope;
- the existing network;
- the wayleave requirements.

5.76. The SPEN technical appraisal raised no concerns with the route options in relation to height or slope constraints for the wood pole design.

5.77. In relation to technical constraints with the existing network, SPEN identified that the proximity of the existing 33kV overhead line and a number of 11kV overhead lines in the vicinity of Middlehope / Middlehouse would require the Black Law Windfarm Extension connection in this area to be re-routed to the east or south.

5.78. SPEN also identified wayleave constraints in relation to the section of line proposed to route parallel to the existing 33kV overhead line within the Cartland Muir Plantation. SPEN advised that the connection would require to be re-routed to the east of the plantation to avoid this technical constraint.

Review of Preferred Route Corridor and Route Option

5.79. On the basis of the technical constraints identified by SPEN above, the preferred route was reviewed in these two areas to seek to identify alternative route sections to avoid these constraints. In reviewing these two sections, it was highlighted that to avoid these constraints would alter the route to such an extent that it would no longer reflect the preferred corridor (corridor 7).

5.80. Therefore, a review of corridor 8, the alternative 'preferred' corridor, was undertaken concurrently by the landscape team, through extensive field work informed by the findings of the early stages of routeing.

5.81. The findings of the review considered that corridor 8 could better accommodate the proposed connection than corridor 7, given the necessary changes associated with the latter for technical reasons. The rationale for this includes corridor 8 comprising:

- a more direct route option, with less changes in line direction;
- opportunities to backcloth large sections of the route against existing mature coniferous woodland;
- a smaller number of residential properties and receptors within the route corridor.

5.82. Further to the above, a route was identified within this corridor following the methodology for identification of route options outlined above. The route is shown on **Figure 5.8.** A technical review of the route was undertaken by SPEN in relation to the criteria identified above (height/slope, existing network and wayleave requirements), which confirmed no technical constraints to the route.

5.83. On this basis, the route was adopted as the 'preferred route' for the overhead line connection from Black Law Windfarm Extension to the existing substation at Linnmill. The preferred route is detailed in **Chapter 6**.

SP TRANSMISSION

Black Law Grid Connection

▸ **Study Area**

- Study Area
- Local Authority Boundary
- Black Law Windfarm Extension Substation
- Alternative Black Law Windfarm Extension Substation
- Linnmill Substation

Map Scale: 1:75,000

Figure 5.1

SP TRANSMISSION

Black Law Grid Connection

Environmental and Technical Constraints

- Study Area
- Black Law Windfarm Extension Substation
- Linnmill Substation
- Listed Building
- Scheduled Monument
- Conservation Area
- Garden & Designed Landscape
- National Nature Reserve (NNR)
- Special Area of Conservation (SAC)
- Site of Special Scientific Interest (SSSI)
- Sites of Importance for Nature Conservation (SINC)
- Scottish Wildlife Trust Reserve (SWTR)
- Area of Great Landscape Value
- Regional Scenic Area
- Windfarm with 152m Buffer
- Slope > 15 degrees
- > 300m AOD

Map Scale: 1:75,000

Figure 5.2

SP TRANSMISSION

Black Law Grid Connection

Identification of Route Corridors

- Black Law Windfarm Extension Substation
- Alternative Substation Location
- Linnmill Substation

- Indicative route corridors from Black Law Windfarm Extension substation to Linnmill substation
- Indicative route corridors from alternative substation location to Linnmill substation

- 2 Illustrative route only
- 8 Illustrative route only

Map Scale: 1:60,000

Figure 5.3

SP TRANSMISSION

Black Law Grid Connection

Route Corridors for Appraisal

- Black Law Windfarm Extension Substation
- Linnmill Substation
- Proposed Terminal Pole Location
- Underground Cable
- Route Corridor Option 5
- Route Corridor Option 7
- Route Corridor Option 8

(5)
(7)
(8)
(7)-(8)
(5)-(7)
(5)-(7)-(8)

0 1 2 3 4 5 Km

Map Scale: 1:60,000

Figure 5.4

SP TRANSMISSION

Black Law Grid Connection

Landscape Sensitivity

- Black Law Windfarm Extension Substation
- Linnmill Substation
- Proposed Terminal Pole Location
- Underground Cable

Landscape Sensitivity to Wood Pole Overhead Lines

- High
- Medium
- Low

Local Landscape Character Types

1 - Abby Burn Valley
2 - Black Law Windfarm
3 - Cartland
4 - Cartland Muir Plantation
5 - Hare Hill East Slopes
6 - Hare Hill South Slopes
7 - Hill Rig & Kinkadzow Law
8 - Kingshaw Moss
9 - Lark Law
10 - Lee Muir
11 - Muirhead
12 - Thornmuir
13 - Yellowshields

- Route Corridor Options

Map Scale: 1:60,000

Figure 5.5

SP TRANSMISSION

Black Law Grid Connection

Residential Amenity

- Blacklaw Extension Substation
- Linnmill Substation
- Proposed Terminal Pole Location
- Underground Cable
- Residential Properties (Including 100m buffer)
- Route Corridor Option 5
- Route Corridor Option 7
- Route Corridor Option 8

Map Scale: 1:60,000

Figure 5.6

SP TRANSMISSION

Black Law Grid Connection

Route Options

- Black Law Windfarm Extension Substation
- Linnmill Substation
- Proposed Terminal Pole Location
- Underground Cable
- Route Section 1
- Route Section 2a
- Route Section 2b
- Route Section 3
- Route Section 4a
- Route Section 4b
- Route Corridor

Map Scale: 1:60,000

Figure 5.7

SP TRANSMISSION

Black Law Grid Connection

- **Preferred Corridor and Route**

- Black Law Windfarm Extension Substation
- Linnmill Substation
- Proposed Terminal Pole Location
- Underground Cable
- Current Preferred Route
- Route Corridor

Map Scale: 1:60,000

Figure 5.8

LUCGL Fig05-08_4770_0026_r2_Route_Options 01/04/2011

6. THE PREFERRED ROUTE

6.1. The preferred route is shown on **Figure 6.1**.

6.2. The preferred route extends south-eastward from Black Law Windfarm Extension Substation through the coniferous plantation for approximately 0.8km. The route then continues south-eastward for approximately 1.5km through rough open grassland keeping to the east of the existing Black Law Windfarm turbines towards Whaup Knowe. From Whaup Knowe, the route continues broadly south-westward towards Springfield Reservoir, passing along the western edge of a mature coniferous plantation located to the east of Hare Hill. This route section passes through rough grassland with the exception of a small section immediately east of Hare Hill mast, which passes through recently felled and replanted coniferous plantation, before crossing perpendicular to an existing 33kV overhead line east of Birniehall.

6.3. Approximately 0.5km east of Springfield Reservoir, the route extends southward through rough grazing fields, crossing an unclassified road east of Easterseat before continuing across pastoral fields and crossing the B7056 road, 0.5km west of Mossplatt. The route then continues to extend southwards through pastoral fields keeping west of Newmains and broadly parallel with the A706 road located 1km to the east, towards a small woodland stand, before continuing south-westwards up the shallow valley of Back Burn to the east of Hill Rig. After 1.5km, the route crosses perpendicular to the A721 road approximately 300m east of Hole, before heading south-westwards crossing an unclassified road and passing to the east of the properties of Hole and Cairn View. The route then extends south-westward for around 1km following the shallow valley of a small burn through pastoral fields before crossing Fullwood Burn near coniferous plantations to the north of Birkenhead. The route continues south-westwards through pastoral fields along the eastern edge of the coniferous plantation before passing westwards through a narrow stand of coniferous plantation to the north-west of Fullwood.

6.4. Once out of the plantation, the route extends south-westwards through farmland crossing a railway line and an unclassified road, remaining north-west of Castlehill Farm, before crossing an unclassified road perpendicular westwards. The route then continues south-westwards across arable fields to the east of Greentowers and extends south-westward over Moor Road and across arable farmland west of Newsteadings and east of Cartland Mains, before continuing south-westward to the terminal pole location to the east of Burgh Wood.

6.5. From the terminal pole location, the connection continues to the Linnmill Substation as an underground cable for the remainder of the route, approximately 2km. The underground cable runs along the eastern edge of Burgh Wood, before running along the verge of the A73/Lanark road to the junction with Sunnyside Road. The cable then follows Sunnyside Road south-westwards for a short distance of 50m before heading westwards along West Nemphlar Road towards Chapel Knowe. After 400m, the cable heads due south across pastoral fields for 150m before continuing south-westwards parallel to the hedgerow field boundary south of Sunnyside towards Hakespie Hill. The cable crosses the River Clyde at Stonebyres Falls and heads south

along the B706 road to the western edge of Linnville before entering the Linnmill Substation after 400m.

6.6. It is important to note that the route is not 'fixed' at this stage. The final design will be informed by feedback from the consultation process and the findings of the environmental surveys and assessment.

SP TRANSMISSION

Black Law Grid Connection

The Preferred Route

- Black Law Windfarm Extension Substation
- Linnmill Substation
- Proposed Terminal Pole Location
- Underground Cable
- Preferred Route

Map Scale: 1:60,000

Figure 6.1

LUCGL Fig06-01_4770_0040_r0_Preferred_Route 01/04/2011

7. NEXT STEPS AND PROJECT PROGRAMME

7.1. With schemes of this nature, SPEN considers it good practice to engage in formal consultation following the identification of the 'preferred route'. Consequently, this Routeing Consultation Report has been issued to the organisations listed in Appendix 1 and has also been made available for public viewing.

7.2. The consultation period for consultees will run from 6th April 2011 until 6th May 2011. Consultation responses will inform confirmation of the 'Proposed Route' to be progressed to the EIA phase of the project. Subject to these responses, confirmation of the proposed route is anticipated in May 2011.

7.3. The preparation of the Environmental Statement (ES) is anticipated to take approximately six months with the baseline studies commencing in May 2011. At the outset of the ES, a request for a Scoping Opinion will be submitted to Scottish Ministers. Views will also be sought from a range of additional non-statutory consultees. It is anticipated that the request for a Scoping Opinion will be submitted in May 2011.

7.4. Subject to the timescale required for completion of the EIA and preparation of the ES, it is anticipated that the Section 37 application for consent to install, and keep installed, the 132kV overhead line will be submitted by December 2011.

APPENDIX 1: LIST OF CONSULTEES

Consultees receiving the Routeing Consultation Report

- South Lanarkshire Council
- North Lanarkshire Council
- West Lothian Council
- Scottish Natural Heritage
- Historic Scotland
- Scottish Government
- Scottish Environment Protection Agency
- Scottish Water
- Coal Authority
- Royal Society for the Protection of Birds Scotland
- British Horse Society
- Association of Salmon Fisheries Board
- Scottish Wildlife Trust
- Forestry Commission Scotland
- Scottish Rights of Way Society
- Woodland Trust
- Transco
- Tarbrax Community Council
- Pettinain Community Council
- Royal Burgh of Lanark Community Council
- West of Scotland Archaeology Service
- Ramblers Association
- The Crown Estate
- Farming and Wildlife Advisory Group (FWAG)
- National Farmers' Union
- British Trust for Ornithology
- Health and Safety Executive
- Department for Trade and Industry
- Architecture and Design Scotland
- National Trust for Scotland
- Scottish Enterprise
- OfCom
- Ministry of Defence
- Civil Aviation Authority
- National Air Traffic Services

APPENDIX 2: THE HOLFORD RULES

THE HOLFORD RULES: GUIDELINES FOR THE ROUTEING OF NEW HIGH VOLTAGE OVERHEAD TRANSMISSION LINES WITH NGC 1992 AND *SHETL 2003* NOTES

Rule 1

Avoid altogether, if possible, the major areas of highest amenity value, by so planning the general route of the line in the first place, even if the total mileage is somewhat increased in consequence.

Note on Rule 1

a) Investigate the possibility of alternative routes, avoiding *altogether, if possible major* areas of highest amenity value. The consideration of alternative routes must be an integral feature of environmental statements. *If there is an existing transmission line through a major area of highest amenity value and the surrounding land use has to some extent adjusted to its presence, particularly in the case of commercial forestry, then effect of remaining on this route must be considered in terms of the effect of a new route avoiding the area.*

b) Areas of highest amenity value *require to be established on a project-by-project basis considering Schedule 9 to The Electricity Act 1989, Scottish Planning Policies, National Planning Policy Guidelines, Circulars and Planning Advice Notes and the spatial extent of areas identified.*

Examples of areas of highest amenity value which should be considered are:

Special Area of Conservation	*(NPPG 14)*
Special Protection Area	*(NPPG 14)*
Ramsar Site	*(NPPG 14)*
National Scenic Areas	*(NPPG 14)*
National Parks	*(NPPG 14)*
National Nature Reserves	*(NPPG 14)*
Protected Coastal Zone Designations	*(NPPG 13)*
Sites of Special Scientific Interest (SSSI)	*(NPPG 14)*
Schedule of Ancient Monuments	*(NPPG 5)*
Listed Buildings	*(NPPG 18)*
Conservation Areas	*(NPPG 18)*
World Heritage Sites (a non-statutory designation)	*(NPPG 18)*
Historic Gardens and Designed Landscapes (a non-statutory designation)	*(NPPG 18)*

Rule 2

Avoid smaller areas of high amenity value, or scientific interest by deviation; provided that this can be done without using too many angle

towers, i.e. the more massive structures which are used when lines change direction.

Note on Rule 2

a) Small areas of highest amenity value not included in Rule 1 as a result of their spatial extent should be identified along with other areas of regional or local high amenity value identified from development plans.

b) Effects on the setting of historic buildings and other cultural heritage features should be minimised.

c) If there is an existing transmission line through an area of high amenity value and the surrounding landuses have to some extent adjusted to its presence, particularly in the case of commercial forestry, then the effect of remaining on this line must be considered in terms of the effect of a new route deviating around the area.

Rule 3

Other things being equal, choose the most direct line, with no sharp changes of direction and thus with few angle towers.

Note on Rule 3

a) Where possible choose inconspicuous locations for angle towers, terminal towers and sealing end compounds.

b) Too few angles on flat landscape can also lead to visual intrusion through very long straight lines of towers, particularly when seen nearly along the line.

Rule 4

Choose tree and hill backgrounds in preference to sky backgrounds, wherever possible; and when the line has to cross a ridge, secure this opaque background as long as possible and cross obliquely when a dip in the ridge provides an opportunity. Where it does not, cross directly, preferably between belts of trees.

Rule 5

Prefer moderately open valleys with woods where the apparent height of towers will be reduced, and views of the line will be broken by trees.

Notes on Rules 4 and 5

a) Utilise background and foreground features to reduce the apparent height and domination of towers from main viewpoints.

b) Minimise the exposure of numbers of towers on prominent ridges and skylines.

c) Where possible follow open space and run alongside, not through woodland or commercial forestry, and consider opportunities for skirting edges of copses and woods. Where there is no reasonable alternative to cutting through woodland or commercial

forestry, the Forestry Commission Guidelines should be followed (Forest Landscape Design Guidelines, second edition, The Forestry Commission 1994 and Forest Design Planning – A Guide to Good Practice, Simon Bell/The Forest Authority 1998).

d) Protect existing vegetation, including woodland and hedgerows, and safeguard visual and ecological links with the surrounding landscape.

Rule 6

In country which is flat and sparsely planted, keep the high voltage lines as far as possible independent of smaller lines, converging routes, distribution poles and other masts, wires and cables, so as to avoid a concatenation or 'wirescape'.

Note on Rule 6

a) In all locations minimise confusing appearance.

b) Arrange wherever practicable that parallel or closely related routes are planned with tower types, spans and conductors forming a coherent appearance. Where routes need to diverge allow, where practicable, sufficient separation to limit the effects on properties and features between lines.

Rule 7

Approach urban areas through industrial zones, where they exist; and when pleasant residential and recreational land intervenes between the approach line and the substation, go carefully into the comparative costs of undergrounding, for lines other than those of the highest voltage.

Note on Rule 7

a) When a line needs to pass through a development area, route it so as to minimise as far as possible the effect on development.

b) Alignments should be chosen after consideration of effects on the amenity of existing development and on proposals for new development.

c) When siting substations take account of the effects of the terminal towers and line connections that will need to be made and take advantage of screening features such as ground form and vegetation.

Explanatory Note on Rule 7

The assumption made in Rule 7 is that the highest voltage line is overhead.

Supplementary Notes

a) Residential Areas

Avoid routeing close to residential areas as far as possible on grounds of general amenity.

b) Designations of Regional and Local Importance

Where possible choose routes which cause the least disturbance to Areas of Great Landscape Value and other similar designations of Regional or Local Importance.

c) Alternative Lattice Steel Tower Designs

In addition to adopting appropriate routeing, evaluate where appropriate the use of alternative lattice steel tower designs available where these would be advantageous visually, and where the extra cost can be justified. [*Note: SHETL have reviewed the visual and landscape arguments for the use of lattice steel towers in Scotland and summarised these in a document entitled Overhead Transmission Line Tower Study 2004*].

Further Notes on Clarification to The Holford Rules

Line Routeing and People

The Holford Rules focused on landscape amenity issues for the most part. However, line routeing practice has given greater importance to people, residential areas etc. The following notes are intended to reflect this.

a) Avoid routeing close to residential areas as far as possible on grounds of general amenity.

b) In rural areas avoid as far as possible dominating isolated house, farms or other small-scale settlements.

c) Minimise the visual effect perceived by users of roads, and public rights of way, paying particular attention to the effects of recreational, tourist and other well-used routes.

Supplementary Notes on the Siting of Substations

a) Respect areas of high amenity value (see Rule 1) and take advantage of the containment of natural features such as woodland, fitting in with the landscape character of the area.

b) Take advantage of ground form with the appropriate use of site layout and levels to avoid intrusion into surrounding areas.

c) Use space effectively to limit the area required for development, minimizing the effects on existing land use and rights of way.

d) Alternative designs of substation may also be considered, e.g. 'enclosed', rather than 'open', where additional cost can be justified.

e) Consider the relationship of tower and substation structures with background and foreground features, to reduce the prominence of structures from main viewpoints.

f) When siting substations take account of the effects of line connections that will need to be made.