SCOTTISHPOWER

SP Transmission Ltd

Black Law Windfarm Extension Grid Connection Environmental Statement

Written Statement, Figures and Appendices

October 2012

Black Law Windfarm Extension Grid Connection
Environmental Statement

Prepared by
LUC
on behalf of
ScottishPower Transmission Ltd

October 2012

Preface

This Environmental Statement (ES) has been prepared in support of the applications for the development of a grid connection for the proposed Black Law Windfarm Extension in South Lanarkshire.

The Environmental Statement comprises one volume and consists of the following:

- Written Statement (principal document)
- Figures
- Appendices

In addition to the above, the Environmental Statement is accompanied by a Non-Technical Summary.

Further copies of Environmental Statement will be available for viewing at:

ScottishPower Energy Networks
New Alderstone House
Dove Wynd
Strathclyde Business Park
Bellshill
ML4 3FF

The Non-Technical Summary is available free of charge. A hard copy of the Environmental Statement costs £250. In addition, all documents are available in an electronic format (as PDF for screen viewing only) on CD/DVD for £25.

The Environmental Statement is available for viewing by the public during normal opening hours at the following locations:

South Lanarkshire Council
Planning and Building Standards Services
Clydesdale Area Office
South Vennel
Lanark
ML11 7JT

North Lanarkshire Council
Planning Offices
North Lanarkshire Council
303 Brandon Street
Motherwell
ML1 1RS

Carluke Library
Carnthwath Road
Carluke
ML8 4DR

West Lothian Council
Development Management
County Buildings
High Street
Linlithgow
EH49 7EZ

Forth Library / Forth Primary School
Main Street
Forth
ML11 1AE

Any representations to the application should be made by completing the online representation form on The Scottish Government, Energy Consents website at

http://www.scotland.gov.uk/Topics/Business-Industry/Energy/Energy-Consents/Support-object

or

by email to The Scottish Government, Energy Consents Unit mailbox at representations@scotland.gsi.gov.uk

or

by post to The Scottish Government, Energy Consents Unit, Scottish Government, 4th Floor, 5 Atlantic Quay, 150 Broomielaw, Glasgow, G2 8LU

Written Statement

Figures

Appendices

Appendix 4.1: Schedule of Mitigation

Appendix 6.1: Computer Modelling Methodology

Appendix 7.1: Watercourse Crossings

Appendix 7.2: Photographs of Watercourse Crossings

Appendix 8.1: Ecological Legislation and Policy

Appendix 8.2: Habitat Survey Report

Appendix 8.3: Protected Species Survey Report

Appendix 8.4: Ecological Impact Significance Assessment

Appendix 9.1: Ornithology Technical Report

Appendix 10.1: Cultural Heritage Sites and Features within the Core Study Area

Appendix 10.2: External Receptors within the Outer Study Area

1 Introduction

1.1 This Environmental Statement (ES) has been prepared by LUC on behalf of Scottish Power Energy Networks (SPEN), agents for ScottishPower Transmission Limited (SPT)[1]. It provides information in relation to the 'Black Law Windfarm Extension Grid Connection' (hereinafter referred to as the 'proposed grid connection'). The proposed grid connection is located within the local authority boundaries of North Lanarkshire, South Lanarkshire and West Lothian, as shown in **Figure 1.1**, and comprises 14.5km of new 132kilovolt (kV) overhead line (OHL) supported on wood poles, 4.5km of underground cable and an extension to the existing Linnmill substation near Lanark, as further described in **Chapter 4: Development Description**. This is required to connect the consented Black Law Windfarm Extension to the existing electricity network.

The Need for the Project

1.2 Global climate change is widely recognised as one of the greatest environmental, social and political challenges facing the world today. One of the principal causes of climate change is a rise in the concentration of atmospheric carbon dioxide (CO_2), to which fossil-fuelled electricity generation is a major contributor. Successive UK and Scottish governments have made progressively more determined efforts to curb CO_2 emissions through attempts to reduce dependence on fossil fuels; most notably for electricity generation. In May 2011, the Scottish Government set a target for renewable sources to generate the equivalent of 100 per cent of Scotland's gross annual electricity consumption by 2020.

1.3 The National Planning Framework for Scotland (NPF) 2[i] was published in June 2009 and is a strategy for Scotland's long term spatial development. The Framework highlights the need for key improvements to the electricity transmission system to facilitate the development of Scotland's renewable energy resources. 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.

The Applicant and Legal Framework

1.4 As developer of the Black Law Windfarm Extension, ScottishPower Renewables has a contract with the electricity transmission system operator for Great Britain (National Grid Electricity Transmission plc) for connection and use of the electricity transmission system. ScottishPower, through its electricity transmission licence holder company 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[ii] *"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 the Black Law Windfarm Extension with a connection to the electricity network.

1.5 All transmission licence holders are required under Paragraph 3 to Schedule 9 and Section 38 of the Electricity Act 1989 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."*

1.6 Section 37 of the 1989 Act stipulates that consent is required from Scottish Ministers for the installation of overhead transmission lines. To obtain consent, in accordance with Paragraph 3 to Schedule 9 of the 1989 Act, it is SPT's duty to consider the possible environmental impacts of the proposals and state what can 'reasonably be done' to mitigate any identified adverse environmental impacts.

The Development and Consenting Process

1.7 SPT is submitting an application to Scottish Ministers under Section 37 of the Electricity Act 1989 for consent to install, and keep installed, a 132kV OHL.

1.8 SPT will also be seeking direction from the Scottish Ministers under Section 57 (2) of the Town and Country Planning (Scotland) Act 1997[iii] (as amended) that deemed planning permission be granted for the OHL, underground cable section and extension to Linnmill substation. Whilst the application will be submitted to the Scottish Ministers, the local authorities (South Lanarkshire Council, North Lanarkshire Council and West Lothian Council) will be consulted to inform the determination.

The Environmental Impact Assessment

1.9 Schedules 1 and 2 to the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000[iv] (as amended), (hereinafter referred to as the 'EIA Regulations'), define those developments for which an Environmental Impact Assessment (EIA) is required. Schedule 1 (b) includes *"an electric line installed above ground with (a) a voltage of 220 kilovolts or more and (b) a length of more than 15 kilometres, the installation of which (or the keeping installed of which) will require a section 37 consent".* Schedule 2(d) includes *"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".* The proposed grid connection has therefore been determined as a Schedule 2 development under the EIA Regulations.

1.10 For Schedule 2 developments, EIA is not mandatory, and professional judgement is required as to the likelihood of the development resulting in significant environmental impacts, depending on the nature, size and location of the proposal.

1.11 SPT considered that the proposed grid connection had the potential to have significant environmental impacts. On this basis, an Environmental Statement (ES) has been prepared to accompany the application for S37 consent and the application for deemed planning permission.

1.12 The ES has been compiled by LUC for SPT. Whilst LUC had overall responsibility for the ES; a number of sub-consultants prepared specialist chapters and provided input to the EIA as indicated in **Table 1.1** below.

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

Table 1.1: Responsibilities for the Environmental Impact Assessment

Chapter Number	Description	Project Team
Chapter 1	Introduction	LUC
Chapter 2	Approach to the EIA	LUC
Chapter 3	The Design Strategy	LUC
Chapter 4	Development Description	LUC
Chapter 5	Planning Policy Context	LUC
Chapter 6	Landscape and Visual Amenity	LUC
Chapter 7	The Water Environment	Kaya Consulting Ltd
Chapter 8	Ecology	LUC with input from Echoes Ecology
Chapter 9	Ornithology	Natural Research Projects Limited (NRP)
Chapter 10	Cultural Heritage	CFA Archaeology
Chapter 11	Noise	Arup
Chapter 12	Traffic and Transport	Arup
Chapter 13	Land Use	LUC, Minerals and Resource Management and RTS LTD.
Chapter 14	Electric and Magnetic Fields	SPEN
Chapter 15	Summary	LUC

Structure of the Environmental Statement

1.13 The first part of the ES comprises introductory **chapters 1-5**:

- **Chapter 1: Introduction** provides a brief introduction to the proposed grid connection and the legislative requirements and outlines the structure of the ES;
- **Chapter 2: Approach to the EIA** provides more detail on the EIA process including scoping, and impacts/topics 'scoped out', and further EIA stage consultation;
- **Chapter 3: The Design Strategy** constitutes the Design Statement in accordance with acknowledged good practice and presents the alternatives considered;
- **Chapter 4: Development Description** provides a more detailed description of the proposed grid connection including construction and maintenance details, and then discusses health and safety aspects and environmental management;
- **Chapter 5: Planning Policy Context** summarises the national, regional and local planning policy context and identifies relevant committed development.

1.14 The second part of the ES comprises technical **chapters 6-14**, and describes the likely significant environmental impacts of the proposed grid connection in relation to the following topic areas:

- **Chapter 6: Landscape and Visual Amenity;**
- **Chapter 7: The Water Environment;**
- **Chapter 8: Ecology;**
- **Chapter 9: Ornithology;**
- **Chapter 10: Cultural Heritage;**
- **Chapter 11: Noise;**
- **Chapter 12: Traffic and Transport;**
- **Chapter 13: Land Use;**
- **Chapter 14: Electric and Magnetic Fields.**

1.15 The third part of the ES, **Chapter 15: Summary** presents the overall findings of the EIA, with particular emphasis on the likely significant impacts.

1.16 The ES also contains the supporting Appendices listed in the contents page.

References

[i] The Scottish Government, (2009), 'National Planning Framework for Scotland 2', Available [online] at: http://www.scotland.gov.uk/Publications/2009/07/02105627/0, Last accessed on: 18/10/2012
[ii] Electricity Act 1989, Available [online] at: http://www.legislation.gov.uk/ukpga/1989/29/contents, Last accessed on: 18/10/2012
[iii] Town and Country Planning (Scotland) Act 1997, Available [online] at: http://www.legislation.gov.uk/ukpga/1997/8/contents, Last accessed on: 18/10/2012
[iv] Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000, Available [online] at: http://www.legislation.gov.uk/ssi/2000/320/contents/made, Last accessed on: 18/10/2012

2 Approach to the EIA

Introduction

2.1 The compilation of an Environmental Impact Assessment (EIA) involves the evaluation and presentation of any predicted significant environmental impacts resulting from a proposed development, to assist the consenting authority, statutory consultees and wider public in considering an application. Early identification of potentially adverse environmental impacts also leads to the identification and incorporation of appropriate mitigation measures into the scheme design.

2.2 This chapter sets out the broad method of approach that has been used in the EIA for the Black Law Extension Grid Connection (hereinafter referred to as the 'proposed grid connection'). It provides an overview of the key stages that have been followed, in line with EIA best practice.

The EIA Process

EIA Regulations

2.3 The ES has been prepared in accordance with the latest regulations and advice on good practice, including:

- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000[i] (as amended);
- Guidance on the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000[ii] (as amended);
- Scottish Planning Series Planning Circular 3 2011 The Environmental Impact Assessment (Scotland) Regulations 2011[iii];
- Planning Advice Note (PAN) 58 Environmental Impact Assessment (1999)[iv];
- The Institute of Environmental Management and Assessment (2004) Guidelines for Environmental Impact Assessment[v];
- Scottish Natural Heritage (2009) A Handbook on Environmental Impact Assessment: Guidance for Competent Authorities, Consultees and others involved in the Environmental Impact Assessment Process in Scotland (3rd Edition)[vi].

2.4 Schedule 4 Part I of the EIA Regulations sets out the information *"reasonably required to assess the environmental effects of the development and which the applicant can, having regard in particular to current knowledge and methods of assessment, reasonably be required to compile".* This includes the following:

- a description of the development including information on the physical characteristics of the whole development and land use requirements during construction and operation. A description of the nature and quantity of materials used is also suggested for inclusion along with consideration of any emissions from the development (including water, soil, noise etc.);
- a description of the aspects of the environment likely to be significantly affected by the development;
- a description of the likely significant effects of the development (including direct, indirect, secondary, cumulative, short, medium and long term, permanent and temporary, positive and negative);
- a description of the measures envisaged to avoid, reduce and, if possible, prevent potentially significant adverse environmental effects (mitigation measures);
- a non-technical summary of the above information;
- an indication of any difficulties encountered during compilation of the ES.

2.5 The information that a developer is *required* to submit in an ES is specified in Schedule 4 Part II of the EIA Regulations:

- a description of the development comprising information on the site, design and size of the development;
- a description of the measures envisaged in order to avoid, reduce and, if possible, remedy significant adverse impacts (mitigation measures);
- the data required to identify and assess the main effects[1] which the development is likely to have on the environment;
- the main alternatives studied by the applicant and an indication of the main reasons for this choice, taking into account the environmental impacts;
- a non-technical summary of the above information.

2.6 This ES includes the information required by Part I and II of Schedule 4 of the Regulations.

Good Practice Guidance

2.7 Scottish Planning Circular 3 2011 and PAN 58 provide guidance on EIA good practice, with the key steps to be followed in the EIA process identified as:

Scoping

2.8 Undertake a scoping exercise to establish likely significant impacts.

Baseline Studies

2.9 Examine, through baseline studies, the environmental character of the area likely to be affected by the development.

2.10 Identify relevant natural and man-made processes which may already be changing the character of the site.

Predicting and Assessing Impacts

2.11 Consider the possible interactions between the proposed development and both existing and future site conditions.

2.12 Predict and assess the possible impacts, both negative and positive, of the development on the environment.

Mitigation

2.13 Introduce design and operational modifications or other measures to avoid, minimise or mitigate adverse impacts and enhance positive impacts.

EIA and the Design Process

2.14 EIA should be treated as an iterative process, rather than a one-off, post-design environmental appraisal. In this way, the findings from the EIA can be fed into the design process, to avoid and minimise environmental impacts. This approach has been used in relation to the design stages of the proposed grid connection. Where potentially adverse environmental impacts were identified through the routeing stages or later in the detailed EIA, consideration was given as to how the scheme design should be modified to design out these adverse environmental impacts, or where this was not possible, to determine appropriate mitigation. Post-routeing stage modifications[2] to the scheme design are outlined in **Chapter 3: The Design Strategy** and in the subsequent assessment chapters.

[1] Section 11.2 of the IEMA EIA Guidelines states that whilst distinguishing between the characteristics of an 'impact' and the significance of an 'effect' can be helpful, the distinction between 'impact' and 'effect' may not necessarily be appreciated by the public and requires a high level of rigour to ensure that the two terms are used in a consistent fashion. For simplicity, the term 'impact' has been used throughout this ES.

[2] Post-routeing modifications to the proposed grid connection were informed by the Scoping Opinion, emerging environment survey findings and land use considerations. Subsequently, the additional modifications included relocation of individual wood poles and associated infrastructure. The justifications for these modifications are outlined in **Chapter 3: Approach to the EIA.**

Scope of the Environmental Statement

2.15 To determine which aspects of the proposed grid connection are likely to give rise to environmental impacts and to inform the requirements for the ES, LUC prepared a Scoping Report which was submitted to the Scottish Government in June 2011 together with a request for a Scoping Opinion as to the environmental impacts to be considered in the EIA. The Scoping Report identified all aspects of potential environmental significance for the proposed grid connection and highlighted the key issues proposed for coverage in the ES.

2.16 Importantly, the purpose of scoping is to ensure that the EIA focuses on the key environmental issues. Therefore, the Scoping Report sought to focus the EIA on the main impacts, with each of the topic-based chapters within the Scoping Report setting out a provisional list of significant impacts prior to mitigation and a second provisional list of non-significant impacts to be 'scoped out' of full assessment. These were drafted on the basis of the findings of the preliminary survey work undertaken, the professional judgement of the EIA team, experience from other projects of a similar nature, and guidance and standards of relevance to the topic area in question.

2.17 On this basis, whilst a range of possible impacts has been investigated as part of the EIA process, only impacts identified as being of likely significance prior to the implementation of the proposed mitigation measures have been addressed fully in the ES.

2.18 The Scoping Opinion provided by the Scottish Government (dated 15th September 2011) included the consultation responses from the statutory consultees. **Table 2.1** provides a summary of the issues raised in the Scoping Opinion.

2.19 In addition to the consultees contacted by the Scottish Government during the formal scoping process, topic area specialists contacted a number of other parties to obtain background information to further inform the EIA and to allow them the opportunity to raise any concerns that they might have in relation to the proposed grid connection. Details of all relevant consultation responses are provided in the specialist topic areas: **chapters 6-14**.

Topic Areas Scoped Out of the ES

2.20 Guidance prepared by the (then) Scottish Executive in relation to the Electricity Works EIA Regulations, states that emphasis should be placed *"on the 'significant' environmental impacts to which a development is likely to give rise. Some impacts may be of little value or of no significance for the particular development in question. They will therefore need only very brief treatment to indicate that their possible relevance has been considered."*

2.21 In line with this guidance, where no significant impacts have been identified for a particular topic these have been 'scoped out' and given only brief treatment in the relevant topic chapters.

2.22 On the basis of the work undertaken to date, responses to the consultation exercise and SPT's expertise and experience in the construction and operation of 132kilovolt (kV) wood pole overhead lines (OHLs) and cable connections, the proposed grid connection is considered unlikely to result in air quality and climate and tourism impacts, therefore these topic areas have been 'scoped out' of detailed assessment.

2.23 Similarly, no significant impacts on geology and soils are predicted, however, information on the existing soil and geological conditions in relation to minerals is provided in **Chapter 13: Land Use.**

2.24 In relation to impacts on land use, whilst significant impacts associated with past, existing and potential future land uses (in relation to minerals) are not predicted, land use has been an important consideration in the routeing and EIA and an overview of the likely relationship of the proposed grid connection with the various land uses within the study area, including woodland, recreation, agriculture and minerals is discussed in **Chapter 13**.

2.25 Significant impacts associated with electric and magnetic fields (EMF) and operational noise are also not considered likely, and are therefore not assessed in detail within the ES. **Chapter 14: Electric and Magnetic Fields** does however provide information in relation to the level of EMF likely to be associated with the operation of the proposed grid connection, in the context of Government guidance.

Table 2.1: Summary of the Black Law Windfarm Extension Grid Connection Scoping Opinion

Key Issues Raised	Action Taken / Where Issues Addressed in ES
Content of the Environmental Statement	
The ES should include a section on the following: Non-technical summary Site selection and alternatives: demonstrating the environmental and economic parameters used to narrow the choice of sites. A detailed examination of these parameters should be presented to show how impacts were minimised through careful design. Description of the proposed grid connection: this should include a description of physical characteristics during all development stages and a description of the main characteristics of the production processes, nature and quality of the materials to be used. Decommissioning: a programme of work complete with outline plans and specifications for the decommissioning and reinstatement of the site should be provided.	A non-technical summary is provided at the front of this ES and as a separate stand-alone document. Details in relation to the design process are provided within the ES **Chapter 3: The Design Strategy** A description of the construction and operation of the proposed grid connection is provided in **Chapter 4: Development Description**. An assessment of the decommissioning has not been undertaken as part of the EIA as i) the future baseline conditions (environmental and other developments) cannot be predicted accurately at this stage and ii) any proposals for refurbishment/decommissioning are not known at this stage.
Construction and Operation	
All aspects of site work that may impact on the environment should be detailed in the ES. This includes any storage areas (i.e. stockpile and materials), access routes (temporary or permanent, including watercourse crossings), digging activity and welfare facilities for workers. The ES should demonstrate which periods of the year are best for construction to avoid pollution risks and other environmental sensitivities e.g. bird nesting. The impact of the proposed grid connection on public footpaths and rights of way should be clearly indicated. The ES should set out mechanisms to ensure workers onsite are aware of environmental risks and state whether an Ecological Clerk of Works will be assigned. Details of emergency procedures should also be provided.	Details of the construction process are provided in **Chapter 4: Development Description**. This includes identification of potentially sensitive areas and proposals to prevent environmental impacts through construction processes. Details in relation to timing of construction activities to minimise environmental sensitivities are provided in **Chapter 4**, **Chapter 7: The Water Environment, Chapter 8: Ecology** and **Chapter 9: Ornithology**. Potential impacts on public footpaths are assessed in **Chapter 13: Land Use.** Outline methods for construction including environmental protection are presented in **Chapter 4,** and a Construction Method Statement will be submitted to the planning authority in consultation with Scottish Natural Heritage (SNH) prior to the commencement of construction works**.** The need for an Ecological Clerk of Works is discussed in **Chapter 8**.
Design/ Landscape and Visual Amenity	
The ES should critically consider the design and routeing of the proposed grid connection against the 'Holford Rules'. Developers are advised to refer to PAN 68: *Design Statements*. The Design Statement should include details on the routeing of tracks and design of substations.	The routeing and design parameters for the proposed grid connection are presented in **Chapter 3** and **Chapter 6: Landscape and Visual Amenity**. It should be noted that no new substation is proposed as part of this application.
Hydrology (Water Environment)	
Developers are advised to consult with the Scottish Environment Protection Agency (SEPA) at an early stage. In addition to SEPA's Pollution Prevention Guidelines, prevention and clean-up measures should be considered for all stages of the proposed grid connection. The ES should clearly identify the location of and mitigation measures in relation to all private water supplies within the catchments impacted by the scheme. Early consultation with the local District Salmon Fishery Board and Fisheries Trust is encourage to avoid a number of potential impacts including increases in silt, point source pollution and drainage issues. <u>*Hydrology and Hydrogeology*</u> The ES should detail the potential impacts on hydrology, water quality and quantity and flood risk. Long term average monthly rainfall figures should be provided within the baseline information. The ES must identify all water crossings and include a systematic table of watercourse crossings or channelising, including justification for any such elements and accompanying photographs. Impacts on watercourses, lochs, groundwater and other features and sensitive receptors such as water supplies must be assessed and measures proposed to prevent sedimentation or discolouration along with monitoring proposals and contingency plans.	SEPA was consulted during the routeing stage in 2010 and was consulted as part of the Scoping process. Details of how pollution impacts will be prevented and/or clean-up measures implemented are provided in **Chapter 4** and **Chapter 7**. Details of the location of private water supplies are presented in **Chapter 7**. These fisheries bodies were consulted during the scoping process and subsequently in relation to ecology. The findings of the assessment of impacts on hydrology are provided in **Chapter 7**. The chapter also presents details of any watercrossings and monthly rainfall figures. **Chapter 7** has addressed these issues.

Key Issues Raised	Action Taken / Where Issues Addressed in ES
SEPA requests that evidence should also be provided to demonstrate that the proposals have been designed to minimise engineering working within the water environment. *Geology and Soils* The ES should clearly set out the likely significant effect of the proposed grid connection on geology and soils. *Assessment of Peat Slide Risk* If the proposed grid connection is to take place on peatland habitats, the ES should incorporate a comprehensive peat slide risk assessment.	The routeing and design of the proposed grid connection is presented in **Chapter 3** with further details of routeing and design considerations in relation to the water environment provided in **Chapter 7**. Limited aggregates are required for construction of the proposed grid connection (no aggregate extraction is proposed) and impacts on Geology and Soils have been 'scoped out'. However, information in relation to the existing soil and geological conditions are provided in **Chapter 13**, in relation to minerals. The design of the proposed grid connection route has taken account of the location of blanket bog habitats (associated with peat) as given in **Chapter 3**. As there is limited peat within the proposed construction area, the depths are less than 50cm, and the nature of the construction and operation of the grid connection, no impacts associated with peat slide risk are predicted and a peat slide risk assessment is not considered necessary.
Ecology, Biodiversity and Nature Conservation	
All ecological surveys should conform to best standards for habitats and species and follow SNH guidance. Methods should be agreed with SNH and carried out by suitably qualified staff at the appropriate time of year. *Designated Sites:* The ES should address likely impacts on nature conservation interests of all designated sites in the vicinity of the proposed grid connection, detail any mitigation measures and include sufficient information to make clear how the tests in the Habitats Regulations will be met. *Habitats:* The ES should provide a comprehensive account of the habitats present along the route of the proposed grid connection. Habitat enhancement and mitigation measures should be detailed in the context of biodiversity conservation, particularly in respect to blanket bog. The ES should address whether or not the proposed grid connection could assist or impede delivery of elements of relevant Biodiversity Action Plans. *Habitat Management:* SNH and RSPB may wish to see a Habitat Management Plan for the area of the OHL, and any area managed in mitigation or compensation for the potential impacts of the proposed grid connection. A commitment to maintain and/or enhance the biodiversity of the overall area is expected. *Species: Plants and Animals:* The applicant should give consideration to meeting the three fundamental tests set out in the Scottish Government Interim Guidance on European Protected Species, Development Sites and the Planning System. A baseline survey of the species, including those which are protected or vulnerable, and numbers present on the site should be undertaken for the following: • plants; • mammals; • reptiles and amphibians; • fish; • invertebrates. Birds: The ES should provide an assessment of the impact of the OHL on birds. A baseline survey of the species and number of birds present on the site throughout the year should be undertaken with particular focus being placed on vulnerable species. Survey work should include assessments of the flight lines of breeding birds and birds whose migrations or other seasonal distributions traverse or are in close proximity to the site. Collision risk analyses will be necessary for species which regularly pass through the site at any time of year.	All ecological surveys have been undertaken by suitably qualified ecologists, in line with current best practice guidance, at appropriate times of the year in consultation with SNH. An assessment of impacts on designated sites is provided in **Chapter 8** and **Chapter 9**. Information on habitats is provided in **Chapter 8.** SPT is committed to maintaining the biodiversity of the overall area. No significant impacts on ecology, biodiversity and nature conservation are predicted, therefore, no Habitat Management Plan (HMP) is proposed. Following construction, small areas of habitat directly affected will be restored to their existing condition and managed in line with existing conditions. Baseline surveys have been undertaken in line with current best practice guidance for the following ecological receptors: • Habitats (Phase 1 and NVC); • Bats (tree inspection); • Otter; • Water vole; • Badger; • Great crested newt; • Reptiles (assessment of habitats); Detailed survey methods and baseline conditions for the ecological receptors listed above are provided in **Chapter 8**. As direct impacts to watercourses have been avoided, no fish or aquatic invertebrate surveys were undertaken. Given the level of impacts predicted for habitats, no surveys were undertaken for terrestrial invertebrates. Details of the bird surveys undertaken and the assessment of impacts on birds are provided in **Chapter 9.**
Archaeology and Cultural Heritage	
Predicted impacts on the historic environment and any mitigation measures should be addressed. Historic environment issues should be taken into consideration from the start of the site selection and design process. Direct and indirect impacts must be assessed for any Scheduled Monument and Listed Building that might be affected by the proposed grid connection.	**Chapter 10: Cultural Heritage** presents the assessment of impacts on cultural heritage assets, including proposed mitigation measures.

Key Issues Raised	Action Taken / Where Issues Addressed in ES
Land Use	
Forestry/Woodlands The ES should indicate proposed areas of woodland for felling to accommodate all works associated with the proposed grid connection. Details of the areas to be cleared and evidence to support the proposed scale and sequence of felling should be provided. Details of trees and woodland that may be affected indirectly should be provided along with proposed mitigation measures.	Details of the existing woodland within which the proposed grid connection is routed are provided in **Chapter 13**. The chapter also includes details of the areas proposed to be felled to accommodate the grid connection i.e. the wayleave and also additional felling in some areas proposed as mitigation for the avoidance of windthrow[3] impacts.
The ES should consider the impacts of forestry activities on: • wildlife (habitats, species and biodiversity); • water (with particular attention paid to water acidification and nutrient leaching); • landscape; and • the historic environment.	Impacts of the proposed felling on wildlife, habitats, water, landscape and the historic environment are assessed in **Chapters 6, 7, 8** and **10** respectively.
If timber is to be disposed of on site, details of the methodology for this should be submitted. Areas of retained forestry or tree groups should be clearly indicated and methods for their protection during construction clearly described.	Details of the woodland treatment and future woodland management proposals are included within **Chapter 13.**
If areas of woodland are to be temporarily removed but then replanted shortly afterwards (typically within 1-5 years) this should be indicated in the ES and details of the replanting plan provided. Where there is a change in land use (e.g. to non-woodland habitats) the woodland should be described in sufficient detail and this will facilitate decisions on whether woodland removal is acceptable and if so, whether compensatory planting will be required.	See above.
Not only should such a plan consider how best to clear the forest for the proposed grid connection, but also describe how the remaining woodland elements both within and beyond the scheme boundary can be best integrated with the development site. Such integration could be achieved, for example, by the selective restocking of strategic areas within the development area.	See above.
Recreation, Access and Tourism The impact on recreation (including provisions made regarding public access) and tourism should be examined including direct and indirect impacts.	Details of recreational land uses within the study area are provided in **Chapter 13.** Potential impacts on tourism have been scoped out.
Other Material Issues	
Population The impacts on the population, local communities and those who use the land along the route for work or recreation, require to be studied. The potential impacts of Electric and Magnetic Fields (EMF) should be addressed.	Consideration of the proposed grid connection in relation to existing land uses is provided in **Chapter 13**. Consideration of EMF associated with the proposed grid connection in relation to Government guidelines is provided in **Chapter 14: Electric and Magnetic Fields**.
Waste The ES should address the issues of construction practises designed to minimise use of raw materials and recycle aggregates.	Details of issues relating to waste are provided in **Chapter 4**.
Noise There is a potential for noise to be an issue during construction. Noise predictions should be carried out to evaluate the likely impact of construction noise.	An assessment of the potential impacts associated with construction noise is provided in **Chapter 11: Noise.**
Traffic Management Information relating to the preferred route options for delivering the wood poles etc. via the trunk road network should be provided in the ES. Access issues should be addressed, including details on stress points at junctions, approach roads and bridges.	Details of the proposed access routes for delivery of construction materials utilising the public road network are detailed in **Chapter 4**. An assessment of impacts associated with traffic movements during the construction phase, including proposals for traffic management is provided in **Chapter 12: Traffic and Transport.**
Cumulative Impacts Applicants should have regard to developments in the vicinity that have been built, have permission or that are currently the subject of undetermined applications.	Cumulative impacts have been assessed as part of the EIA.

[3] Refers to wind damage to woodland which has been exposed through felling.

Identification of Impacts

2.26 To ensure the identification of all the key impacts arising from the Development, the following principles were applied throughout the EIA process.

Significant Impacts

2.27 The assessment of the significance of impacts arising from the Development is a key stage in the EIA process. It is this judgement that is vital in informing the decision-making process.

2.28 As the significance of impacts will differ depending on the context and the 'receptors' affected by the Development, there is no general definition of what constitutes significance. In EIA, the term *significance* reflects both its literal meaning of 'importance' and its statistical meaning where there is an element of quantification. This combination of judgemental/subjective and quantifiable/objective tests has become the standard approach to understanding and applying the test of 'significance'.

2.29 Specific significance criteria have been defined for the majority of topic areas, and these are listed in the topic chapters. As the specialists undertaking each assessment have defined these criteria to reflect the topic area in question, there is some variation. However, each of the sets of criteria is based on the following aspects:

- type of impact (adverse/beneficial);
- sensitivity of receptor;
- extent and magnitude of impact;
- nature of impact: reversible, irreversible, long term, short term;
- comparison with legal requirements, policies and standards;
- comparison with environmental thresholds.

2.30 Using the criteria in each chapter, the predicted significance of the impacts arising from the proposed development has been categorised, where possible, as follows[4]:

- major;
- moderate;
- minor;
- negligible.

2.31 Impacts of 'major' or 'moderate' significance are considered to be 'significant' in the context of the EIA Regulations.

Interrelationships between Impacts

2.32 For the purposes of the ES, the potential impacts of the Development are considered in terms of impacts on each of the discrete topic areas. In reality, topic areas such as ecology and hydrology are interrelated. In accordance with Annex 5 of PAN 58, indirect and secondary impacts resulting from the interaction of separate direct impacts arising both within a topic area and interrelated with other topics areas are addressed within the ES.

Cumulative Impacts

2.33 The EIA Regulations state that types of impact identified "*should cover direct impacts and any indirect, secondary, **cumulative**, short, medium and long-term, permanent and temporary, positive and negative impacts*." It is also important to consider the possible impacts that the Development may have in combination with existing, consented or other proposed developments or activities. Likely cumulative impacts have been defined as the predicted impacts that the Development may have in combination with other developments of a similar or related nature which are at application stage, consented, under construction or operational. A 'cut-off date' of 3rd September 2012 was selected for the inclusion of other developments in the cumulative assessment.

Mitigation and Enhancement

2.34 Part I (4) of Schedule 4 of the EIA Regulations states that the ES should include *"a description of the measures envisaged to prevent, reduce and where possible offset any significant adverse impacts on the environment."* These measures have been termed 'mitigation' measures for the purposes of this Development.

2.35 The EIA has identified, and assessed, predicted significant impacts prior to mitigation, and, where mitigation measures are proposed, their likely effectiveness has been examined and the significance of the 'residual' effect assessed. SPT is committed to implementing all the mitigation measures identified in this ES which are indicated as reducing the significance of the residual impact.

2.36 It is important to note that given the prior experience of SPT in implementing accepted good practice during construction and operation of schemes such as this, and the current regulatory context, a number of measures are not considered 'mitigation' as such but rather an integral part of the design/ construction process, and have been taken into account *prior* to assessing the likely impacts of the Development. Where relevant, these good practice measures are described in the topic chapters.

Monitoring

2.37 PAN 58 states that the process of EIA *"should continue right through to monitoring the impacts of the development, the on-going operation of mitigation measures and, where appropriate, site restoration"*. The monitoring of impacts of a development and the effectiveness of mitigation measures compared to predicted impacts is considered *"an essential part of the process"*.

2.38 The ES sets out details of any post-consent monitoring which is proposed. This includes, where appropriate, proposals to measure the effectiveness of the identified mitigation measures.

Data Gaps and Uncertainty in Assessment

2.39 The EIA process is designed to assist informed decision-making, based on sound information about the environmental implications of a proposed development. However, there may be some uncertainty as to the exact scale and nature of environmental impacts. This may arise due to technical deficiencies, limitations of the prediction process or shortcomings in information. In accordance with Paragraph 6 of Part I to Schedule 4 of the EIA Regulations, the ES states where 'difficulties' (technical difficulties or lack of know-how), have been encountered during the EIA process.

2.40 Such 'difficulties' in relation to this EIA relate primarily to restrictions on access for environmental surveys in some areas by landowners due to the presence of livestock, e.g. bulls. Where access restrictions were unable to be overcome by SPT, environmental survey information was gathered from a combination of aerial photography data, Ordnance Survey (OS) mapping and field observations from neighbouring land. On this basis, it is considered that the ES contains adequate information to enable the Scottish Ministers to review and form a judgement on the predicted significant environmental impacts of the Development.

Consultation

2.41 Consultation has formed an integral part of the EIA process and the EIA team contacted a number of interested parties to determine their views on the scheme, collect baseline information and to refine survey methodologies. Replies received from consultees in response to Scoping and responses from other consultees who were contacted for further information to inform the EIA are detailed in the relevant topic chapters.

2.42 The responses received indicated that, generally, the scope of the ES had been defined appropriately. However, a number of consultees did highlight issues where further investigation or clarification was required. This has been highlighted and addressed where appropriate within the ES.

[4] Exceptions to this are **Chapter 9: Ornithology** and **Chapter 10: Noise** and where impacts are assessed as being either significant or not significant. In some instances, **Chapter 6: Landscape and Visual Amenity** assesses significance at different geographical scales and this is also the approach to assessment adopted in **Chapter 8: Ecology**.

References

[i] Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000, Available [online] at: http://www.legislation.gov.uk/ssi/2000/320/contents/made, Last accessed on 19/10/2012

ii The Scottish Government, (2011), 'Guidance On The Electricity Works (Environmental Impact Assessment) (Scotland) Amendment Regulations 2008', Available {online] at: http://www.scotland.gov.uk/Topics/Business-Industry/Energy/Infrastructure/Energy-Consents/Guidance/EIA-Amendment-Regs-2008, Last accessed on: 19/10/2012.

iii The Scottish Government, (2011), 'Guidance on The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011', Available [online] at: http://www.scotland.gov.uk/Publications/2011/06/01084419/0, Last accessed on: 19/10/2012.

iv The Scottish Government, (2009), 'Planning Advice Note (PAN) 58 Environmental Impact Assessment (1999)', Available [online] at: http://www.scotland.gov.uk/Publications/1999/10/pan58-root/pan58, Last accessed on: 19/10/2012.

v Institute of Environmental Management and Assessment (IEMA), (2004), 'Guidelines for Environmental Impact Assessment', Available [online] at: http:www.iema.net, Last accessed on: 19/10/2012.

vi SNH, (2009),' A Handbook on Environmental Impact Assessment: Guidance for Competent Authorities, Consultees and others involved in the Environmental Impact Assessment Process in Scotland (3rd Edition)', Available [online] at: http://www.snh.org.uk/pdfs/publications/heritagemanagement/eia.pdf, Last accessed on@ 19/10/2012.

3 The Design Strategy

Introduction

3.1 This chapter constitutes the 'Design Statement' in accordance with the EIA Scoping Opinion (see **Chapter 2: Approach to the EIA**).

3.2 Following a review of the alternatives considered for the Black Law Windfarm Extension Grid Connection (hereinafter referred to as the 'proposed grid connection') the chapter provides an overview of the routeing process and subsequently discusses the design strategy for the wood poles, access tracks, and forestry felling, the design of which, in combination with the routeing work, played a critical role in seeking to avoid and reduce possible significant environmental impacts.

Consideration of Alternatives

3.3 The EIA Regulations do not specifically require the assessment of alternatives. However, the Regulations do require *"an outline of the main alternatives studied by the developer and an indication of the main reasons for his choice, taking into account the environmental effects".* Guidance prepared by the (then) Scottish Executive in relation to the The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 (as amended)[1i] states in paragraph 4.1.3 that in relation to overhead lines (OHLs), this is *"likely to mean looking at alternative routes and undergrounding"*. These are discussed below, in addition to alternative connection options.

Options for Connection

3.4 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. An additional connection capacity of 69 megawatts (MW) of wind generation is required to be connected to the transmission system in Lanarkshire. The existing Black Law Windfarm, with 124MW of wind generation, was connected to the transmission system in March 2005 via a 132kilovolt (kV) circuit to Wishaw grid substation.

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

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

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

3.6 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 would incur considerable additional costs associated with the required replacement of the existing Auto-Transformer at Wishaw substation. A further constraint at Wishaw is the practicality of achieving another 132kV cable connection into the substation, which technically would be difficult given that routes into Wishaw are already very congested. Therefore, following technical appraisal of both options, the preferred connection for Blacklaw Windfarm Extension is via a 132kV OHL and underground cable to Linnmill substation extension.

[1] Scottish Executive (Energy Division) (undated) *Guidance on The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000.*

Undergrounding

3.7 SPT is obliged to comply with the requirements of the Electricity Act 1989[ii] to develop and maintain an efficient, co-ordinated and economical system of electricity supply. SPT policy seeks to find an OHL solution for all connections and only where there are exceptional 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. Where an OHL solution is not achievable for technical reasons, SPT looks to an underground cable solution as an alternative. However, sections of underground cable identified for inclusion within a scheme must balance the economic, technical and environmental considerations.

3.8 The main environmental advantage of an underground cable when compared to an OHL is often the reduction in impacts on visual amenity and landscape character.

3.9 The main environmental disadvantages of an underground cable when compared to an OHL often relate to greater impact on habitats and natural heritage interests; unknown archaeology; drainage and land use for construction. The disadvantages often arise from the invasive nature of excavation of trenches to lay the cable, the extent of the area disturbed, the equipment required and the volume of materials involved.

3.10 The relative cost for an underground option at higher transmission voltages such as this would typically be up to 5 times that of a similarly rated overhead option. The variation would be dependent on a number of factors such as manufacturing costs, ground conditions and methods for installation. Therefore, only in exceptional circumstances would the costs associated with the design, manufacture and construction of long lengths of underground cable for use at transmission voltages be considered an efficient and economic development of the transmission system, and consistent with SPT's statutory duties under the 1989 Act.

3.11 The last few kilometres of the connection are proposed to be undergrounded for technical and environmental reasons. Firstly, there was no route available for an OHL across the River Clyde in the vicinity of Linnmill substation. Secondly, if there was an available route, it was considered that the visual impact of another power line crossing the River Clyde in this location would have been unacceptable. Therefore, a decision was taken to terminate the line some distance from the river and to utilise the refurbishment works being undertaken on Stonebyres Weir to route the cable across the river and up to Linnmill substation extension.

Routeing Process

3.12 In 2010, LUC, commenced a strategic routeing study to identify a *"technically feasible and economically viable"* route for a 132kV single circuit[2] transmission line mounted on wood poles 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".*

3.13 Technical constraints to routeing comprised proposed, consented and operational wind turbines, due to their production of air turbulence which could potentially damage conductors on the OHL. A distance of 1.5x the blade tip height of the turbine was applied to all known turbines within the study area and routeing within these areas avoided. Other technical issues identified by SPEN included physical constraints to routeing comprising slopes >15^{o} and altitude >300m AOD in relation to conductor ice loading for the wood pole design, as well as the presence of areas of woodland, which were avoided where possible in routeing.

3.14 In compliance with Section 9 of the Electricity Act 1989, the proposed route must be *"economically viable"*. This is interpreted by SPEN as meaning that as far as is reasonably possible, and all 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.

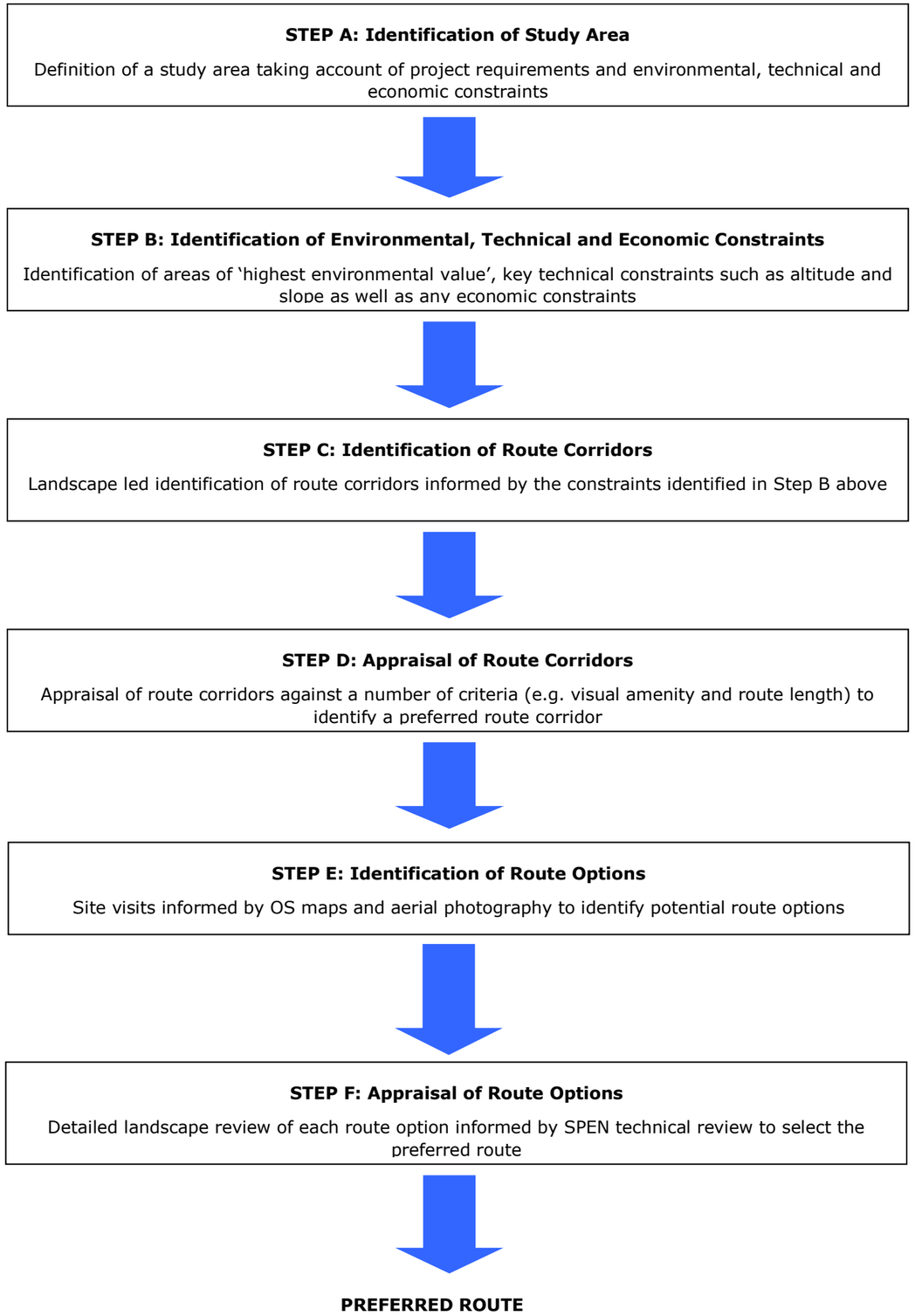
3.15 In accordance with statutory duties imposed by Section 38 and Schedule 9 of the Electricity Act 1989, SPT is required to seek to preserve features of natural and cultural heritage interest. In seeking to ensure these duties are met, a number of potential impacts on people and the environment were identified, and which SPEN sought to avoid or limit these impacts through careful routeing, including impacts on:

[2] A single circuit transmission line carries conductors for only one circuit.

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

3.16 The methodology for the routeing study followed a number of steps devised on the basis of technical, economic 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. An overview of the routeing methodology is provided in **Diagram 3.1**.

Diagram 3.1: Routeing Methodology



3.17 The findings of the routeing process culminated in the 'Preferred Route'. The findings of the routeing methodology and the preferred route were presented in the 'Black Law Windfarm Extension Grid Connection Routeing Consultation Report[iii]. The report was provided to a number of organisations e.g. North Lanarkshire Council, South Lanarkshire Council, West Lothian Council, SNH, SEPA, RSPB and Historic Scotland, as well as local Community Councils. These organisations were asked to respond with any comments, queries or concerns relating to the routeing process or the preferred route.

EIA Phase Modifications to Scheme Design

3.18 Consultation responses received from consultees and the local Community Councils, in combination with preliminary environmental survey work findings, were taken account of in making modifications to the preferred route to identify the 'proposed route' for progression to the EIA. The proposed route was presented within the Scoping Report [iv] upon which the Scoping Opinion was based.

3.19 On the basis of the Scoping Opinion, feedback from consultees and the local community, in combination with emerging detailed environmental survey findings, the EIA was used to further influence the design of the connection.

3.20 Feedback from landowners in relation to the current use of the land primarily for agriculture and to a lesser extent, forestry, formed a key influence on the design of the route during the early EIA stages. The route was modified where possible, continuing to take account of other environmental characteristics, to minimise impacts on current land use.

3.21 Further to the re-routeing of sections of the OHL to accommodate land use considerations, additional modifications have included the relocation of individual wood poles and associated infrastructure. These modifications were made to:

- reflect emerging technical constraints in relation to new turbine proposals;
- reduce visual impacts from a number of locations;
- reduce impacts on key habitats of nature conservation interest;
- avoid felling trees with bat roost potential;
- minimise the requirement to fell woodland;
- ensure a minimum of 30m from known badger setts;
- avoid direct impacts on known features of cultural heritage interest;
- ensure a minimum of 5m from known watercourses;
- minimise the number of water crossings;
- ensure private water supplies are avoided through a 100m buffer on all infrastructure;
- avoid areas of wet ground in identifying access routes to the pole positions;
- locate the underground cable section within the road where possible, to avoid the need to fell broadleaf trees along the road verges e.g. the A73.

Project Design Parameters

3.22 It is important to highlight the following project parameters which influenced the design of the proposed grid connection from the outset:

(i) SPT has a statutory duty to connect the Black Law Windfarm Extension to the electricity network. The location of the Windfarm, and therefore the start point of the corresponding grid connection, has been determined by the Windfarm developer, and therefore has not been subject to routeing or design work as part of the proposed grid connection;

(ii) the required capacity of the connection was an important design parameter in influencing the selection of pole type;

(iii) under Section 38 and Schedule 9 of the 1989 Act, SPT is required to consider technical, economic and environmental issues in undertaking its duties, for which design plays an important role;

(iv) as a consequence of the above, design and routeing objectives for the proposed grid connection required technical, economic and environmental issues to be balanced;

(v) the design strategy reflects well established procedures and guidance (the Holford Rules[3],) and incorporates wood poles and associated infrastructure used widely across the UK electricity transmission network (the 132kV 'Trident' wood pole).

3.23 In line with established practice, the design of the following was considered in sequence; informed by technical considerations, including the required capacity, and by the preferred route for the connection:

(i) the pole locations, type, and span length;

(ii) the location and design of access tracks and pulling areas;

(iii) the design of woodland felling.

Wood Pole Design

3.24 The key design objective for selection of the wood poles has been to meet technical requirements, including capacity, safety, network security requirements, and OHL design parameters, whilst taking account of economic and environmental considerations.

3.25 On this basis, SPT selected a 132kV Trident wood pole design because it has a low profile and is not considered to be as intrusive as steel towers within the landscape. Pole locations can also be relatively flexible and the construction requirements for timber structures are also potentially less disruptive to the landscape and habitats found along the route.

3.26 The OHL requires several different types of poles, as follows:

- *Line* or *suspension* poles where the pole is part of a straight section of line and no change in direction is required. Straight sections of wood pole lines include *section* poles where segmentation is required to contain any failure of the OHL;
- *Angle* or *tension* poles where there is a horizontal or vertical deviation in the line direction and straight sections of line require to be segmented. Angle poles can accommodate changes in direction of up to 35 degrees;
- *Terminal* pole where the OHL becomes a cabled section.

3.27 Further details of the poles, including dimensions, stringing details, diagrammatic illustrations and photographs are provided in **Chapter 4: Development Description**.

3.28 Wood poles are dark brown when first erected and weather to a silver/grey after about five years; a colour in between these has been used to for routeing and impact assessment purposes. The wood pole top cross-arms are galvanised steel and support the aluminium conductors on stacks of grey insulator discs. Both the steelwork and aluminium will weather and darken after a few years.

Access Track Design

3.29 Access to every component of the proposed grid connection is required during construction. The overall design objective for the access tracks has been to avoid and/or reduce impacts upon natural and cultural heritage interests and to cause least disturbance to current land use and land management practices. The principle method employed to achieve this has been to maximise the use of existing tracks (and bridges). Where this is not possible, or where the use of existing tracks would result in unnecessarily long connecting tracks, two options for temporary access tracks have been considered as follows:

i) the use of temporary spurs from existing roads/tracks to each pole;

ii) the use of temporary tracks between poles which connect to an existing road or track.

[3] *The Holford Rules for the Routeing of New High Voltage Overhead Transmission Lines* (1959). 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. Both the Holford Rules (and NGC clarification notes) were reviewed subsequently by Scottish Hydro Electric Transmission Limited (SHETL) in 2003 to reflect Scottish circumstances. Whilst these relate to towers only, the principles are also useful in routeing high voltage wood pole lines.

3.30 Further details of the proposed tracks are provided in **Chapter 4**, including the temporary track options available for different ground conditions, and the proposals for reinstatement once the tracks are removed.

Design of Woodland Felling

3.31 The overall design objective has been to minimise the extent of felling required and woodland areas were avoided where possible during the routeing phase. Where routeing through woodland has been unavoidable, a 'wayleave' corridor is required for safety reasons to ensure that trees do not fall onto the line. SPT has statutory powers to control tree clearance within the wayleave corridor. A corridor of 50m (i.e. 25m either side of the centre line) is required for the OHL connection. In addition, a wayleave of 10m is required for the underground cable section.

3.32 In two sections of the route, additional felling outwith the wayleave is proposed to address the risk of future wind damage to these woodlands. Following felling, these areas would be available for replanting by the forest owner. In many forest clearance situations, the impact of tree removal on the landscape is addressed by the creation of irregular cutting boundaries and the replanting of other species including lower growing trees and shrubs adjacent to the line. In the case of this project, the scale of tree felling is small relative to the remaining forest and it is anticipated that the landscape of the forest will be addressed within the next crop rotation by the forest owner following current best forest design practices.

3.33 Further details of the felling requirements are provided in **Chapter 13: Land Use**.

Project Programme

3.34 Scottish Government advice provided in Planning Advice Note (PAN) 68 highlights the need for the programme for delivery of the project to be considered in designing the project. The construction programme for the proposed grid connection is six months. Further details of the construction phase are provided in **Chapter 4.**

References

[i] Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000, Available [online] at: http://www.legislation.gov.uk/ssi/2000/320/contents/made, Last accessed on 19/10/2012

[ii] Electricity Act 1989, Available [online] at: http://www.legislation.gov.uk/ukpga/1989/29/contents, Last accessed on: 18/10/2012

[iii] LUC, (2011), *Black Law Windfarm Extension Routeing Consultation Report,* Available [online] at: http://www.spenergynetworks.co.uk/serving_our_customers/consulation_black_law.asp?NavID=1&SubNavID=3&SubSubNavID=3, Last accessed on: 25/10/2012

[iv] LUC, (2011), *Black Law Windfarm Extension Grid Connection: Scoping Report*.

4 Development Description

Introduction

4.1 This chapter provides a description of the Black Law Windfarm Extension Grid Connection (hereinafter referred to as the 'proposed grid connection') and forms the basis of the assessments presented within **chapters 6- 14**. It includes details about the construction and operation of the proposed grid connection and includes measures proposed for the protection of the environment during these stages.

4.2 The routeing and EIA process has been used in conjunction with technical design work and digital modelling to identify the proposed route as shown in **Figure 4.1**. Further details of the design strategy are provided in **Chapter 3: The Design Strategy**.

4.3 The chapter includes an overview of the proposed grid connection followed by a detailed description of the main elements and their method of construction.

The Proposed Grid Connection

4.4 The proposed grid connection comprises three main elements:

- **A 132kilovolt (kV) overhead line (OHL)** mounted on wood poles running approximately 14.5km south-west from the proposed Black Law Windfarm Extension substation, located at approximately NS 291241 656776, towards the terminal wood pole at NS 286242 646335.
- **An underground cable** from the terminal wood pole at NS 286242 646335, running approximately 4.5km southwards and terminating at the existing Linnmill substation in the Clyde Valley.
- **An extension to the existing Linnmill substation** by approximately 23m x 20m to accommodate additional switchgear and electrical connection equipment.

4.5 The following sections provide more detail on these elements and outline the construction and operational details of the project.

Description of the Proposed Grid Connection Route

4.6 An overview of the proposed grid connection is shown on **Figure 4.1** and a detailed layout of the proposed grid connection is shown on **Figures 4.2a-4.2g.**

4.7 The route of the proposed grid connection is described in five distinct sections, running southwards from the consented Black Law Windfarm Extension substation in the north to Linnmill substation extension in the south.

Black Law Windfarm to Springfield Reservoir

4.8 The northern section of the OHL heads south-east, across an area of former opencast coal extraction and through existing coniferous forestry, which will be felled prior to construction of Black Law Windfarm Extension. The route then crosses an area of dry heath moorland and rough grassland, with areas of young scattered mixed woodland close to the east of the existing turbines of Black Law Windfarm. Once south of the Black Law Windfarm access track, the OHL runs across open heath moorland and crosses two existing 11kV wood pole OHLs, before arriving at Whaup Knowe where the OHL deviates to the south-west to follow the western edge of an existing stand of coniferous forestry. The OHL runs parallel to the linear edge of the forestry, before passing through the edge of a young stand of mixed woodland, avoiding a water body to the west of the route. The OHL then deviates southwards close to the farmstead of Birniehall, descending from the edge of the elevated moorland plateau into the enclosed farmland to the south, while crossing an existing 33kV wood pole OHL. The OHL then passes to the east of Springfield Reservoir, south-west across semi-wetland pastoral farmland enclosed by drystone walls and post and wire fencing.

Springfield Reservoir to the A721 Road

4.9 The OHL crosses the B7056 (Yieldshields Road) to the south-east of Easterseat, close to a stand of mature deciduous woodland and three domestic/Feed in Tariff (FiT) wind turbines before deviating south-east across enclosed pastoral farmland dissected by several small burns, fed by the watershed of Hill Rig to the south-west. The OHL crosses Netherton Burn before running south, along the shallow valley of Back Burn to the east of the flanks of Hill Rig, where small coniferous shelterbelts provide some backclothing to the OHL. The OHL follows this shallow valley south-westwards, running parallel to existing field boundaries and crossing an existing 11kV wood pole OHL, to where it meets the A721 road to the east of a linear stand of mature deciduous trees located on the lower ground between Hill Rig to the west and Whitelees Wood and Muirhead to the east.

A721 Road to West Coast Mainline Railway

4.10 The OHL crosses the A721 and heads south across pastoral farmland of semi-improved and marshy grassland to the east of Hole, before crossing the minor road which runs north-south between the A721 and Collielaw. Once west of the road, the OHL descends south-west into the basin of Fullwood Burn passing across enclosed pastoral farmland, with drystone wall and linear deciduous tree field boundaries, before crossing Fullwood Burn and meeting the coniferous plantations which lie to the west. The OHL follows the linear edge of the coniferous forestry, running parallel with the forestry across improved grassland, before passing west through two narrow stands of forestry and crossing an existing 11kV wood pole OHL to the north of the Railway Line. The OHL then heads west, parallel with the railway line across semi-improved grassland, scattered scrub, enclosed arable farmland and crossing an existing 33kV wood pole OHL to meet the southern edge of Cartland Muir Plantation.

West Coast Mainline Railway to the A73 Road

4.11 The proposed OHL crosses the railway line to the north-west of New Greentowers Farm, before heading south-westerly, across drystone wall enclosed arable farmland parallel with an existing 33kV wood pole OHL. Continuing south-west, the OHL passes through a linear stand of mature broad-leaved trees to the north-west of the settlement of Cartland, before descending the shallow valley slopes towards the terminal wood pole, located in an enclosed field of semi-improved grassland. From the terminal wood pole location, the proposed grid connection becomes an underground cable, continuing south-west to where it passes through a stand of broad-leaved woodland to meet the A73.

A73 Road to Linnmill Substation Extension

4.12 The underground cable heads south-east following the route of the A73 (Lanark Road), descending into the Clyde Valley where it deviates west along the route of Sunnyside Road, before ascending across the enclosed pastoral farmland to the east of Nemphlar. The underground cable will run across the semi-improved grassland, passing through deciduous hedgerow and post and wire fence field boundaries, before descending the steep slopes west of Hakespie Hill to the broad-leaved tree lined corridor of the River Clyde. The cable route then crosses the river via the existing Stonebyres Weir, to then pass across an area of scattered broadleaved woodland on the southern banks of the river. The underground cable route then runs south beneath the A72, before following the route of the B7018 south, ascending the steep slopes of the Clyde Valley before entering the Linnmill substation extension.

The Overhead Line

4.13 The proposed OHL will be constructed using the Trident 43-50 wood pole design with galvanised steelwork cross-arms supporting aluminium conductors on insulators. The proposed design is described below and examples of pole designs and photographs are shown on **Figure 4.3**.

Line Height

4.14 The statutory minimum ground clearance for a 132kV OHL is 6.7m. The line is designed to afford this minimum clearance in all circumstances. The overall height of the line is also dependent on a number of other criteria, including geographical location, localised topography, height above sea level, wind and ice loading, span length and conductor type.

Span Length

4.15 The span lengths (distance between wood pole supports) also depend on the same criteria as line height and will vary from 70m to120m, with an average span of 85m between supports.

Wood Poles

4.16 Trident wood pole sizes to support the OHL will be selected to maintain this statutory minimum clearance. The wood poles will be primarily single poles, with double ('H Poles') used at a small number of angle locations and at the terminal pole location. Poles will be typically 13 – 15m high above ground, with 2.5m below ground. The above ground height includes steelwork and insulators that support the conductors (wires). Pole heights may require to be increased (e.g. 17 – 18m) where extreme circumstances dictate, e.g. electrified railway crossings, over elevated land, structures or features. Pole sizes may also be reduced where there are short spans or on localised topography.

4.17 The OHL will comprise a combination of three types of wood pole types:

- *an intermediate support pole* is used where a support is in a straight line and the conductors are supported on 'line post' insulators;
- *a section/angle support pole* is used where the line deviates and the conductors are connected in tension to the pole either side of the deviation;
- *a terminal support pole (underground connection)* is used when the line terminates and continues as an underground cable circuit, the terminal pole arrangement requires a double 'H' pole 'chair' configuration.

4.18 The maximum allowable angle deviations on single wood pole designs is 30°, with deviations up to 75° being permitted on 'H' pole section supports, subject to special limitations. An intermediate support pole, intermediate 'H Pole' and Terminal 'H Pole' are shown on **Figure 4.3.**

OHL Components

4.19 The single-circuit comprises three separate 'phases' attached to the pole at the pole cross-arm. The cross sectional area of each conductor is 175mm^2 and the weight per route kilometre of conductor is three tonnes.

4.20 No earth wire is required between pole supports on the wood pole design. Insulators are supported on the pole cross-arm and prevent electric current from crossing to the pole. The insulators are made from porcelain, glass or modern composite materials, and normally last for 40 years.

The Underground Cable and Connection to the Existing Transmission Network

4.21 The transition from OHL to underground cable is achieved via a cable sealing end on the terminal support pole 'chair' configuration. Between the terminal support pole at NS 286242 646335, and Linnmill substation extension, approximately 4.5km of 132kV underground cable will be used to avoid technical and environmental constraints associated with crossing the River Clyde at Stonebyres Weir with an OHL.

4.22 Typically, the conductors and pilot wires are accommodated in a trench approximately 1.25m deep and 1m wide. Within this trench, the conductors and pilot wires are contained in separate polyethylene ducts. The arrangement and protection of these ducts are shown in **Figure 4.4**.

Linnmill Substation

4.23 The high voltage (HV) compound within Linnmill substation will need to be extended to accommodate additional switchgear and electrical connection equipment. This will comprise a small extension to the south side of the existing HV compound, approximately 23m x 20m in size being surrounded by an extended 2.74m tall steel palisade security fence as illustrated in **Figure 4.4**. The extension of the HV compound will be accommodated within existing SPT operational land with a 1.5m perimeter pathway and no new buildings or extensions to existing buildings are required. **Figure 4.4** also illustrates the additional electrical apparatus and reconfiguration of the down lead conductors (wires) from existing tower YR23. There is no requirement to upgrade the electrical capacity of the substation.

Black Law Windfarm Extension Substation

4.24 A new substation will be established as part of the Black Law Windfarm Extension works. The environmental impacts of this substation are considered in the Environmental Statement accompanying the application for the Windfarm Extension under Section 36 of the Electricity Act 1989.

Construction Details

Overhead Line Construction Process

4.25 The construction of the OHL will follow a well-established sequence of activities as outlined below:

- preparation of accesses and construction compounds;
- felling of woodland;
- excavation of foundations;
- delivery of poles;
- erection of poles;
- undergrounding/deviation of lower voltage lines where necessary for safety clearances;
- delivery of conductor drums and stringing equipment;
- insulators and conductor erection and tensioning;
- clearance and reinstatement.

4.26 The construction activities are described in further detail below.

4.27 The assessments reported in this ES are based on the approach and extent of work described below. The successful contractor would be allowed the opportunity to submit specific proposals that vary from those indicated in the following description of construction on the basis that they must also submit evidence demonstrating that any associated environmental impacts do not exceed those described in the ES. Subject to appropriate consultation, client review and approval, such proposals may be incorporated into the contract.

Access for Materials, Construction Plant and Personnel

4.28 Delivery of construction materials to wood pole locations will be achieved by access from public roads. Based on SPT's experience of constructing similar connections, a series of access points from the public road network have been identified. Vehicular access will be required to every pole site along the route during construction and whilst final access arrangements will be agreed with the landowners, indicative access routes from the public road access points to each pole location have been identified as shown on **Figure 4.5.**

4.29 As the area is crossed by a network of public roads and tracks, from which field gates allow access to the majority of the route, the creation of semi-permanent access tracks is not envisaged. On this basis, two types of temporary access tracks are proposed to reflect the ground conditions within the area:

- **Low Pressure Vehicles (no track required):** In areas of dry pasture and level moorland, use will be made of low ground pressure vehicles which do not require a track. It is important to note however, that the movement of these vehicles will still be restricted to the access routes identified.
- **Steel Matting:** In areas with wetter ground conditions and/or sensitive habitat, e.g. between the Black Law Windfarm Extension and Easterseat, and where a pre-defined access is required, e.g. to access an angle pole, temporary steel matting will be used for access. Principally, sensitive peatland habitats, the condition of which could be somewhat preserved by overlaying protective steel matting, are limited at the northern end of the proposed grid connection route, where peat depths are greatest. These two track types are shown as photographs A and B on **Figure 4.6.**

4.30 Pedestrian access between the poles is required along the length of the route for pilot wire running and access routes and detailed arrangements will be agreed with each landowner or occupier.

4.31 The OHL has been designed to minimise the number of water crossings; however, where a new temporary access track is required to cross a watercourse, a temporary bridge will be utilised. Due to the narrow width of the watercourses required to be crossed during construction, a mat of timbers will be used as shown as photograph C on **Figure 4.6.**

4.32 Further details of the watercourse crossings are provided in **Chapter 7: The Water Environment.**

Temporary Construction Compounds

4.33 At locations along the OHL route, temporary construction compounds will be required for delivery, storage and assembly of materials and dispersal of plant and equipment and temporary welfare facilities. The temporary construction compounds are normally located within a farm complex or similar location where existing hard standings and convenient road access facilitate delivery of materials. These locations will be agreed between SPT and the landowners; however, indicative locations are shown on **Figures 4.2a-4.2g.**

Temporary Working Areas

4.34 Temporary working areas around each pole location will be required for foundation excavation and pole erection, with the dimensions of typical working areas being 15m x 15m. An example of a working area is shown on **Figure 4.7.**

4.35 If necessary, temporary working areas could be taped-off to delineate the area for environmental protection reasons. In accordance with the proposed Infrastructure Location Allowance (ILA) (see below), further consideration will be given to varying the shape of the working area at each pole to avoid environmental constraints identified prior to construction. Following the completion of the construction works, the temporary working areas will be reinstated and restored.

Wood Pole Construction Process

Wood Pole Foundations

4.36 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, as shown in **Figure 4.7**. The excavated material will be sorted and stored in appropriate layers and used for backfilling purposes. No concrete is required. Although SPT anticipates there to be little surplus material, any generated will be removed from site and treated in accordance with the Site Waste Management Plan.

4.37 There are areas of peat along the corridor in the north, e.g. within the Black Law Windfarm Extension, that cannot be avoided. The compressible nature and potential water content of peat means that it has a low load bearing capacity. Construction on peat is therefore likely to require the use of different types of pole foundations to those used elsewhere along the connection. Techniques for construction of wood poles on peat can include the use of 'floating' foundations or soil mixing techniques which stabilise peat.

Assembly and Erection of Poles

4.38 Poles are erected in sections, i.e. between angle support poles and/or terminal support pole. The insulator fittings, and wood poles forming the pole support, will be assembled local to the pole site and lifted into position utilising the tracked excavator which excavated the foundations. The pole foundation holes will then be backfilled and the pole stay wire supports attached to the ground in preparation for conductor stringing. Erection of a pole is shown in **Figure 4.7**.

Stringing of Conductors and Commissioning of the Line

4.39 Once a sufficient number of sequential poles have been erected, stringing of the conductors can commence. This requires temporary 'pulling' (or 'stringing') areas at certain pole locations along a line as shown on **Figures 4.2a-4.2g**. In some cases, the temporary pulling areas overlap with the temporary working areas, and elsewhere, they are located outwith the working areas. Where ground conditions require, the temporary pulling area will be formed using the steel matting proposed to be used at certain locations for the temporary access tracks. All temporary surfacing materials will be removed from site on completion of the stringing operations. It should be noted however that pulling areas shown on **Figures 4.2a-4.2g** are indicative at this stage as the contractor will decide exactly where these areas should be based on their conductor stringing methodology and specific onsite conditions.

4.40 At each pole pulling area, a winch will be positioned and set up at one end of the stringing section, with a 'tensioner' set up similarly at the other end of the section. Pilot wires will be placed in blocks fitted to the top of the insulator strings on the poles and connected around the winch and tensioner at either end. Using the winch to pull the pilot wires, the conductor will then be drawn through the section, using the tensioner to maintain a constant tension. This allows the conductor to be controlled without touching the ground, avoiding damage to both the conductor and the underlying ground. A winch for stringing of a pole is shown in **Figure 4.7**.

Crossing Existing OHLs and Other Existing Infrastructure

4.41 The proposed grid connection will require the re-routeing of existing lower voltage OHLs. This may present the opportunity at such areas to rationalise the existing low voltage network and reduce the number of lines.

4.42 Where the proposed grid connection OHL crosses other existing OHLs (11KV, 33kV, or 132kV), works will be required to the existing lines, to enable the new line to be constructed without health and safety risks to construction workers. Where possible, the supply to customers will be maintained which may necessitate the temporary erection of 'live line' protective scaffolds over the existing lines. Whilst these locations are within the environmental survey area for the projects, a mechanism for further consideration of these works will be set out with the proposed Environmental Management Plan (EMP).

4.43 The proposed OHL route will cross the existing Shell North Western Ethylene pipeline and two feeders of the Bathgate to Elvanfoot high pressure National Grid gas transmission pipelines. All works within the vicinity of these national pipelines will be carried out in accordance with approved Codes of Practice and Guidance as prepared by the Health and Safety Executive[1], and with particular reference to the National Grid's requirements for safe working in close proximity to high pressure pipelines[2], safe working requirements and adopted protective measures.

4.44 It is not expected that the underground cable section of the proposed route would intersect with existing underground services such as water mains and sewage pipes. However, the normal procedure in such cases is to provide a deeper trench for the underground cable and tunnel under the existing services. Excavation and reinstatement local to existing services would be carried out with due care.

4.45 Where the conductors needs to be strung over existing roads and railways, protection in the form of scaffolding will be erected prior to the commencement of stringing as shown as photograph D on **Figure 4.6**. The appropriate rail/road authorities will also be consulted. Scaffolding will be erected at either side of the crossing, with the span in between the scaffolding netted.

Forestry Felling

4.46 The felling of some woodland and individual trees will be required to physically construct the OHL and also to maintain the clearances for safe operation and maintenance of the OHL. The minimum clearance corridor (wayleave) required for operational reasons is 25m either side of the OHL.

4.47 Small areas of woodland will also be required to be felled to construct and maintain a safe clearance distance for the operation of the underground cable. It is considered that a maximum wayleave of 10m will be necessary for the underground cable.

4.48 Approximately 9.98 hectares (ha) of forestry will be felled for the proposed grid connection (approximately 9.91ha will be felled to physically construct the OHL and approximately 0.07ha will be felled for the underground cable). The majority of trees proposed for felling comprise mid rotation mixed conifer species. In addition a further 2.47 ha of trees will be felled as part of the woodland management strategy (see **Chapter 13: Land Use**).

4.49 Within areas of non-commercial sized timber, tree clearance will be undertaken utilising tracked mulching machinery with the resultant chipped material being spread over the site. In areas where the timber can commercially be harvested, this will be done utilising conventional timber harvesters, manual felling and timber forwarder machinery. This timber will be delivered to loading points suitable for uplift by timber hauliers for onward delivery to local markets. Further information in relation to woodland is provided in **Chapter 13** and areas where felling is considered necessary is shown on **Figure 13.3**.

Underground Cable Construction Process

4.50 For the 132kV cable, a 1 to 1.5m deep x 1m wide trench will be excavated. This will be undertaken through an 'open cut' of the ground surface to create a cable trench within which cable will be laid. The cable will be laid on a bed of thermally selected sand and backfilled with the previously excavated material, with the excess material spread in proximity to the excavation, in agreement with the landowner.

[1] HS(G)47 Avoiding Danger from Underground Services.

[2] Specification for Safe Working in the Vicinity of National Grid High Pressure Gas Pipelines and Associated Installations – requirement for third parties (T/SP/SSW22)

4.51 The underground cable section will be delivered by a separate work team to the OHL construction. The A73 will require traffic management for up to 12 weeks to excavate the cable trench, install the cable ducts then reinstate the road[3]. Traffic management will be required on all the public highway excavations, including Sunnyside Road, the crossing of the A72 (minor disruption) and the B7018 from the A72 to Linnmill substation extension. Standard utilities road opening and excavation equipment will be used. The only additional/specialised equipment is a cable pulling winch to pull the individual cables through the installed ducting at each cable joint bay along the cable route. Where the cable excavation is in the public highway e.g. along the A73, all working and reinstatement methods will comply with the New Roads and Street Works Act 1991.

4.52 A short section of the cable route, as it exits the ducting on the north side of Stonebyres Weir, will be located in a fully enclosed, but surface mounted, heavy duty cable tray as shown on **Figure 4.8**. The cable route, on the north side of Stonebyres Weir must negotiate a rock outcrop that includes the main water intake culvert for Stonebyres Hydro-Generating Station. The cable tray will support the cables as they traverse up and over the rock outcrop to an underground cable joint bay located at the field boundary.

4.53 It is proposed that the underground cable will cross the River Clyde by utilising the Stonebyres Weir. The cables will be carried in ducts which are already in-situ on the underside of the recently refurbished deck of Stonebyres Weir as shown on **Figure 4.8**. No construction work is necessary on the Stonebyres Weir structure. The cable tray arrangement that will carry the cables up and over the rock face adjacent to Stonebyres Weir will be the only visible aspect of the cable works.

Linnmill Substation Extension Construction Process

4.54 The extension to the existing high voltage (HV) substation compound at Linnmill will require ground preparation works, including the import of quarried materials to provide a suitable platform at the same level as the existing HV Compound. Redundant civil works will be removed and concrete foundations will be installed to support the new electrical apparatus (cable sealing end, busbar insulator supports, switchgear and ancillary metering and protection equipment). The existing palisade security fence will be extended to enclose all of the new electrical apparatus and the remaining land outwith the HV Compound will be appropriately landscaped

Infrastructure Location Allowance (ILA)

4.55 The iterative EIA process has been used in combination with technical design work to develop the detailed grid connection footprint upon which assessments are made. However, it is anticipated that, post consent, it may be necessary, and desirable, on environmental and technical grounds, to refine the final vertical and horizontal profile of conductors and pole positions and the lines of access tracks, to reflect the following:

- pre-construction confirmation of dynamic environmental conditions e.g. the location of protected species;
- more detailed technical survey information, particularly for unconfirmed ground conditions such as the wooded areas;
- to provide further scope for the effective mitigation of any likely environmental impacts;
- any minor alterations requested by landowners.

4.56 To ensure that the final positions of the OHL and underground cable are not varied to such a degree as to cause an increase in the significance of likely environmental impacts outlined in this ES, an Infrastructure Location Allowance (ILA) is proposed. This would permit the siting of a pole to be adjusted within a 25m radius of the indicative pole locations and a 25m tolerance either side of the indicative access track locations.

4.57 Implementation of the ILA would be controlled through the proposed Environmental Management Plan (EMP). Should a request to vary a pole or access track position within the ILA be raised, the relevant environmental baseline surveys undertaken to inform the EIA would be reviewed in the first instance as these surveys extend beyond the proposed 25m ILA tolerance. Should this review identify any potential issues, further environmental advice would then be sought from the appropriate specialists. A procedure for notifying relevant statutory consultees of proposed ILA movements would also be agreed with these bodies prior to construction commencing.

Construction Equipment and Personnel

4.58 There will be approximately 10 – 12 full time contracting staff in total working on the construction of the OHL during the six month construction programme. The construction team may be split into a North Team and a South Team. This will be confirmed upon appointment of the construction contractor. The underground cable section will be delivered by a separate team working in parallel. Ten construction staff will be employed daily on the construction of Linnmill substation extension.

4.59 Construction traffic will comprise vehicles for delivery of plant, equipment, temporary steel matting for wood pole access tracks where necessary, substation plant and tree removal. The vehicles used to construct the OHL will range from HGV (low-loader) for pole, plant and equipment delivery. In total, 143 poles will be delivered to site, with each HGV carrying an estimated 16 poles per load. HGVs will also be required for delivery of tracked excavators, conductor pulling winches, drums of conductor, pole top steel work, stay wire drums, etc.

4.60 Each pole will require four construction staff who will be transported to the pole location in 4x4 vehicles. Two 4x4s will therefore be required for the construction of the wood poles on the basis that there will be two teams working in the north and south of the route. Construction at each pole location will also require two tracked excavators. There may be a need to utilise a helicopter for delivery of the individual poles to any protected habitat areas, i.e. the northern end of the OHL, however this is unlikely and has not been assumed for assessment purposes.

4.61 Vehicles for delivery of plant for construction of the substation extension will comprise HGVs for transportation of stone (from nearby quarries), concrete, an excavator and JCB, mobile work platform and electrical equipment e.g. switchgear and control cabinets.

4.62 Further details in relation to construction vehicle types and numbers are provided in **Chapter 12: Traffic and Transport**.

Construction Working Hours

4.63 Construction activities will be undertaken on Monday to Friday during daytime periods only, between 07.00 and 19.00 in summer (April to September) and 7.30 to 17.00 (or as daylight allows) in winter (October to March). There may be a requirement to work on Saturdays, however no Sunday working will be undertaken.

Construction Timescales

4.64 Construction and erection of a standard single pole generally takes approximately half a day depending on ground conditions and location, i.e. it may take more hours if the ground is softer. Angle poles and H-poles can take longer due to the need for 'stay wires' to stabilise the pole in the ground.

4.65 It is anticipated that construction of the OHL will take approximately six months. Construction of the underground cable and alteration works at Linnmill substation will be undertaken concurrently with construction of the OHL so that the overarching construction programme is approximately six months.

Operation and Maintenance

4.66 Whilst most OHL components are maintenance free, exposed elements which suffer from corrosion, wear, deterioration and fatigue may require inspection and periodic maintenance. OHLs and underground cables generally require refurbishment after approximately 40 years.

4.67 Any felled wayleave areas will also have to be managed to maintain the required clearances whilst the connection remains in service. Walk over surveys or flyovers will identify where there is a requirement to clear wayleaves of new growth.

Decommissioning

4.68 When the operational life of the proposed grid connection comes to an end, it is possible that the line may be re-equipped with new conductors and insulators and the cable and substation extension refurbished. Alternatively, the grid connection may be decommissioned fully.

[3] This is based on an anticipated programme of 30m of cable laying per day.

4.69 An assessment of the decommissioning of the connection is not proposed as part of this EIA as i) the future baseline conditions (environmental and other grid connections) cannot be predicted accurately at this stage and ii) the proposals for refurbishment/decommissioning are not known at this stage.

Health and Safety

4.70 In constructing and operating the connection, SPT will take account of the health and safety of all those who could potentially be affected, e.g. constructions workers, felling operatives, electricity company operatives and the general public. Possible risks to health and safety will arise during felling operations, construction (e.g. the movement of heavy vehicles), and the operation of the OHL.

4.71 The baseline desk and field surveys undertaken by Minerals and Resources Management in relation to minerals, as presented within **Chapter 13**, highlighted areas in proximity to the proposed grid connection where historical mining has taken place, and hence where shallow mine workings and mine entries may be located. With regard to mine entries, it is proposed that where the indicated position of a mine entry (based on current mapping) lies within 20m of the grid connection, such mine entries will be investigated by trench excavations or similar techniques to positively identify locations prior to construction. If necessary, the grid connection and ancillary development will be re-routed/located to a minimum of 10m from known proven mine entries and a minimum of 20m from likely mine entries which, following the proposed trench excavations, have not resulted in a positive identification(based on current mapping). During construction, safety harnesses will be used by construction workers in any area where ground is considered susceptible to severe movement, e.g. if excavations have penetrated mine workings at an outcrop, with withdrawal of construction workers where considered necessary, such as in the case of the sudden collapse of an unrecorded mine shaft within the operational area of construction work on the grid connection.

4.72 Health and safety precautions to be taken in relation to mine gas will include prohibition to site workers within 10m of any mine entry location, with no entry into any mine workings discovered by the site works.

4.73 SPT is committed to implementing good practice construction methods and has extensive working knowledge of constructing and operating similar schemes within similar environmental conditions in Scotland. Construction activities will be managed within the requirements of the Construction (Design and Management) Regulations 2007[i] and in accordance with the Health and Safety and Work Act 1974.

Public Access

4.74 Due to the short term and localised nature of the construction process, any temporary disturbance to public access during construction will be minimal and concentrated in localised areas at any one time as construction progresses along the course of the proposed grid connection route. In light of this, any Rights of Way or public footpaths that are crossed by the route will only be affected for a short time and it is unlikely that diversions will be required.

4.75 Once the grid connection is in place, there will be no further works required unless for maintenance purposes and use of the land can continue as normal, including use of public access routes.

Environmental Management

4.76 SPT is committed to minimising impacts on the environment during construction and operation of its assets. As part of the EIA process, all potentially significant environmental impacts have been identified and assessed and, where required, mitigation measures identified. These measures are presented within the draft Schedule of Mitigation, provided in **Appendix 4.1**. The Schedule of Mitigation will be used to inform the Construction Procedures Handbook (including the Environmental Management Plan) which will be produced prior to construction to include overarching environmental principles to be adhered to during construction.

Waste Management

4.77 Waste will be generated as a result of any felling or removal of vegetation and topsoil, and will require management at the construction stage.

4.78 Good practice waste management methods will be implemented during the construction phase of the proposed grid connection. These will seek to encourage the reduction, reuse and recycling of wastes. Mitigation measures will be put in place to further minimise the potential environmental impacts associated with the storage and transportation of waste, with further details provided below.

4.79 Wastes will be generated, and will require management, at a number of construction stages including:

- tree felling and clearance of vegetation along the route to enable access to pole locations, construction of the OHL and installation of the cable connection;
- stripping of topsoil and excavation of materials for construction of poles;
- construction of ancillary works, including temporary working areas.

4.80 Measures to reduce possible environmental impacts associated with the storage and transportation of waste will include:

- the careful location of stockpiles and other storage areas;
- the use of good practice in the design of waste storage areas and the use of suitable waste containers;
- the use of sheeting, screening and damping where appropriate and practicable;
- the control and treatment of runoff from soil and waste soil stockpiles;
- minimising storage periods;
- minimising haulage distances;
- the sheeting of vehicles.

4.81 All wastes will be identified, classified, quantified and, where practicable, appropriately segregated. Any materials that cannot be reused will be disposed of according to relevant waste management legislation which will serve to address a number of possible environmental impacts. This includes:

- the Duty of Care imposed by Section 34 of The Environmental Protection Act 1990[ii];
- The Waste Management Licensing Regulations 1994[iii] (as amended), particularly provisions related to registered exemptions from waste management licensing.

4.82 All waste materials removed from the site will be handled in accordance with relevant waste and environmental regulations. Waste will be transferred using a registered waster carrier to a licensed waste disposal site or recycling centre.

References

[i] Construction (Design and Management) Regulations 2007, Available [online] at: http://www.legislation.gov.uk/uksi/2007/320/contents/made, Last accessed on: 26/10/12
ii The Environmental Protection Act 1990, Available [online] at: http://www.legislation.gov.uk/ukpga/1990/43/contents, Last accessed on: 26/10/12
iii The Waste Management Licensing Regulations 1994, Available [online] at: http://www.legislation.gov.uk/uksi/1994/1056/contents/made, Last accessed on: 26/10/2012

5 Planning Policy Context

Introduction

5.1 This chapter sets out the planning policy considerations for the Black Law Windfarm Extension Grid Connection (hereafter referred to as the 'proposed grid connection'), which are of relevance in considering predicted significant impacts. This chapter includes references, where appropriate, to national, regional and local planning policy and guidance frameworks and identifies other relevant material considerations.

5.2 It is important to note that this chapter does not include an assessment of the proposed grid connection's compliance with the policy framework. This would inevitably involve a degree of subjective interpretation which is contrary to good practice advice on ES preparation.

Legislative Background

5.3 SPT will submit an application to Scottish Ministers under Section 37 of the Electricity Act 1989[i] for consent to install, and keep installed, a 132kilovolt (kV) overhead line (OHL). SPT will also be seeking direction from the Scottish Ministers under Section 57 (2) of the Town and Country Planning (Scotland) Act 1997[ii] (as amended) (hereafter referred to as 'the Act') that deemed planning permission be granted for the OHL, underground cable and extension to Linnmill substation.

5.4 The proposed grid connection is an 'EIA development' in accordance with the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000[iii] (the 'Regulations') (as amended). The proposed grid connection is a Schedule 2 development under Schedule 2, paragraph 2 (d) as, *"an electric line installed above ground with a voltage of 132 kilovolts (kV) 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*". It is considered that the proposed grid connection is likely to have significant impacts on the environment by virtue of factors such as its nature, size or location.

Development Plan Framework

5.5 Section 25 of the Act and Paragraph 25 of Scottish Planning Policy[iv] (SPP) require that decisions on planning applications are made in accordance with the relevant Development Plan(s), unless material considerations indicate otherwise.

5.6 The proposed grid connection lies predominantly within the administrative area of South Lanarkshire. The most northerly part extends into North Lanarkshire and West Lothian, where the proposed Black Law Windfarm Extension will be located. The adopted Development Plans comprise:

South Lanarkshire

- Glasgow and the Clyde Valley Strategic Development Plan[v] (approved 2012).
- South Lanarkshire Local Plan Volumes 1 and 2 (adopted 2009)[vi].

North Lanarkshire

- Glasgow and the Clyde Valley Strategic Development Plan (approved 2012).
- Adopted North Lanarkshire Local Plan[vii] (approved October 2008, and adopted in 2012 after post Inquiry modifications).

West Lothian

- Edinburgh and Lothians Structure Plan 2015[viii] (adopted 2004).
- West Lothian Local Plan[ix] (adopted 2009).

Emerging Development Plan Framework

Strategic Development Authority for Edinburgh and South East Scotland

5.7 The SESplan Joint Committee approved the proposed Edinburgh and South East Scotland Strategic Development Plan for submission to Scottish Ministers in June 2012. Although this has not been approved by Scottish Ministers, it is deemed that the proposed Plan has progressed to a stage where it is necessary to take into consideration its policies in relation to the proposed grid connection.

South Lanarkshire, North Lanarkshire & West Lothian

5.8 In line with planning system changes implemented through the Act, all three councils are in the process of producing their respective Local Development Plans (LDPs). The LDP for each council region in Scotland will replace the current adopted Local Plans. Following a review of the relevant Development Plan Schemes, details of the timescales for adoption for each council area are provided in **Table 5.1** below.

Table 5.1: Timescale for adoption of Local Development Plan

Council	Anticipated date of adoption of LDP
South Lanarkshire	2014[1]
North Lanarkshire	December 2015
West Lothian	Early 2015

5.9 As the LDPs for each Council are still in the early stages, these are not considered further in this chapter.

Review of Development Plan Policy

Introduction

5.10 The following section identifies the relevant Development Plan policies against which the application will be assessed and highlights specific considerations of relevance to the proposed grid connection.

5.11 The Structure and Local Plan policies which are to be considered within this assessment are arranged, where possible, by theme and reflect the chapters within the ES. To provide additional clarity, the full wording of certain policies is provided. Reference is made to associated Supplementary Planning Guidance under 'Other Material Considerations'.

Development Control

Adopted North Lanarkshire Local Plan (2012)

5.12 The North Lanarkshire Local Plan includes a series of Development Strategy Policies (DSPs) in support of its aim to promote regeneration and sustainable growth of communities. **Policy DSP 4 Quality of Development** is that of most relevance to the proposed grid connection. This policy is concerned with ensuring that proposed developments consider the setting, historic environment, design (in terms of siting, overall layout, density, form, scale, height, massing, proportion, detailing and materials), health and safety and impacts on amenity. In terms of 'setting', the policy refers to consideration of landscape, biodiversity and heritage features.

Renewable Energy

Glasgow and the Clyde Valley Strategic Development Plan (2012)

5.13 **Strategic Support Measure 9: Natural Resources Planning** states that *"low carbon economic growth requires that indigenous supplies of natural resources continue to be developed and that, where feasible, a phased programme of development be established through the life of the plan. Broad areas of search*

[1] Whilst the Development Plan Scheme 2012 states that the LDP will be adopted in Jan 2014, it is now likely to be later in the year.

for surface coals, sand and gravel aggregate, biomass wood-fuel production and wind energy have been outlined in the Spatial Development Strategy and it will be for Local Development Plans to take forward the refinement of these areas to establish their long-term potential"..

5.14 **Strategic Support Measure 12: Energy and a new low carbon paradigm** states that *"in order to achieve a paradigm shift in energy generation and consumption to meet a low or decarbonised future, a structured approach 'Energy – Carbon Masterplanning' could be adopted in Local Development Plans when taking forward the components of the Spatial Development Strategy model…".*

South Lanarkshire Local Plan (2009)

5.15 **Policy ENV 38: Renewable Energy Site Assessment** states, under 'other considerations', that where landscape or other sensitivities have been identified in relation to a windfarm development, *"the environmental effects of all new transmission lines between the development and the point of contact to the grid should have been assessed and shown to have no significant adverse environmental impact, or that such impacts can be suitably mitigated"*[2].

Adopted North Lanarkshire Local Plan (2012)

5.16 Although there is no reference to windfarm related infrastructure, policy **EDI 3 Assessing Economic Development and Infrastructure** states that the Council supports renewable energy generation in principle.

Edinburgh and Lothians Structure Plan 2015 (2004)

5.17 **Policy ENV 6: Renewable Energy** supports the development of renewable energy resources where they can be achieved in an environmentally acceptable manner.

West Lothian Local Plan (2009)

5.18 Similar to that stated for North Lanarkshire, the West Lothian Local Plan does not refer to OHLs or windfarm related infrastructure, but does support the development of renewable energy schemes, as stated in policy **NWR 20**.

Landscape

South Lanarkshire Local Plan (2009)

5.19 **Policy ENV 29: Regional Scenic Area and Areas of Great Landscape Value** states that development will only be permitted where adverse impacts on the quality of the designated landscape area are not anticipated. The following features which contribute to local distinctiveness should be preserved including:

- *"the setting of settlements and buildings within the landscape;*
- *the pattern of woodland, fields, hedgerows and tree features, particularly where they define/create a positive settlement/urban edge;*
- *special qualities of river corridors;*
- *historic landscapes; and*
- *skyline and hill features, including prominent views."*

Adopted North Lanarkshire Local Plan (2012)

5.20 **Policy DSP 4** states that development will only be permitted where it is demonstrated that landscape features will be safeguarded or enhanced.

5.21 **Policy NBE 1: Protecting the Natural and Built Environment** protects the interests of National and Regional sites of importance including Regional Scenic Areas and Areas of Great Landscape Value. Planning permission will only be granted for proposals that have potential to affect such sites if it is demonstrated that there will be no adverse impacts, or appropriate mitigation measures are proposed.

The Edinburgh and Lothians Structure Plan 2015

5.22 **Policy ENV 1 D** of the Structure Plan, addressed later under 'Other Policy Considerations', refers to the sensitivities within the landscape that should be considered.

5.23 A detailed analysis of the visual impact of the proposed grid connection is provided in **Chapter6.**

Hydrology

South Lanarkshire Local Plan (2009)

5.24 **Policy ENV 12: Flooding Policy** states that permission will be refused for new development where it would be at risk from flooding or increase the risk of flooding elsewhere. For any proposed development that has a potential flood risk attached, a Flood Risk Assessment (FRA) will be required.

5.25 **Policy ENV 37: Sustainable Urban Drainage Systems** states that details of sustainable urban drainage systems (SUDS) should ideally be submitted at the planning application stage. These details should be decided upon following consultation with the Scottish Environment Protection Agency (SEPA), Scottish Water and the Council's Flood Prevention System's Officer.

Adopted North Lanarkshire Local Plan (2012)

5.26 **Policy DSP 2** states, amongst other criteria listed, that any development should avoid locations liable to flooding.

The Edinburgh and Lothians Structure Plan 2015

5.27 **Policy ENV 1 D** of the Structure Plan, addressed later under 'Other Policy Considerations', refers to the sensitivities of peatland, relevant to this topic area.

5.28 **Policy ENV 12: Water Management and Flooding** prevents any development that may lead to a significant increase in the risk of flooding on an individual or cumulative basis. Equally, a development will not be permitted if the site itself is at risk from flooding. If a development is proposed for a greenfield or brownfield site, the policy states that proposals *"should include sustainable drainage systems for the attenuation and treatment of surface water and to assist in reducing the risk of flooding unless local conditions prevent this approach."*

The West Lothian Local Plan 2009

5.29 **Policy IMP 6** requires that development proposals comply with best practice SUDS practices and a drainage strategy, as well as details on treatment and flow, may be required.

5.30 Where there is risk of flooding, **Policy IMP 7** states that a FRA may be required and proposals will be refused where the risk of flooding is considered to be unacceptable.

5.31 **Chapter 7: The Water Environment** provides a comprehensive assessment of the potential impacts of the proposed grid connection on water assets including risk of flooding.

Natural Heritage

South Lanarkshire Local Plan (2009)

5.32 **Policy ENV 4: Protection of the Natural and Built Environment** states that all development proposals will be assessed in terms of their impact on the character and amenity of the natural and built environment. The Council have compiled a list of natural and built heritage sites that are to be conserved and, where appropriate, enhanced. Development will only be permitted where it is proven that*:*

- *it will not adversely affect the conservation interest and integrity of any of the listed sites it may be close to;*
- *there is no alternative solution; and*
- *there are imperative reasons of overriding public interest.*

5.33 **Policy ENV 20: Natura 2000 Sites** protects the conservation interests of Natura 2000 sites. Any development likely to have a significant impact on such a site will be subject to an Appropriate Assessment. Where an assessment is unable to conclude that a development will not adversely affect the integrity of the site, development will only be permitted subject to the same conditions listed above under policy **ENV 4**.

5.34 **Policy ENV 21: European Protected Species** states that consideration will be given, in light of any development proposal, to protected habitats and species listed in Annex I, II, IV and V of the EC Habitats Directive, Annex I of the EC Birds Directive and Schedules 1, 5 and 8 of the Wildlife and Countryside Act 1981 as amended. Any development judged to have significant detrimental impacts on these resources will not be permitted.

[2] To be consistent with the other ES chapters, the term 'impact' has been used in this chapter except where 'effect' has been included within direct quotes.

5.35 **Policies ENV 26: Sites of Special Scientific Interest/National Nature Reserves** and **ENV 27: Local Nature Conservation Sites Policy** protect such sites from developments that would be detrimental to the integrity of the designated area and where adverse impacts are likely that don't outweigh any social or economic benefit.

Adopted North Lanarkshire Local Plan (2012)

5.36 **Policy NBE 1** protects sites designated for their international, national, regional or local importance. These include the following:

- Special Areas of Conservation (SACs);
- Sites of Special Scientific Interest (SSSIs);
- Sites of Importance for Nature Conservation (SINCs);
- Local Nature Reserves (LNRs);
- Country Parks;
- Tree Preservation Orders.

5.37 **Policy NBE 2: Promoting the Natural and Built Environment** promotes the improvements of these assets and maintains to focus development on brownfield land.

The Edinburgh and Lothians Structure Plan 2015

5.38 **Policy ENV 1 A: International Natural Heritage Designations** protects the conservation interests of Natura 2000 sites from adverse impacts unless it can be proven that there is no alternative solution. If adverse impacts are likely, it must be demonstrated that there are imperative reasons of over-riding public interest, including those of a social or economic nature.

5.39 **Policy ENV 1 B: National Natural Heritage Designations** prevents development which could affect national designations, including SSSIs not designated as international sites. Development would only be permitted where it can be demonstrated that:

a) "the objectives of designation and overall integrity of the site will not be compromised; or

b) any significant adverse effects on the qualities for which the area has been designated are clearly outweighed by social or economic benefits of national importance."

5.40 Designated natural heritage sites, protected priority habitat or species or other important non-statutory locations noted under Policy ENV 1 F: Environmental or Biodiversity Assessments, will require an appropriate level of environmental or biodiversity assessment. If permission for development is granted, mitigation measures and enhancement must be included in proposals to reduce any adverse impact and/or to provide for sustainable habitat replacement.

The West Lothian Local Plan 2009

5.41 **Policy ENV 2** protects key habitats and species identified in the West Lothian Local Biodiversity Action Plan (BAP) from development proposals that might cause harm.

5.42 **Policies ENV 3**, **ENV 4** and **ENV 5** protect the interests of sites of international, national and local importance respectively. Under each of these policies, development will not be permitted unless there are no alternative solutions and there is imperative reasoning that overrides the interest of the designation.

5.43 In the event that a development proposal may affect the areas of importance protected under policies ENV 3, ENV 4, and ENV 5, policy ENV 6 states that the need for an EIA will be considered against the EIA (Scotland) Regulations 1999 and Appropriate Assessment under the Conservation (Natural Habitats, &c.) Regulations 1994 as amended.

5.44 **Policy ENV 11** states that there will be a presumption against development proposals that could affect woodlands and trees. More specifically, policy ENV 14 protects trees that have a preservation order, that are within a conservation area or which have local amenity of nature conservation value.

5.45 A comprehensive assessment of the impacts of the proposed grid connection on species and habitats is set out in **Chapter 8: Ecology** and an assessment of impacts on birds is set out in **Chapter 9: Ornithology**.

Cultural Heritage

South Lanarkshire Local Plan (2009)

5.46 **Policy ENV 4**, referred to above, is relevant to this topic area in addition to the policies discussed below.

5.47 **Policy ENV 23: Ancient Monuments and Archaeology** protects Scheduled Monuments, and other identified nationally important archaeological resources, from development that may have an adverse impact on the feature itself or the integrity of its setting. All other archaeological resources shall be preserved in situ wherever feasible. Any predicted impacts on archaeological resources will be assessed against the benefits of the development in the determination of planning applications. An archaeological evaluation report may be required prior to determination of the planning application and, in the case that the preservation of affected features is not *possible "the developer shall be required to make appropriate and satisfactory provision for archaeological excavation, recording, analysis and publication, in advance of development."*

5.48 **Policy ENV 24: Listed Buildings** states that Listed Buildings and their settings will be preserved and any development proposed close by will need to be sensitive to the designation in terms of layout, design, materials, scale and siting. **ENV 25: Conservation Areas Policy** requires the same sensitive approach in relation to Conservation Areas.

5.49 **Policy ENV 28: Historic Gardens and Designed Landscapes** states that any development *"affecting Historic Gardens and Designed Landscapes shall protect, preserve and enhance such places and shall not impact adversely upon their character, upon important views to, from and within them, or upon the site or setting of component features which contribute to their value."*

Adopted North Lanarkshire Local Plan (2012)

5.50 **Policies NBE 1** and **NBE 2** also apply to the built environment, in the interest of safeguarding them from development that could cause adverse impacts. Sites of importance listed within the policies, designated for their archaeological and cultural heritage interests include:

- Scheduled Ancient Monuments (SAMs);
- Inventory Historic Garden/Designed Landscapes;
- Listed Buildings;
- Conservation Areas;
- Canal Corridors;
- Sites of Archaeology Interest.

The Edinburgh and Lothians Structure Plan 2015

5.51 International and National Historic or Built Environment Designations are granted protection under **Policy ENV 1 C**. The policy discourages development which would harm the character, appearance and setting of the following designated built or cultural heritage sites, and/or the specific features which justify their designation:

- World Heritage Sites;
- Listed Buildings;
- Scheduled Ancient Monuments;
- Royal Parks;
- Sites listed in the Inventory of Gardens and Designed Landscapes.

The West Lothian Local Plan 2009

5.52 **Policies HER 2** and **HER 10** protect the setting of any Listed Building that may be affected by a proposed development.

5.53 **Policy HER 12** states that developments will not be permitted if there is potential for adverse impacts on the historic interest, character and setting of Scheduled Monuments. Special protection controls will be imposed if the setting of a Scheduled Monument is impacted by unsympathetic development (Policy HER 14).

5.54 In relation to Historic Gardens and Designed Landscapes, **Policy HER 22** states that these designations will receive full protection from development proposed within, or adjacent to, them. **Policy HER 23** protects these designations from development that may affect their historical character and/or setting.

5.55 An assessment of impacts on features of historical and archaeological interest is presented in **Chapter 10: Cultural Heritage**.

Recreational Impacts

South Lanarkshire Local Plan (2009)

5.56 With regards to recreational routes **Policy TRA 2: Walking, Cycling and Riding Routes** states that the Council will seek to protect the existing and proposed walking and cycling routes within the Plan area. It goes on to highlight that developments on, or adjacent to, recreational routes will be required to take them into consideration, and where appropriate, make developer contributions to the provision or enhancement of the route.

Adopted North Lanarkshire Local Plan (2012)

5.57 **Policy NBE2,** referred to above, highlights that countryside access/public rights of way should be enhanced where development proposals directly affect them. This is to be seen as helping to deliver an improved green network of natural environmental assets.

The Edinburgh and Lothians Structure Plan 2015

5.58 **Policy ENV 3**: **Development in the Countryside** states that *"development in the countryside will be allowed where it has an operational requirement for such a location that cannot be met on a site within an urban area or land allocated for that purpose, and is compatible with the rural character of the area".* Where justified in local plans, the policy may support developments of the following nature in the interest of rural diversification:

- tourism or other recreational uses;
- development that re-uses appropriate redundant rural buildings that make a positive contribution to the landscape;
- diversification of an appropriate scale and character on agricultural land, including lowland crofting, as a means of supporting and diversifying the rural economy, maintaining communities and services or affecting landscape improvement.

Other Policy Considerations

The Edinburgh and Lothians Structure Plan 2015

5.59 **Policy ENV 1 D: Regional and Local Natural and Built Environment Interests** applies to several of the topic areas addressed above. The policy protects the interests and setting of the regional or local areas of natural heritage and built environmental interest listed below:

- Conservation Areas;
- Areas of Great Landscape Value or other local landscape designations defined in Local Plans;
- the Pentland Hills Regional Park;
- Country Parks;
- defined Core and Local Path Networks;
- Local Nature Reserves;
- Regionally Important Geological and Geomorphological Features;
- sites of archaeological interest;
- designated wildlife sites;
- peatland;
- prime agricultural land;
- water supply catchment areas;
- areas of significant open space within urban areas.

5.60 Under this policy, development will only be permitted *"where it can be demonstrated that:*

- *The objectives and overall integrity of the designated area will not be compromised; or*
- *The social or economic benefits to be gained from the proposed development outweigh the conservation or other interest of the site."*

5.61 As noted, **Chapters 6**, **7, 8, 9**, **10 and 13** provide assessments related to the features/sites of interest listed above in **Policy ENV 1 D**.

Other Material Considerations

Supplementary Planning Guidance (SPG)

5.62 Relevant SPG documents are included below.

South Lanarkshire Local Plan Supplementary Planning Guidance: Renewable Energy (December 2010)

5.63 The aim of the SPG is to assist in the accommodation of renewable energy development where the development can operate efficiently and where environmental and cumulative impacts are to a satisfactory level. Whilst this guidance document focuses on renewable energy generation, i.e. the windfarms; reference is also made to the infrastructure required to distribute the energy generated.

5.64 The aim of the SPG is supported by three objectives:

- *"To identify potential areas of search for windfarms over 20MW generating capacity;*
- *To set out a policy framework to guide small wind generation development (under 20MW and above micro-generation capacity);*
- *To support the provision of on-site low carbon and renewable sources (less than 50kW capacity)".*

5.65 The document sets out a spatial framework which illustrates Areas of Significant Protection for Wind Energy Developments, Other Constraints for Wind Energy Developments and Broad Areas of Search for Wind Farms over 20MW.

5.66 Areas of Significant Protection for Wind Energy Developments include:

- international and national heritage designations;
- the Southern Uplands Foothills and Pentland Hills area of significant protection; and
- Green Belt.

5.67 Other Constraints for Wind Energy Developments include:

- local landscape considerations and cumulative impact;
- ecology, biodiversity and nature conservation;
- the historic environment;
- peat, soils and water;
- communities;
- tourism and recreation interests; and
- aviation and defence interests.

5.68 Broad Areas of Search for Wind Farms are areas where there are no significant constraints on development for windfarms over 20MW. Furthermore, this section of the SPG includes a number of constraints as the SPP accepts that these areas can still contain constraints. The constraints identified include:

- other natural heritage interests, including habitats of high nature conservation value;
- project viability, including wind speed, site access, ground suitability and other environmental factors; and
- grid capacity.

Adopted North Lanarkshire Local Plan Supplementary Planning Guidance for Wind Turbine Developments (2012)

5.69 **SPG 12: Assessing Planning Applications for Wind Turbine Developments** for North Lanarkshire states that any grid connection that is not permitted development will require the *"routing and scale of transmission lines linking renewable energy developments and the effects [to be] taken into account when considering proposals".* The SPG further states that visual amenity and protection of the environment are primary considerations.

Emerging Planning Policy

5.70 As stated above, the proposed Edinburgh and South East Scotland Strategic Development Plan was submitted to Scottish Ministers for adoption in June 2012 and is therefore a material consideration for the proposed grid connection.

5.71 **Policy 1B The Spatial Strategy: Development Principles** requires Local Development Plans to:

- *"ensure that there are no significant adverse impacts on the integrity of international, national and local designations, in particular National Scenic Areas, Special Areas of Conservation, Sites of Special Scientific Interest and Areas of Great Landscape Value and any other Phase 1 Habitats or European Protected Species;*
- *Ensure that there are no significant adverse impacts on the integrity of international and national built or cultural heritage sites in particular World Heritage Sites, Scheduled Ancient Monuments, Listed Buildings, Royal Parks and Sites listed in the Inventory of Gardens and Designed Landscapes;…*
- *Contribute to the response to climate change, through mitigation and adaptation".*

5.72 **Policy 10: Sustainable Energy Technologies** seeks to promote sustainable energy sources. It seeks Local Development Plans to set a *"framework for the encouragement of renewable energy proposals, taking into account relevant economic, social, environmental and transport considerations".*

National Planning Policy

5.73 National planning policy and advice are also important considerations. The following policy and advice documents are considered to be of most relevance to the connection:

- The National Planning Framework for Scotland 2009 (NPF 2);
- Scottish Planning Policy 2010 (SPP);
- Scottish Government Policy Subject 'Renewable Energy' and 'Onshore Wind Turbines' website guidance document (February 2011, last updated October 2012);
- Planning Advice Note 42: Archaeology, the Planning Process and Scheduled Ancient Monument Procedures 1994 (PAN 42);
- Planning Advice Note 51: Planning, Environmental Protection and Regulations (Revised 2006) (PAN 51);
- Planning Advice Note 58: Environmental Impact Assessment 1999 (PAN 58);
- Planning Advice Note 60: Planning for Natural Heritage 2000 (PAN 60);
- Planning Advice Note 75: Planning for Transport 2005 (PAN 75);
- Planning Advice Note 3/2010: Community Engagement;
- Planning Advice Note 1/2011: Planning and Noise.

5.74 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. 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".* 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".

5.75 This statement reinforces the support for renewable energy developments and associated infrastructure that are necessary to meet Government targets.

5.76 The Scottish Government's 'Onshore Wind Turbines' website guidance document (last updated October 2012) forms part of a suite of web based advice on renewable energy, first published in February 2011 and updated regularly. This guidance replaces PAN 45: Renewable Energy Technologies and states that *"careful consideration should be given to the relative merits of underground versus overhead lines from the substation to the electricity distribution system".*

References

[i] Electricity Act 1989, Available [online] at: http://www.legislation.gov.uk/ukpga/1989/29/contents, Last accessed on: 18/10/2012

[ii] Town and Country Planning (Scotland) Act 1997, Available [online] at: http://www.legislation.gov.uk/ukpga/1997/8/contents, Last accessed on: 15/10/2011.

[iii] Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000, Available [online] at: http://www.legislation.gov.uk/ssi/2000/320/contents/made, Last accessed on 19/10/2012

[iv] Scottish Governmnt, (2010), *'A statement of the Scottish Government's policy on nationally important land use planning matters',* Available [online] at: http://www.scotland.gov.uk/Publications/2010/02/03132605/0, Last accessed on: 15/11/2012

[v] Glasgow and the Clyde Valley Strategic Development Plan, (2012), Available [online] at: http://www.gcvsdpa.gov.uk/, Last accessed on: 15/11/2012

[vi] South Lanarkshire Local Plan, (2009), Available [online] at: http://www.southlanarkshire.gov.uk/info/178/local_and_statutory_development_plans/39/development_plans/2, Last accessed on: 15/11/2012

[vii] North Lanarkshire Local Plan, (2012), Available [online] at: http://www.northlanarkshire.gov.uk/index.aspx?articleid=16016, Last accessed on: 15/11/2012.

[viii] Edinburgh and the Lothians Structure Plan 2015, Available [online] at: http://www.westlothian.gov.uk/1210/161/178/ELSP_2015, Last accessed on: 15/11/2012.

[ix] West Lothian Local Plan, Available [online] at: http://www.westlothian.gov.uk/1210/161/178/wllp, Last accessed on: 15/11/2012

6 Landscape and Visual Amenity

Introduction

6.1 This chapter presents the findings of the Landscape and Visual Impact Assessment (LVIA) which considered the potential impacts of the Black Law Windfarm Extension Grid Connection (hereinafter referred to as the 'proposed grid connection') on the landscape and visual amenity resources. The assessment considers the impacts of the proposed grid connection during construction and operation, and cumulative impacts with other developments.

6.2 The proposed grid connection is described in full in **Chapter 4: Development Description**, and comprises a 14.5km overhead line (OHL) mounted on wood poles between the proposed Black Law Windfarm Extension substation located at NS 291241 656776, towards the wood pole termination structure west of Cartland at NS 286242 646335, a 4.5km underground cable from the wood pole termination structure at NS 286242 646335 towards the existing Linnmill substation, and an extension to the existing Linnmill substation. The LVIA was undertaken by landscape architects at LUC.

6.3 This chapter should be read in conjunction with **Chapter 3: The Design Strategy, Chapter 10: Cultural Heritage** and **Chapter 13: Land Use**.

Study Area Description

6.4 The study area for the LVIA was defined as 2km from the proposed OHL route and 1km from the proposed underground cable route in all directions. The study area was agreed through consultation with statutory consultees and informed by professional judgement, with reference to relevant literature and guidance and informed by experience from other relevant projects. The extent of the study area includes land within three local authorities, North Lanarkshire, South Lanarkshire and West Lothian, as shown in **Figure 6.1**.

6.5 The Cumulative Landscape and Visual Impact Assessment (CLVIA) study area comprised a 4km radius from the route of the proposed OHL and 1km from the route of the proposed underground cable to capture potential interactions and intervisibility with other existing, consented and proposed grid connection within the surrounding landscape. The cumulative study area is shown on **Figure 6.16**.

Impacts Assessed in Full

6.6 This section sets out the impacts considered in this assessment. Impacts on the landscape include physical changes to the landscape as well as changes in landscape character. They may also include impacts on areas designated for their scenic or landscape qualities, at a national or local policy level. Impacts on visual amenity relate to changes in views, and the appearance and prominence of the proposed grid connection in those views. It is important to consider the potential impacts that the proposed grid connection will have on the character of the landscape and on views around the study area. Public perception will be linked, to some extent, to the appearance of the proposed grid connection in the landscape, and the changes people will see in views and in the character of the landscape.

Impacts Scoped Out

6.7 The likely receptors are identified for each of the potential impacts set out above. Where receptors are unlikely to be affected by the proposed grid connection, through having little or no predicted visibility, or being distant from the proposed grid connection, potential impacts on these receptors have been scoped out. This was undertaken on the basis of the desk based and survey work undertaken, the professional judgement of the EIA team, experience form other relevant projects and policy guidance or standards.

6.8 The underground cable section of the proposed grid connection, once operational, will be hidden underground, with the exception of occasional small cable markers and manholes. There are unlikely to be any significant landscape and visual impacts arising during operation, so operational impacts associated with the cable section are scoped out of the assessment.

Assessment Structure

6.9 The assessment of impacts therefore considers the following impacts of the proposed grid connection:

- direct impacts upon **landscape resources** (sometimes described as landscape elements);
- direct and indirect impacts upon **landscape character** (examined with reference to Landscape Character Types (LCTs);
- the consequential impact of direct and indirect impacts upon resources and character on any **designated landscapes**[1];
- the consequential impact of the direct and indirect impacts upon **views** and **visual amenity** (examined with reference to assessment **viewpoints** and illustrated with photomontage visualisations);
- the cumulative impacts upon **landscape resources, landscape character, designated landscapes**, **views** and **visual amenity** when considering other consented and proposed grid connection within the study area.

Data Sources and Guidance

6.10 The landscape and visual assessment was informed by policy, current guidelines, and other documents as appropriate, including:

Government Policy and Guidance

- Scottish Government (2010) Scottish Planning Policy[i];
- Scottish Government (2003) Planning Advice Note (PAN) 68: *Design Statements*[ii];
- Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011[iii].

LVIA and Cumulative Assessment Guidance

6.11 The LVIA was undertaken following the approach set out in:

- Landscape Institute and Institute of Environmental Management and Assessment (2002) Guidelines for Landscape and Visual Impact Assessment: Second Edition (GLVIA)[iv].

6.12 Other guidance documents referred to include:

- Countryside Agency and Scottish Natural Heritage (2002) Landscape Character Assessment: Guidance for England and Scotland[v];
- Countryside Agency and Scottish Natural Heritage (2004) Landscape Character Assessment: Guidance for England and Scotland, Topic Paper 6: Techniques and Criteria for Judging Capacity and Sensitivity [vi];
- Scottish Natural Heritage (2006) Visual Representation of Windfarms: Good Practice Guidance[vii];
- Landscape Institute (2011) Practice Advice Note, Photography and Photomontage in Landscape and Visual Impact Assessment. Advice Note 01/11[viii];
- Turnbull Jeffrey Partnership (1996) Assessment of Visual and Landscape Effects of Overhead Transmission Lines, Version 6.0[ix].

Landscape Character Assessments

- Land Use Consultants (1999) *Glasgow and the Clyde Valley Landscape Character Assessment*. Scottish Natural Heritage Review no. 116;
- ASH Consulting Group (1998) *The Lothians Landscape Character Assessment*. Scottish Natural Heritage Review no.91; and
- IronsideFarrar (2010) South Lanarkshire Landscape Character Assessment (for localised landscape character).

[1] Refer also to **Chapter 10: Cultural Heritage** which contains the assessment of impacts on Gardens and Designed Landscapes.

Mapping

- Ordnance Survey (OS) Maps:
  - Landranger 1:50,000 scale;
  - Pathfinder 1:25,000 scale;
  - 1:10,000 scale.
- Online map search engines;
- Aerial photography (Dated May 2009);
- British Geological Society (1979) Geological Map, Solid, North.

Field Survey

6.13 Field survey work was carried out during several visits under differing weather conditions between February 2011 and August 2012, and records were made in the form of field notes and photographs. Representative viewpoints were selected, for use as a tool to inform the examination of impacts on views. Field survey work included detailed study of potential route options between March-November 2011. Assessment visits out to all locations along the route of the proposed OHL and underground cable, visits to viewpoints and designated landscapes, and extensive travel around the study area to consider potential impacts on landscape character and on experiences of views seen from settlements and routes were carried out between November 2011 and August 2012.

Consultation

6.14 In addition to the scoping opinion received from the Scottish Government (see **Chapter 2: Approach to the EIA**) consultation was carried out with North Lanarkshire Council, South Lanarkshire Council, West Lothian Council and Scottish Natural Heritage (SNH) in September 2011 and July 2012 to agree the selection of representative viewpoints and appropriate study area for the assessment.

6.15 Responses were received from statutory consultees in July and August 2011. Recommendations relevant to the LVIA are included in **Table 6.1**.

6.16 Consultation with regard to the selection of viewpoints to be used for the LVIA was initially undertaken in August 2011, subsequent consultation was undertaken in June-July 2012 following the relocation of the southern section of the route, which deemed one previously agreed viewpoints surplus to requirements and required the relocation of two viewpoints. The rationale behind the selection of viewpoints and information relating to the consultation on the selection of viewpoints is presented in **Table 6.1**.

Planning Policy

6.17 Planning policies of relevance to this assessment are outlined in **Chapter 5: Planning Policy Context**.

Table 6.1: Scoping and Viewpoint Consultation Responses

Consultee	Scoping/Other Consultation	Issue Raised	Response/Action Taken
North Lanarkshire Council	**Scoping**	Requested consideration of potential views from Headless Crossroads on A71/B715 and confirmation of retention of forestry along the B715. Requested further clarification within the EIA of the detailed design to show that the best landscape and visual fit were selected within the preferred corridor.	Response provided by LUC during 1st Viewpoint Consultation. Clarification of detailed routeing stages for the final proposed grid connection provided in **Chapter 3: Design Strategy**.
	1st Viewpoint Consultation Correspondence sent 11th August 2011	Requested inclusion of viewpoint from Headless Crossroads on A71/B715.	Viewpoint from the Headless Crossroads on A71/B715 was deemed to have limited opportunity for visibility of the proposed grid connection so a viewpoint was not included from this location. LVIA carried out under the presumption that the woodland will no longer be present during construction or operation of the proposed grid connection and therefore limited screening will be provided on basis of felling plans provided within Black Law Windfarm Extension ES.
	2nd Viewpoint Consultation Correspondence sent 3rd July 2012	Confirmed that proposed viewpoints were acceptable (4th July 2012).	No action required.
	Cumulative Consultation Correspondence sent 20th August 2011	Requested details of proposed or consented grid infrastructure and wind energy developments within council area. List of windfarm and wind turbine applications within North Lanarkshire provided 22nd August 2012.	Relevant wind energy developments included in cumulative assessment.
South Lanarkshire Council	**Scoping**	Other consultation responses received adequately address the issues which should be incorporated into the ES and had no further comment.	No action required.

Consultee	Scoping/Other Consultation	Issue Raised	Response/Action Taken
	1st Viewpoint Consultation Correspondence sent 11th August 2011	Confirmed that proposed viewpoints were acceptable 25th August 2011	No action required.
	2nd Viewpoint Consultation Correspondence sent 3rd July 2012	Confirmed that proposed viewpoints were acceptable 11th July 2012.	No action required.
	Cumulative Consultation Correspondence sent 20th August 2011	Requested details of proposed or consented grid infrastructure and wind energy developments within council area. List of windfarm and wind turbine applications within South Lanarkshire provided 21st August 2012.	Relevant wind energy developments included in cumulative assessment.
West Lothian Council	**Scoping**	No response received.	No action required.
	1st Viewpoint Consultation Correspondence sent 11th August 2011	No comments received regarding the proposed viewpoints.	No action required.
	2nd Viewpoint Consultation Correspondence sent 3rd July 2012	No comments received regarding the proposed viewpoints.	No action required.
	Cumulative Consultation Correspondence sent 20th August 2011	Requested details of proposed or consented grid infrastructure and wind energy developments within council area. List of windfarm and wind turbine applications within West Lothian and neighbouring local authorities provided 22nd August 2012.	Relevant wind energy developments included in cumulative assessment.
SNH	**Scoping**	Agreed with the selection of assessment viewpoints, requested a Zone of Theoretical Visibility (ZTV) be produced and submitted for consultation prior to undertaking the LVIA.	ZTV provided for consultation and viewpoints subsequently agreed during Viewpoint Consultation with SNH. There is predicted to be no visibility from New Lanark, therefore, it has not been included in the assessment.
		Agreed 2km study area and appropriate assessment method as set out in the Scoping Report. Requested that impacts upon views from New Lanark World Heritage Site be considered.	
	1st Viewpoint Consultation 11th August 2011	Requested inclusion of 2 additional viewpoints from Kilncadzow and north side of Lanark 23rd August 2011.	Viewpoints included from Kilncadzow (VP7) and north side of Lanark on the A706[2].
	2nd Viewpoint Consultation Correspondence sent 3rd July 2012	Viewpoints from Cartland and Craigenhill Road (VPs 8, 9) added to assessment viewpoints replacing north side of Lanark (A706), Greentowers and Moor Road. Confirmed that revised assessment viewpoints were acceptable 4th July 2012.	No action required.

Assessment Methodology

6.18 This section sets out the methodology used for the LVIA and CLVIA. The methodology is applicable to the assessment of **short term** (temporary) impacts during the construction of the project, and the **long term** (permanent) impacts during operation of the OHL.

6.19 Landscape resources and character are considered to be of importance in their own right and are valued for their intrinsic qualities regardless of whether they are seen by people. Impacts on views and visual amenity as perceived by people are clearly distinguished from, although closely linked to, impacts on landscape, and are a consequence of the latter changes. Landscape and visual impact assessments are therefore separate, but linked processes.

6.20 The LVIA considers the potential impacts of the addition of the proposed grid connection to the existing landscape, against a baseline that includes existing OHL infrastructure and other built development, including large scale windfarms and domestic/Feed in Tariff (FiT) wind turbines.

6.21 The CLVIA considers the potential impacts of the addition of the proposed grid connection to the landscape alongside OHL infrastructure and other built development that may or may not be present in the landscape in the future (i.e. consented and undetermined applications).

Computer Modelling

6.22 **Appendix 6.1** sets out the methodology for the computer modelling used to produce the ZTV, wireframe diagrams and photomontages that represent the appearance of the proposed grid connection in selected views.

Method for Recording and Evaluating the Landscape Baseline

6.23 The *GLVIA* (LI and IEMA, 2002) advises that to reach an understanding of the impact of development on landscape resources, it is necessary to consider different aspects of the landscape, i.e. the individual elements or features that make up the landscape, as well as its wider character, and the characteristics

[2] Viewpoint from North Lanark on A706 was subsequently removed following the relocation of the preferred OHL route.

which contribute to that character. For the purposes of this assessment, the consideration of impacts upon landscape includes impacts on:

- **Landscape resources**: the components, elements or features that make up the landscape including aspects such as landforms, trees, hedgerows and woodlands, walls and watercourses;
- **Landscape character**: the distinct and recognisable pattern of elements (for example associations of field patterns) that occurs consistently in a particular type of landscape and creates a particular sense of place; and
- **Designated landscapes:** areas designated for their landscape quality or value at the national, regional or local level.

6.24 These are composite attributes of landscape which intersect, rather than operate in isolation. As such, impacts on landscape resources, landscape character and designated landscapes are interrelated, and represent layers of the same landscape. For example, an overall impact on landscape character may be the result of a direct impact on a landscape resource, and in turn could affect a landscape designation; they are composite parts of the same overall landscape impact.

Landscape Sensitivity

6.25 The sensitivity of the landscape is evaluated as part of the baseline studies. Sensitivity is the extent to which a landscape can accept change of the type and scale proposed, without adverse impacts on its character. Assessments of sensitivity in this chapter are specific to the type of development proposed, in accordance with the approach set out in *Topic Paper 6: Techniques and Criteria for Judging Capacity and Sensitivity* (SNH and the Countryside Agency, 2004).

Landscape Resources and Sensitivity

6.26 Determining the sensitivity of landscape resources is based upon an understanding of *"quality, value, contribution to landscape character, and the degree to which the particular element … can be replaced or substituted"* (GLVIA, LI and IEMA, 2002). Landscape resources relate to local variations in landscape characteristics and are specifically linked to the key areas and landscape elements likely to be directly affected by the proposed works. Landscape resources within the OHL and underground cable route corridor were recorded using OS maps, aerial photography and field survey, and sensitivities were assigned with reference to **Table 6.2**.

Landscape Character and Sensitivity

6.27 The GLVIA (LI and IEMA, 2002) state that: *"The degree to which a particular landscape type or area can accommodate change arising from a particular development, without detrimental impacts on its character, would vary with:*

- *existing land use;*
- *the pattern and scale of the landscape;*
- *visual enclosure/openness of views;*
- *the scope for the effective implementation of mitigation, which would be in character with the existing landscape;*
- *the value placed on the landscape.*

Variations of these characteristics within the local landscape need to be identified. The determination of the sensitivity of the landscape resource is based upon an evaluation of each key element or characteristic of the landscape likely to be affected."

6.28 The landscape character of the areas in which the proposed grid connection is located was described and mapped with reference to existing landscape character assessments, published by SNH and local authorities, and sensitivities were assigned with reference to **Table 6.2**.

Landscape Designations and Sensitivity

6.29 Landscape designations can be an indicator of the recognised value of a landscape. National and local designations within the study area were identified. In the case of designated landscapes, sensitivity may be determined by considering:

- the characteristics of the area;
- the reasons for the designation;
- the policy importance of the designation.

6.30 Indicators used in relation to the sensitivity of designated landscapes are set out in **Table 6.2**.

Table 6.2: Indicators of Landscape Sensitivity

Sensitivity[3]	Landscape	Indicators of Landscape Sensitivity
High	**Landscape Resources**	Highly valued landscape resource in good condition, which makes a strong positive contribution to landscape character and would take considerable time to replace, e.g. mature trees or woodland that make a strong positive contribution to the local landscape.
	Landscape Character	Key characteristics of this landscape type/area offer very limited opportunity for change or are susceptible to change and would be adversely affected by this type of development. High sensitivity may reflect a particularly distinctive or rare character type.
	Designated Landscapes	The designation may be of international or national policy importance and/or would be vulnerable change or its key reasons for designation are likely to be adversely affected by development of the type proposed.
Medium	**Landscape Resources**	Moderately valued landscape resource in fair condition, which makes some positive contribution to landscape character. Elements are replaceable but maturity would take some time, e.g. trees that contribute less positively to the local landscape, or hedgerows that contribute positively to the site, but would be replaceable over time.
	Landscape Character	The key characteristics that make up the landscape character type/area offer some opportunities for the accommodation of change, or for development of successful mitigation. The landscape may be valued locally.
	Designated Landscapes	A nationally or regionally important landscape that is less likely to be affected by change or its key reasons for designation are vulnerable, to some extent, to change from this type of development.
Low	**Landscape Resources**	Landscape resource of limited/low value which may be in poor condition and does not contribute positively to landscape character. Elements would be easily replaced, e.g. a gapped hedgerow that does not contribute especially to the landscape, or young planting that could easily be replaced over a short time.
	Landscape Character	The key characteristics that make up the landscape character type/area are tolerant of change and offer opportunities for successful mitigation.
	Designated Landscapes	The landscape may be locally important or is without formal designation. Reasons for designation (if applicable) are unlikely to be affected by the type of change being proposed.

Method for Recording and Evaluating the Visual Baseline

6.31 The visual baseline is described in terms of views from representative viewpoints, settlements and routes located within the study area. A viewpoint typically represents an area over which a broadly similar perspective of the proposed grid connection is obtained. The sensitivity of the viewers at a particular viewpoint or from a particular settlement or route depends upon the activity of the viewers and the extent to which they are affected by changes in their view.

[3] Note that not all aspects listed are required to apply concurrently to result in the relative level of sensitivity.

Representative Viewpoints

6.32 Representative viewpoints form the basis of the assessment of the potential impacts of the proposed grid connection on views, in line with the *GLVIA* (LI and IEMA, 2002). Viewpoints were selected through desk study, site work and consultation with North Lanarkshire Council, South Lanarkshire Council, West Lothian Council and SNH. The viewpoints were selected for the following reasons:

- being publicly accessible;
- being representative of the nearest residents and the clearest viewpoints of the site;
- providing a representative range of viewing distances (i.e. short, medium, and long range views within 2km of the OHL and 1km of the cable route corridor);
- representing a range of viewing experiences (i.e. static views, from residential properties and points from sequential views, for example from roads and footpaths);
- having a reasonably high potential number of viewers or are of particular importance to the viewers affected.

Settlements

6.33 Settlements with potential visibility of the proposed grid connection, as illustrated by ZTV analysis and subsequent fieldwork, were included within the assessment.

Routes

6.34 Communication routes (roads and railways), cycle routes and long distance footpaths with potential visibility of the proposed grid connection, as identified by ZTV analysis and fieldwork, were included within the assessment.

Visual Sensitivity

6.35 For the purposes of this assessment, visual sensitivity is dependent upon:

- the existing scenic qualities of the view, including the presence of other existing man-made elements in the view;
- the number of viewers[4] likely to experience views from that particular viewpoint, settlement or route;
- the viewing experience available from the viewpoint;
- whether the location represents views from an advertised viewpoint or route, i.e. marked as a viewpoint on Ordnance Survey or tourist maps, or by tourist signs.

6.36 For the purposes of this assessment, the indicators of sensitivity are set out in **Table 6.3**.

Table 6.3: Indicators of Visual Sensitivity

Sensitivity[5]	Indicators of Visual Sensitivity
High	A view with high scenic quality; The view is experienced by a large number of viewers and/or is of particular importance to the viewers affected (e.g. located in a residential area, on a National Cycle Network Route, or National Trail); A mapped or signposted viewpoint from which there is a view with high scenic quality (this may include views across or within a nationally or regionally designed landscape); There are few overt or intrusive man-made elements in the view.
Medium	A view with some scenic quality (this may include views across, or within, a locally designated landscape; A view experienced by a moderate number of viewers and/or located in a recreational area (e.g. on a local footpath); Some overt or intrusive man-made elements in the views.
Low	A view with low scenic quality; A view experienced by a small number of viewers, or a larger number of viewers with passing interest in their visual environment (e.g. motorists and people at work); A number of overt or intrusive man-made elements already in the view.

[4] The likely number of viewers is judged on factors such as the size and the function of roads, settlements or places rather than numerical data. For example main roads, large settlements and tourist or visitor attractions are judged to have relatively high numbers of viewers, whilst minor roads, hamlets or open countryside are judged to have lower numbers of viewers.

[5] Note that not all aspects listed are required to apply concurrently to result in the relative level of sensitivity.

Method for Assessing Magnitude of Change

6.37 The magnitude of change in landscape resources, landscape character and visual amenity is been assessed in terms of the degree of change; and the extent to which the proposed grid connection alters the range of characteristic elements of the landscape and the scale of the change in the view and the degree of contrast, or integration, of the proposed infrastructure with existing features. The indicators of magnitude of change to both landscape and views and visual amenity are outlined below.

Magnitude of Change to the Landscape

6.38 The assessment considers magnitude of change to landscape resources and character, and where relevant to those parts of the landscape which may be designated, during construction and operation. The assessment allows consideration of residual impacts once mitigation measures and route reinstatement measures (embedded as part of the works) have had time to reach a degree of maturity.

6.39 The magnitude of change depends on the nature and scale of change that is expected to occur. In a landscape, the magnitude of change depends on the loss, change or addition of any feature, or any change in the backdrop to, or outlook from, a landscape that affects its character.

6.40 Magnitude of landscape change ranges from imperceptible (including none) to high. Indicative descriptions are provided in **Table 6.4**.

Table 6.4: Magnitude of Change to Landscape

Magnitude of Change	Indicators of Landscape Change
High	Extensive or widespread, long term loss of landscape resources or displacement with large scale new elements; An obvious change in landscape character; An obvious change to the quality/value of a designated landscape or which may affect the objectives or attributes for which it was designated.
Medium	Partial loss of or damage to landscape resources which may be partly reversible; Discernible changes in landscape character; Discernible but not obvious change to the character of a designated landscape or the objectives or attributes for which it was designated.
Low	Small or localised change to landscape resources; A small change in character of the landscape; Minor change to the character of a designated landscape or the objectives or attributes for which it was designated.
Imperceptible	Negligible or no change to landscape resources; A virtually imperceptible change in character of the landscape; Imperceptible change to the character of a designated landscape or the objectives or attributes for which it was designated.

Magnitude of Change to Views and Visual Amenity

6.41 The magnitude of the change in the view and the degree of contrast or integration of any new features with existing features is considered, as well as the extent of the change (proportion of the view occupied by the development, and distance away), and the reversibility of the change. Magnitude of visual change ranges from imperceptible (including none) to high as indicated in **Table 6.5**.

Table 6.5: Magnitude of Change to Views and Visual Amenity

Magnitude of Change	Indicators of Visual Change
High	The development has a defining influence on the view and becomes a key focus in the view; It does not integrate well with existing features. It may be an irreversible change.
Medium	The development is clearly visible in the view and forms an important but not defining element of the view; The feature may integrate partially and may be a partially reversible change.
Low	The development is visible, but forms a small element of the view; It integrates well with existing features and it may be a reversible change.
Imperceptible	The development may go unnoticed as a small element in the view, or is not visible; It may be a fully reversible change.

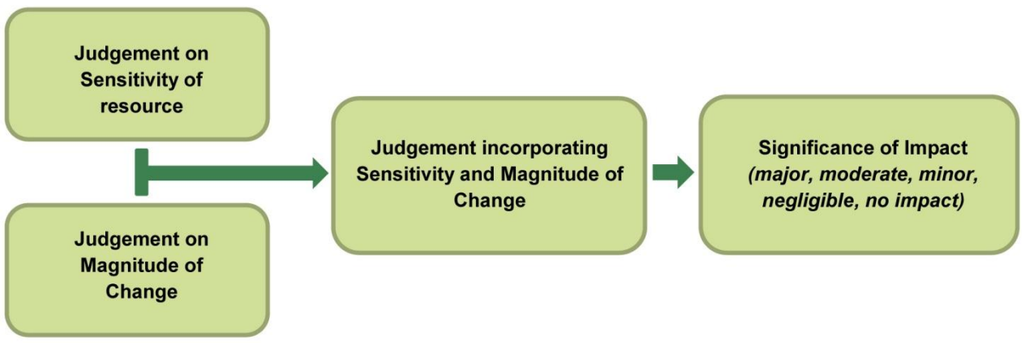
Significance Criteria

6.42 The assessment of landscape and visual impacts is based on three stages:

- evaluation of the sensitivity of the landscape and visual receptors to the proposed change as set out above;
- prediction of the magnitude of change in the landscape or the view as a consequence of the proposed change; and
- evaluation of the level and significance of landscape and visual impacts.

6.43 A higher level of significance is generally attached to large scale changes affecting sensitive or high value resources or viewers. **Diagram 6.1** represents the process, ultimately a matter of judgement by which the significance of impact is determined:

Diagram 6.1 Process for Determining Significance of Impacts



6.44 In accordance with the *GLVIA* (LI and IEMA, 2002), significance is determined by considering the sensitivity of the landscape or visual receptor and the magnitude of change expected as a result of the proposed grid connection. Professional judgement and experience are applied on a case by case basis in order to identify levels of significance for each receptor. Each case is assessed on its own merits, but broadly speaking, higher levels of significance would result from greater change to higher sensitivity receptors.

6.45 The EIA Regulations require that the significance of each potential impact is identified. In this assessment, four levels of significance of impact are used: **major, moderate, minor** and **negligible**, however there is a gradual, transition between levels of significance.

6.46 Where no impact is predicted on a landscape or visual receptor, this is stated following the judgement incorporating sensitivity and magnitude of change.

6.47 Impacts of major or moderate significance are considered significant in the context of the Electricity Works (EIA) (Scotland) Regulations 2000 as amended.

Cumulative Impacts

6.48 Cumulative assessment is concerned with identifying the *additional* impacts that may arise from the proposed grid connection, in conjunction with other developments present, consented or proposed (valid applications for development consent) which are likely to give rise to similar landscape and visual impacts. The purpose of the cumulative assessment is to focus upon identifying additional impacts resulting from the proposed grid connection when experienced in combination with others.

6.49 Cumulative impacts occur where developments occur in the same or nearby location and/or at the same time. It is necessary to include a larger study area for the consideration of cumulative landscape and visual impacts, which for this assessment extends to a radius of 4km from the proposed OHL route and a radius of 1km from the underground cable route.

6.50 A review of existing, consented and proposed (valid applications for development consent) developments in the study area with which the proposed grid connection could potentially have cumulative impacts, included windfarms and single wind turbines of over 10m to blade tip height, and OHL infrastructure (although no proposed or consented OHLs were identified).

Existing Conditions

The Study Area

6.51 The study area has been influenced by a history of human activity. Areas of intensive coniferous commercial forestry plantations are located to the east and north of the existing Black Law Windfarm and north of the railway line near Cartland. An area of former opencast coal extraction has been developed near Black Law Windfarm and a number of other coal extraction sites in the north of the study area have been restored following the completion of opencast workings. Mineral extraction has left a legacy of bings (spoil heaps) across this part of the landscape.

6.52 Enclosed pastoral and arable agriculture is widespread across the study area and represents the predominant land use within the study area between Black Law Windfarm and Linnmill substation extension.

Settlement and Residential Properties

6.53 The pattern of settlement across the study area is of small to medium sized settlements, along main roads and individual farmsteads located within close proximity to minor roads. The western and northern parts of Forth lie within the study area to the north-east. The northern and western fringe of Lanark is located at the southern extent of the study area and is the largest settlement within the study area. Several small settlements and hamlets are located within the study area including Climpy, Kilncadzow, Cartland and Kirkfieldbank. Clusters of properties and ribbon developments are also present throughout the length of the study area, located close to the main arterial roads, including the A706, A721, A73 and A72.

Transmission Network, Transport Infrastructure and Other Developments

6.54 Several A-roads pass through the study area for the proposed grid connection, these link settlements located within and outside the study area and include the A706 which runs north-south between Lanark

and Forth, the A71 which runs west-east between Newmains and West Calder, the A73 which runs north-south between Newmains, Carluke and Lanark, the A721 which runs west-east between Carluke, Kilncadzow and Carnwath and the A72 which runs north-south between Hamilton and Lanark. A number of B-roads also cross the study area including the B715 which runs north-south between Headless Cross and Forth and the B7056 which runs east-west between Westertown, Yieldshields, Carluke and Crossford.

6.55 The West Coast Mainline Railway crosses the study area west-east to the north of Lanark, with steep sidings present along sections of the route across the study area. The high speed electrified railway line has high voltage OHL infrastructure present along its length.

6.56 There is an existing network of overhead transmission and communication infrastructure of varying scales located across the study area; these include steel tower high voltage transmission lines and wood pole 33kV and 11kV lines. This linear network of vertical structures connected through the undulating and often open landscape of the study area reduces the horizontal scale of the landscape and diminishes the vertical scale of other natural and man-made features within the wider landscape. An overview of the existing OHL infrastructure is included in **Table 6.6** and shown on **Figure 6.2**. Other low voltage and telecommunication OHL infrastructure is also present within the study area but is less perceptible within the landscape and predominantly concentrated within close proximity to residential properties and within the interior of nearby settlements.

6.57 There are two large telecommunication masts located within the study area, close to the summits of Hill Rig (317m AOD, NS 901 491) and Kilncadzow Hill (320m AOD, NS 888 488) north of the A721. These structures are clearly visible from across the study area and the wider landscape beyond, appearing as distinguishable vertical features in views.

6.58 There are also a number of existing operational commercial windfarm developments and domestic/FiT[6] turbine developments located across the study area. Black Law Windfarm which consists of 54 turbines of up to 115.1m to blade tip is visible from a large proportion of the study area and the turbines appear as large vertical features across the slightly elevated and open landscape of the north of the study area. A large number of domestic/FiT turbines, ranging from 12.5m to 46.6m blade tip height exist within the study area, with turbines predominantly located within pasture farmland close to farmsteads and agricultural buildings. These existing developments are listed below in **Table 6.6** and shown on **Figure 6.2**.

Table 6.6: Existing Developments within the Study Area

Development Name	Status[7]	No. of Turbines	Blade Tip Height (m)	Distance from Proposed Grid Connection
Windfarm Developments				
Black Law	Operational	54	< 115.1m[8]	281m
Domestic/FiT Turbine Developments				
Covanhill Farm Cluster	Operational	3	19.9m	1613m
Mossplatt Farm	Operational	3	19.9m	793m
Easterseat Farm	Operational	3	19.36m	90m
Muirhead Farm	Operational	1	24.5m	522m
Harelaw Farm Cluster	Operational	3	20m	1764m
Harelaw Farm	Operational	1	24.2m	1406m
Westwood Lane	Operational	1	12.5m	215m
OHL Network	**Status[9]**		**Type and Approx. Height (m) of Infrastructure**	
OHL Infrastructure				
High Voltage Transmission Lines	Operational		Steel Tower : 45m	
33kV OHL	Operational		Wood Pole : 10.5m	
11kV OHL	Operational		Wood Pole : 10.5m	
Telecommunication Masts				
Kilncadzow Hill	Operational		30m	
Hill Rig	Operational		65m	

[6] Domestic/FiT: Feed in Tariff renewable energy schemes.
[7] Development status as of 3rd September 2012.
[8] Turbine specifications for the Black Law Windfarm vary across the extent of the turbine layout.

Landscape Resources

6.59 The route corridor (to 100m on either side) for the proposed grid connection has been divided into six landscape resources which will be directly affected by the OHL, underground cable route and associated construction activities. Each localised landscape resource area comprises a number of elements, features or components which together constitute the landscape resource. The identified landscape resources are listed below:

A. Black Law - Central Scotland Forest;
B. Black Law Windfarm to Springfield Reservoir;
C. Springfield Reservoir to the A721 Road;
D. A721 Road to West Coast Mainline Railway;
E. West Coast Mainline Railway to the A73 Road;
F. A73 Road to Linnmill Substation Extension.

6.60 These were identified through field survey, use of aerial photography and 1:10,000 OS mapping, shown on **Figure 6.3** and **Figure 6.4** and are described in more detail below.

A. Black Law - Central Scotland Forest

6.61 This area of coniferous forestry covers previous open cast coal workings which once covered the area of the existing Black Law Windfarm and the site of the consented Black Law Windfarm Extension. Coniferous forest stands of varying ages (up to approximately 20m in height) are dissected by access tracks for forestry operations and the existing Black Law Windfarm. Mineral workings and open cast mining is evident with the presence of spoil tips located within the forestry. Areas of recently planted mixed woodland and heath/rough grassland lie to the southern edge of the forestry, from Craig Burn to the main Black Law Windfarm access road and public viewing area. The coniferous forestry through which the route passes is due to be felled prior to construction of the Black Law Windfarm Extension and the influence of windfarm development and previous open cast workings make this land of low value. It is therefore considered to be of **low** sensitivity.

[9] There are currently no other consented or proposed grid connections works located within the cumulative assessment study area.

B. Black Law Windfarm to Springfield Reservoir

6.62 Heath moorland/rough grazing land use predominantly lies south of the Black Law Windfarm west of the B715 road, across an area of previous mine and gravel workings, recently restored to open moorland. Existing wood pole OHL infrastructure runs north-south parallel with the B715 and the turbines of Black Law Windfarm lie within similar landscape to the west and north-west. Watercourses dissect the heathland with blocks of coniferous forestry located around the higher ground of Hare Hill and Whaup Knowe, where several watercourses lead south forming the catchment of Springfield Reservoir. This large open landscape has many previous and existing man-made influences, including wood pole OHL infrastructure. It is therefore considered to be of **low** sensitivity.

C. Springfield Reservoir to the A721 Road

6.63 Springfield Reservoir, used for private angling, and publically accessible to walkers is surrounded by clusters of broadleaved trees and Scots Pine shelterbelts. The reservoir lies at the edge of the heath moorland, fed by numerous watercourses from the north and north-east and marks the transition from heath moorland to the settled farmland to the south. Semi-wetland to the east of the reservoir is used for rough grazing with medium scale silage/pasture fields enclosed by stone walls and post and wire fencing between the reservoir and the B7056 (Yieldshields Road). South of the B7056, stone wall enclosed pasture and arable fields cover the low lying land on the north and the flanks of Hill Rig, dissected by Candymill Burn and Netherton Burn, from west to east. The telecommunications masts on Hill Rig and Kilncadzow offer local foci above the rough grazing which covers these rolling hills with small blocks of coniferous forestry located below the northern flanks. Farmsteads and residential properties are scattered across the farmland close to the B7056 and A706 and existing wood pole OHL infrastructure is present in the landscape. The shallow valley east of Hill Rig consists of rough grazing, enclosed pasture and arable fields enclosed by stone walls and post and wire fences, with sporadic remnant hedgerows and deciduous shelterbelts. Due to the presence of existing man-made features and extensive agricultural practice, this landscape is considered to be of **medium** sensitivity.

D. A721 Road to West Coast Mainline Railway

6.64 South of the A721, the landscape resource comprises predominantly pasture farmland, enclosed by stone walls, post and wire fencing and sporadic deciduous boundary trees, sloping southwards towards Fullwood Burn and the coniferous forestry plantations which lie across the lower slopes. Scattered farmsteads and residential properties are often orientated southwards to take advantage of open views towards the Tinto Hills. Between the A721 and the West Coast Mainline Railway (via Carstairs), the corridor is largely free of built development, however coniferous forestry across the southern section of the corridor offers opportunities for backclothing and offers a linear edged feature to route alongside. To the west of Craigenhill Road and south of Cartland Muir Plantation, the landscape resource consists of rough gorse scrub and grassland, and enclosed pasture fields north of the railway line. The corridor passes east to west through this low sensitivity scrub, parallel to the railway line and associated OHL infrastructure. Small scale pasture fields bordering the coniferous plantation to the north are dissected by small watercourses and are enclosed by post and wire fence. Due to the large scale pasture fields and the presence of coniferous plantations and the existing OHL infrastructure of the railway line, this landscape is considered to be of **medium** sensitivity.

E. West Coast Mainline Railway to the A73 Road

6.65 This is a short section of route corridor. South of the railway line, stone wall enclosed pasture fields lie to either side of Moor Road, which leads to the small settlement of Cartland. Farmsteads and residential properties form this linear settlement. The route corridor runs south-west parallel with Brocklinn Burn towards the A73 road. Blocks of coniferous forestry lie to the north-west of Cartland, with deciduous boundary trees and shelterbelts to the west of Cartland, and along the Brocklinn Burn. Existing wood pole OHL infrastructure lies within this corridor to the west of Cartland. The pasture land is of low landscape value and is possible to reinstate. However, some landscape features, including stone walls, mature broadleaved boundary trees and shelterbelts are considered to be high sensitivity as they contribute to the overall landscape character. Therefore due to the presence of these features, the landscape resource is considered to of **medium** sensitivity.

F. A73 Road to Linnmill Substation Extension

6.66 The underground cable route follows the A73 road, from the broadleaved woodland which lines the road to the east, to Cartland Bridge which crosses the Mouse Water within an incised valley. Post and wire fence enclosed pasture fields lie to the east and west of the road between Brocklinn Bridge and Cartland Road and the broad leaved woodland of Burgh Wood lies within the Lee Castle Gardens and Designed Landscape (GDL) to the west of the road corridor. Due to the influence of the road within this section of the route, the sensitivity of the landscape resource is considered to be of low sensitivity, however the mature broadleaved woodland to either side of the road corridor is considered to be of high sensitivity.

6.67 Beyond Cartland Bridge, the underground cable route corridor follows the route of Sunnyside Road and a track running south-east before crossing enclosed pasture fields to the River Clyde. Broadleaved trees and deciduous hedgerows lie along linear field boundaries of these small scale pasture fields on the slopes overlooking the River Clyde. Existing small scale wood pole OHL infrastructure lies within this landscape resource, often backclothed against woodland and the valley slopes. The corridor passes through broadleaved woodland alongside the River Clyde before crossing the river at the existing weir near Stonebyres Falls. Residential properties and small hamlets lie along the River Clyde Valley often with views overlooking the pastoral slopes. Rough grassland and broadleaved woodland lies to the south between the river and Linnmill substation extension. Due to the nature of the development proposed for this section of the proposed grid connection (underground cable), the landscape resource area is considered to be of **low** sensitivity overall.

Landscape Character

6.68 The landscape of the study area is described and classified in *The Lothians Landscape Character Assessment* (ASH Consulting Group, 1998) and *Glasgow and the Clyde Valley Landscape Character Assessment* (Land Use Consultants, 1999). Landscape character types (LCTs) within the study area are shown on **Figure 6.3**.

6.69 The proposed grid connection will be located within five LCTs across the study area. The following LCTs are described in **Table 6.7**:

Glasgow and Clyde Valley Landscape Character Assessment: LCTs

- 4 Rolling Farmland LCT (area 4d Lanark);
- 5 Plateau Farmland LCT (area 5a Central Plateau);
- 8 Incised River Valley LCT (area 8h Mouse Water);
- 18 Plateau Moorlands LCT (area 18a Central Plateau).

The Lothians Landscape Character Assessment: LCTs

- Upland Fringes LCT (area 5 North-West Pentlands Fringe).

6.70 Neither the *Glasgow and Clyde Valley Landscape Character Assessment* nor *The Lothians Landscape Character Assessment* assigns sensitivity to particular development types, but they provide information and guidelines relating to tall structures. From the LCT descriptions, and field surveys, characteristics which may be sensitive to the proposed grid connection works have been identified, using the criteria in **Table 6.2**.

6.71 It should be noted that *The Lothians Landscape Character Assessment* and the *Glasgow and Clyde Valley Landscape Character Assessment* were published prior to the construction of the Black Law, Pates Hill, Hagshaw Hill, and Lochhead Windfarms. These windfarms are all perceptible in views from some areas of the study area, and influence landscape character.

Table 6.7: Landscape Character Types[10]

4 Rolling Farmland LCT (area 4d Lanark)	
Characteristics/ Attributes	• distinctive undulating landform created by fluvio-glacial action; • dominance of pastoral farming, varying in productivity according to elevation and exposure; • importance of woodland in structuring the landscape and providing shelter for agriculture and rural settlement.
Guidelines	*The aim should be to conserve the rural character of these areas of rolling farmland; developments should therefore generally be of a small scale, well sited so as to maximise the natural screening and integration provided by topographic and woodland variety; tall structures such as masts or aerials should generally be discouraged except where there are opportunities to provide a degree of backclothing.*
Key Strategic Aim	*Landscape planning and management should aim to conserve the distinctive agricultural character of these areas. In particular, management should aim to emphasise the role of woodland in these areas, and to limit the wider impact of mineral working activities.*
Sensitivity	*The rolling topography of this landscape may allow natural screening of some development. However, the landscape would be sensitive to schemes which break ridgelines and fail to respond to topography.* This a relatively open landscape, where linear development is likely to be visible over hillocks and undulating landform but opportunities for backclothing will exist in lower lying areas. The landscape consists of predominantly pasture farmland, enclosed by stone walls and post and wire fences, which are relatively easy to restore, however broadleaved shelterbelts and field boundary trees are considered to be of high sensitivity and difficult to restore. Small stands of woodland should be retained and scattered farmsteads and properties close to communication routes avoided where possible. The LCT forms the transition between the rural farmland fringe and the settled Clyde Valley and includes the settlement of Lanark and other small outlying settlements to the east. Existing wood pole OHL infrastructure (transmission and telecommunications) exists, and domestic and FiT wind turbines are present within this LCT. The southern part of the LCT is locally designated as part of the Middle Clyde Valley Special Landscape Area (SLA), in recognition of its scenic quality. The landscape character type is considered to have **medium** sensitivity to the development type.
5 Plateau Farmland LCT (area 5a Central Plateau)	
Characteristics/ Attributes	• extensive, gently undulating landform; • dominance of pastoral farming, but with some mosses surviving; • limited and declining tree cover; • visually prominent settlements and activities such as mineral working; • the rural character of the Plateau Farmland has suffered as tree cover has declined and the visual influence of settlements, transport infrastructure and mineral working has increased.
Guidelines	*These areas of Plateau Farmlands are already crossed by lines of electricity pylons, following routes which exploit the relatively simple topography of the area. Although they are often visible features in the open landscape, the scale of the landscape is such that they only become particularly intrusive within a limited vicinity. The landscape is most sensitive where tall structures would be viewed on the skyline, and least sensitive where higher ground (for example the Plateau Moorlands) provide an element of backclothing.* *Discourage the erection of masts or other tall structures in prominent locations particularly in areas adjacent to lower ground where the development could be visible on the skyline; favour areas where tall structures would be provided with a backcloth to reduce their visual and landscape impacts.* *However, the capacity of the landscape type to accommodate developments of low or average height (even with large footprints) could be enhanced by additional planting or reinforcement of existing woodlands or tree belts.*
Key Strategic Aim	*Planning and management should aim to restore the rural landscape character by increasing appropriate tree cover particularly in relation to non-rural landscape elements. Planning policies should aim to prevent further visual intrusions. There may be opportunities for more radical enhancement of the landscape by the creation of a more extensive woodland framework.*
Sensitivity	This landscape lies between the open plateau moorlands and the broad valley lowlands and is predominantly made up of pastoral farmland with small broadleaf woodland stands, shelterbelts and field boundary trees. Existing wood pole OHL infrastructure is present in the landscape of this LCT, within the study area of the proposed grid connection, often backclothed against the undulating topography. The route of the proposed grid connection follows the low lying areas of the LCT backclothed against undulating topography of Hill Rig and the coniferous forestry of Cartland Muir Plantation. The existing industrial/infrastructure elements of the A721 and West Coast Mainline Railway dissect the LCT in its central and southern extents. The southern part of the LCT is locally designated as part of the Middle Clyde Valley SLA, in recognition of its scenic quality. The landscape character type is considered to have **low** sensitivity to the development type.
8 Incised River Valley LCT (area 8h Mouse Water)	
Characteristics/ Attributes	• narrow, steep sided valleys cut deeply into the plateau farmlands; • rich broadleaf woodlands on steep valley sides; • agriculture where valleys are wide enough with a mixture of pastures, arable, market gardens and orchards; • series of policy landscapes, castles and other historic sites; • linear villages and winding roads; • focal role of rivers and tributaries; • rich, sheltered and settled areas, often hidden within the wider landscape.
Guidelines	*This landscape type is sensitive to the encroachment of settlements located in surrounding Plateau Farmland areas, particularly where they have expanded onto the upper valley slopes and are consequently visible from within the valley.* *The landscape is sensitive to the introduction of tall structures such as pylons and*

[10] Key sections, which are considered relevant, are quoted directly from the publication and are shown in italics. Attributes, guidelines and the key strategic aim for the LCT are also quoted from the publication and shown in italics.

	masts, either within the valley on in locations visible from within the valley. *Rivers comprise a central and formative element in these landscapes. The character of these areas would be very sensitive to any measures which resulted in the loss of natural river landscapes, or the introduction of modern, engineered structures.*
Key Strategic Aim	*Landscape planning and management should aim to conserve and enhance the distinctive combination of landform, land cover and settlement features that distinguish the Incised River Valleys within Glasgow and the Clyde Valley. Conservation and appropriate management of woodlands, together with the sensitive control of development are central to this objective.*
Sensitivity	The landscape of the LCT is considered sensitive to the introduction of tall structures including OHL infrastructure due to the presence of extensive broadleaf woodland within the Middle Clyde Valley and surrounding the Lee Castle GDL. Residential properties and a caravan park are located within the lower reaches of the valley, with views often enclosed by topography and broadleaf woodland screening. The proposed grid connection will be predominantly an underground cable within this LCT; however a short section of the wood pole OHL and the terminal pole infrastructure will be located to the east of the A73 near Brocklinn Burn, at the transition from the Plateau Farmland LCT. Part of the LCT is locally designated as part of the Middle Clyde Valley SLA, in recognition of its scenic quality, and the grounds of Lee Castle GDL and the Falls of Clyde GDL are located within this LCT. The landscape character type is considered to have **high** sensitivity to the development type.
18 Plateau Moorlands LCT (area 18a Central Plateau)	
Characteristics/ Attributes	• distinctive upland character created by the combination of elevation, exposure; • smooth, plateau landform, moorland vegetation and the predominant lack of modern development; • these areas share a sense of apparent naturalness and remoteness which contrasts with the farmed and settled lowlands.
Guidelines	*This landscape type is relatively free from other forms of built development. In places, however, housing and light industrial development threatens to encroach onto the lower fringes of the moors. The open nature of these areas means that this landscape type would be very sensitive to such development. Many villages have also experienced incremental growth.* *These moorlands already accommodate tall structures such as masts and pylons. These are often visible over a considerable distance.* *Given the open, horizontal and apparently wild character of these areas, the landscape would be sensitive to the concentration of windfarm development in this area. This would be particularly the case where cumulative impacts occurred or where the intrinsic undeveloped upland character was weakened.*
Key Strategic Aim	*Landscape planning and management should aim to conserve the upland character of the Plateau Moorlands. New developments which introduce modern elements or which would undermine the sense of 'wildness' and remoteness should generally be resisted.*
Sensitivity	This LCT has been heavily influenced by man-made features (Black Law Windfarm, OHL infrastructure) since the publication of the landscape character assessment.
	Areas of previous open cast coal workings and mineral extraction have been restored to create large areas of open moorland, with remnants of previous land use still visible. The large scale open nature of this LCT makes it of low sensitivity to small scale linear development, with opportunities to backcloth against undulations in topography and large areas of existing forestry plantations. Existing wood pole OHL infrastructure within the southern extent of the LCT is often imperceptible against the backdrop of open moorland. The landscape character type is considered to have **low** sensitivity to the development type.
2 Upland Fringes LCT (area 5 North-West Pentlands Fringe)	
Characteristics/ Attributes	• Simple, large-scale visual character; • Distinctive shelterbelts and field boundary features; • Diversity of land cover and habitat types; • High visual sensitivity of open areas; • Visual intrusion of edges and shapes of major coniferous plantations.
Guidelines	*Increase woodland cover in accordance with 'Central Scotland Forest Strategy' targets, through sensitively designed and located planting, and keeping visual balance-between openness and enclosure under regular review.* *Reinforce robustness and integrity of distinctive field boundary features: treelines, hedgerows and shelterbelts;* *Alleviate visual impact of existing large-scale coniferous plantations through re-structuring;* *Conserve diversity of open habitats on less productive ground including wetland and heather moorland;* *Proposed new road route (Fastlink) would require very careful siting and design in sensitive, open landscape.*
Key Strategic Aim	*Enhance existing robust, large-scale landscape framework, preserving delicate existing balance between openness and enclosure.*
Sensitivity	The western extent of this large scale landscape is dominated by coniferous forestry plantations and extensive mineral workings. Since publication of the landscape character assessment, man-made features have heavily influenced the landscape (Black Law and Black Law Extension Windfarms, OHL infrastructure). Further wind energy development has taken place to the east at Pates Hill and the Tormywheel Windfarm proposal has been consented. Areas of previous coal workings (open cast and deep mine) and mineral extraction are present across this LCT creating a landscape of relatively low landscape value. Small hills and coniferous forestry within the LCT offer opportunities to backcloth linear development, however the imminent construction of Black Law Windfarm Extension will lead to widespread preparatory felling of this forestry. A part of this LCT is locally designated as part of the Levenseat; South Fauldhouse Area of Special Landscape Control (ASLC), there is potential for environmental enhancement within this locally designated landscape. Despite the presence of the ASLC, this landscape character type is considered to have **low** sensitivity to the development type.

Local Landscape Character Types

6.72 The *South Lanarkshire Landscape Character Assessment* (IronsideFarrar, 2010) provides a refined and more detailed characterisation of the South Lanarkshire area in relation to recent changes in land use, including windfarm development, afforestation and open cast mining. The majority of the assessment is based upon the *Glasgow and Clyde Valley Landscape Character Assessment* (SNH, 1999) supplemented by the identification of additional LCTs and sub-types.

6.73 The following Landscape Character Types (LCTs) and sub-types are defined in the *South Lanarkshire Landscape Character Assessment* and are shown on **Figure 6.4**:

- 1 Urban Fringe Farmland (minimal visibility, not considered further);
- 2 Incised River Valley;
- 4 Rolling Farmland:
  - 4a Rolling Farmland Forestry sub-type;
- 5 Plateau Farmland:
  - 5a Plateau Farmland Forestry sub-type;
- 6 Plateau Moorland:
  - 6a Plateau Moorland Forestry sub-type;
  - 6c Plateau Moorland Windfarm sub-type;
- Urban (minimal visibility within urban area, not considered further).

6.74 The existing Linnmill substation lies within the *Rolling Farmland LCT* defined in the *South Lanarkshire Landscape Character Assessment*. The route of the proposed grid connection runs through four LCTs (and one subtype), described in **Table 6.8**.

Table 6.8: Local Landscape Character Types[11]

2 Incised River Valley LCT	
Characteristics/ Attributes	See **Table 6.7** The characteristics of this LCT have not undergone drastic change since the previous 1999 assessment. A sub-type identified (2a *Incised River Valley, Broad Valley Floor)* does not occur within the 2km study area.
Guidelines	See **Table 6.7**
Key Strategic Aim	See **Table 6.7**
Sensitivity	Part of the LCT is locally designated as part of the Middle Clyde Valley SLA, in recognition of its scenic quality, and the grounds of Lee Castle GDL and the Falls of Clyde GDL are located within this LCT. The landscape character type and relevant sub-type is considered to have **medium** sensitivity to the development type.
4 Rolling Farmland LCT and sub-type	
Characteristics/ Attributes	See **Table 6.7** The characteristics of this LCT have not undergone drastic change since the previous 1999 assessment. A sub-type has been identified: *Rolling Farmland, Forestry (4a).*
Guidelines	See **Table 6.7** *There is also a pressure for development of windfarms in the farmland areas of South Lanarkshire. Given the small to medium scale of the landscape and the number of domestic scale references such as houses and small roads, large scale wind turbines are likely to be in contrast with this landscape type and would dominate its surroundings.* *Tall structures such as masts or aerials should generally be discouraged except where there are opportunities to provide a degree of backclothing and where unacceptable cumulative impacts would not result.*
Key Strategic Aim	See **Table 6.7**
Sensitivity	Part of the LCT is locally designated as part of the Middle Clyde Valley SLA, in recognition of its scenic quality. The landscape character area and relevant sub-type is considered to have **medium** sensitivity to the development type.
5 Plateau Farmland LCT and sub-types	
Characteristics/ Attributes	See **Table 6.7** The characteristics of this LCT have not undergone drastic change since the previous 1999 assessment. Three sub-types of the LCT have been identified: *Plateau Farmland, Forestry (5a), Plateau Farmland, Opencast Mining (5b), Plateau Farmland, Windfarm (5c*), reflecting local land use or development. Sub-type 5a is present within the 2km study area, but not sub-types 5b and 5c.
Guidelines	See **Table 6.7** *Areas of Plateau Farmlands are already crossed by lines of electricity pylons, following routes which exploit the relatively simple topography of the area. Although they are often visible features in the open landscape, the scale of the landscape is such that they only become particularly intrusive within a limited vicinity. The landscape is most sensitive where tall structures would be viewed on the skyline, and least sensitive where higher ground (for example the Plateau Moorlands) provides an element of backclothing.*
Key Strategic Aim	See **Table 6.7**
Sensitivity	The southern part of the LCT is locally designated as part of the Middle Clyde Valley SLA, in recognition of its scenic quality. The landscape character type and relevant sub-type is considered to have **low** sensitivity to the development type.
6 Plateau Moorland LCT and sub-types	
Characteristics/ Attributes	See **Table 6.7** The characteristics of this LCT have not undergone drastic change since the previous 1999 assessment. Four sub-types of the LCT have been identified: *Plateau Moorland, Forestry (6a), Plateau Moorland, Forestry/Windfarm (6b), Plateau Moorland, Windfarm (6c)* and *Plateau Moorland, Opencast Mining (6d),*

[11] Key sections of the character description quoted directly from the publication are shown in italics. Attributes, guidelines and the key strategic aim for the LCT are also quoted from the publication and shown in italics. Where descriptions, characteristics and guidelines are unchanged from the 1999 assessment, the table should be read in conjunction with

Table 6.7**.**

	reflecting local land use or development. Sub-types 6a and 6c are present within the 2km study area, sub-types 6b and 6d are not present. Increasingly these areas are subject to significant landscape change resulting from extensive large scale windfarm development and associated reduction in area of commercial forestry.
Guidelines	See **Table 6.7** *Further scope of wind energy development in this landscape type is limited; further developments should be very carefully sited so as to avoid significant expansion of the visual and landscape impacts, including cumulative impacts in areas already supporting extensive windfarm development;* *The spread of turbines towards or across the boundary with Plateau Farmlands should be avoided so as to avoid cumulative impacts and blurring of the two landscape types.*
Key Strategic Aim	*Within the context of windfarm development, landscape planning and management should aim to conserve the upland character and vegetation of the Plateau Moorlands. New Developments in addition to the existing windfarms, which introduce modern elements or which would further undermine the simple, exposed upland character or extend impacts into neighbouring landscape, should generally be resisted.*
Sensitivity	The landscape character type and relevant sub-type is considered to have **low** sensitivity to the development type.

Designated Landscapes

6.75 There are no nationally designated landscapes located within the study area; however, two locally designated landscapes lie within the study area. These designations are listed below and shown on **Figure 6.5**.

- ***Middle Clyde Valley Special Landscape Area***: Following revisions to local landscape designations within South Lanarkshire, this replaces the former Clyde Valley Area of Great Landscape Value. Described in **Table 6.9**;
- ***Levenseat, South Fauldhouse Area of Special Landscape Control (ASLC)***: This designation covers only a very small part of the study area and visibility of the proposed grid connection from this area is considered unlikely due to the presence of intervening topography and coniferous forestry. Impacts upon this designated landscape have therefore been scoped out this assessment.

Table 6.9: Local Landscape Designation

Local Landscape Designation	Middle Clyde Valley SLA[12]
Description	*The middle section of the Clyde Valley and associated tributaries is located in South Lanarkshire between the towns of Hamilton in the north and Lanark in the south.* *The Clyde Valley and associated tributaries have long been recognised as a significant landscape in terms of its scenic, cultural and historic qualities. This has included an AGLV designation. The New Lanark World Heritage site and dramatic Falls of Clyde are set within this landscape. The settlement pattern of linear villages along the valley connected with windy roads, policy landscapes, woodland, castles, rich agriculture and agricultural heritage, including distinctive orchards, is perhaps unique in a Scottish context and is a very popular visitor destination.* *Opportunities to experience the landscape are considerable with a number of well-established visitor destinations including New Lanark, the Falls of Clyde and Chatelherault Country Park. The long distance Clyde Walkway and footpaths along the Avon water associated with Chatelherault and Hamilton High Parks designed landscape, in particular provide a significant and popular recreational resource which is continuing to be developed and improved.* *The boundary follows the line of the AGLV boundary as defined in 1998.* There are several issues and opportunities for change identified within the report: • Continue to develop Clyde Walkway as a contiguous long distance route; • Encourage replanting of shelterbelts, field boundaries and hedges with native tree and shrub species; • Protect and enhance historic landscapes, encouraging low-key sustainable tourism; • Reduce potential of visual encroachment of housing and commercial developments.
Sensitivity	The sensitivity of this local landscape designation is considered to be **medium** because of its scenic qualities which are vulnerable to some extent to change from this type of development, and the designation is of local importance.

Visual Baseline

6.76 Visual impacts were assessed using views from static locations (represented by viewpoints) and consideration was also given to the visual experience from settlements, and when travelling through the area via communication routes (sequential views from roads, railways, cycle routes and long distance footpaths).

Visual Receptors

6.77 Likely viewers or visual receptors of the proposed grid connection include:

- residents living in settlements or individual residences near to the proposed grid connection;
- recreational users of the landscape, including those using cycle routes and footpaths;
- travellers (workers, visitors or local people) using transport (road and rail) routes passing through the study area.

Zone of Theoretical Visibility

6.78 A ZTV was generated for the OHL section of the proposed grid connection to illustrate where visibility of the over ground infrastructure will be theoretically possible. This ZTV does not consider theoretical visibility of the underground cable section of the proposed grid connection, as it is considered that visibility will be limited to areas within close proximity of the route during construction, and visibility of this section of the proposed grid connection will be imperceptible once operational.

6.79 The ZTV of the OHL in **Figure 6.6** was calculated to show the number of wood poles theoretically visible across the study area[13]. The ZTV indicates that theoretical visibility of the proposed OHL will be widespread across the study area. The ZTV is generated based on a 'bare ground' digital terrain model, which does not take account of screening or filtering by vegetation and localised variations in topography. It therefore illustrates a maximum visibility scenario, which will be reduced in the field by natural screening and other man-made elements. It should also be noted that theoretical visibility does not equate to a significant impact on views.

6.80 Due to the relatively small vertical scale of the proposed infrastructure, visibility will be limited to sections of the OHL, with only a proportion of the 128 poles visible from any given location within the study area. The height of each of the 128 individual wood poles and terminal pole infrastructure of the proposed OHL infrastructure was used to calculate the ZTV, with wood poles ranging from 10m to 18m high above ground.

[12] Descriptions in italics referenced from: *South Lanarkshire Validating Local Landscape Designations*. IronsideFarrar, November 2010.

[13] The ZTV was calculated to a distance of 5km from the proposed grid connection to provide an indication of visibility across the study area and beyond.

6.81 The ZTV has been overlaid on a greyscale 1:50,000 Ordnance Survey map in accordance with page 34, Para. 61 of *Visual Representation of Windfarms: Good Practice Guidance* (SNH, 2006).

6.82 Due to the nature of the infrastructure proposed it is considered that visibility will be largely imperceptible beyond 2km. The ZTV indicates that theoretical visibility of wood poles will generally be limited to less than 50 wood poles from any individual location, however some elevated locations may experience theoretical visibility of up to 80 poles.

Representative Viewpoints

6.83 Fieldwork revealed that the character of views varies along the length of the study area, in response to changing landscape character. Nine viewpoints were selected, based on criteria set out in the methodology, and agreed with North Lanarkshire, South Lanarkshire and West Lothian Councils and SNH. Viewpoints were selected to represent the nearest views from public places and key recreational areas/paths. Viewpoints were chosen to reflect locations at varying distances and directions from the proposed OHL, and to cover a representative sample of landscape types/character areas along the route.

6.84 Across the study area, the presence of hedgerows, trees, woodland and forestry often means that views of construction activities will be restricted, particularly during summer when deciduous vegetation is in leaf. The viewpoints selected therefore concentrate on the nearest settlements to the proposed grid connection, notable recreational interests close to the route, and viewpoints with high numbers of receptors (e.g. main communication routes).

6.85 Settlements and routes with theoretical visibility of the proposed grid connection were also assessed based on the indicated visibility shown by the ZTV and informed by observations made during fieldwork.

6.86 The viewpoints are listed in **Table 6.10**, with a summary of the reasons for their selection, descriptions and sensitivity. The locations of the viewpoints are shown in **Figure 6.6**. Visualisations for the viewpoints are provided in **Figures 6.8** to **6.16**.

Table 6.10: Representative Viewpoints

VP No.	Viewpoint Location	Grid Reference	Elevation (m AOD)	Approx. Distance to OHL (m)	Viewpoint Description	Viewpoint Sensitivity
1	B715 near Climpy	NS 93158 54893	310m	840m	Viewpoint located in elevated location alongside B715 looking west, south-west towards the OHL. Representative of views experienced from residential properties at Climpy adjacent to the B715. Potential view of the OHL in the foreground of the view towards the operational turbines of Black Law Windfarm.	This viewpoint represents the views of a number of residential receptors and views of passing road users. Open views across plateau moorland to the west are interrupted by the presence of wind turbines. Therefore, the sensitivity of this viewpoint is considered to be **medium**.
2	Springfield Reservoir	NS 90688 52024	244m	400m	Viewpoint located alongside the southern retaining wall of Springfield Reservoir with potential views south towards the OHL. Representative of views experienced by recreational users (walkers and anglers) of Springfield Reservoir, and similar views from residential properties located to the west.	The viewpoint represents the views of recreational users and offers some scenic views across Springfield Reservoir, although the turbines of Black Law Windfarm are visible in the view. Therefore, the sensitivity of this viewpoint is considered to be **medium**.
3	B7056 at Netherton Burn	NS 91469 50844	237m	490m	Viewpoint located on the B7056 close to the OHL. Representative of views by road users travelling north-west and south-east on the B7056, and representative of views experienced from nearby residential properties and farmsteads around Westertown. Potential views of the OHL to the west, north-west of residential properties.	The viewpoint represents the views of residential receptors and road users, with views across the adjacent farmland interrupted by the presence of existing man-made features, such as OHL infrastructure and agricultural buildings. The sensitivity of this viewpoint is therefore considered to be **medium**.
4	A706 near Muirfoot	NS 91686 49055	244m	820m	Viewpoint represents views experienced by road users travelling north and south on the A706, and is representative of views experienced from residential properties and farmsteads at Newmains, Muirfoot, Tamarind House and Silverbirch, located along the A706 to the east of the OHL.	Representing views of nearby residential properties and road users, with views available across the pastoral farmland. The turbines of Black Law Windfarm are visible on the skyline to the north-west. The sensitivity of this viewpoint is considered to be **medium**.
5	A721 near Muirhead	NS 90465 48065	290m	430m	Viewpoint located on the A721 road to the west of Muirhead farm. Representative of views experienced by motorists travelling on the A721, with potential views of the OHL as it crosses the A721.	The viewpoint represents the views of road users on this busy A-road, where man-made features including OHL infrastructure are present in existing views. Therefore, sensitivity of this viewpoint is considered to be **low**.
6	Minor Road, near Collielaw Cottage	NS 89870 47744	273m	220m	Viewpoint located on minor road to the south of Hole. Representative of views experienced by road users travelling north and south on the minor road, and is representative of views experienced from nearby residential properties and farmsteads at Hole and Cairn-view. Potential view of the OHL as it crosses agricultural land towards Fullwood Burn.	Viewpoint represents views of both nearby residential receptors and road users, with few man-made features evident in views west across the Fullwood basin, offering some scenic views across the SLA. The sensitivity of this viewpoint is considered to be **medium**.

VP No.	Viewpoint Location	Grid Reference	Elevation (m AOD)	Approx. Distance to OHL (m)	Viewpoint Description	Viewpoint Sensitivity
7	A721 near Kilncadzow	NS 88609 48651	271m	1200m	The viewpoint represents views experienced by road users travelling east on the A721 and is representative of views experienced from residential properties located on the eastern and south-eastern edge of the settlement of Kilncadzow. Viewpoint requested by SNH during consultation.	A view with some scenic value, with the Tinto Hills visible in the distance to the south. Representing residential receptors and road users, with few overt man-made elements evident in the view. The sensitivity of this viewpoint is therefore considered to be **medium**.
8	Craigenhill Road, north of Railway line	NS 86759 46338	243m	100m	Located on road between Kilncadzow and Fullwood/railway bridge. The viewpoint represents views experienced by road users travelling south along Craigenhill Road.	A view of low scenic value, representing road users and with existing overt man-made elements, including OHL infrastructure and the railway line visible in the available view. The sensitivity of this viewpoint is therefore considered to be **low**.
9	Cartland, south of Greentowers Farm	NS 87736 47064	230m	290m	Representative of views from residential properties on the western edge of Cartland and New Greentowers Farm, and road users travelling north and south along Moor Road.	Representing views from residential receptors and road users, where overt man-made elements are already evident in the view, but some scenic value across pastoral farmland exists. The sensitivity of this viewpoint is therefore considered to be **medium**.

Settlements

6.87 Potential visual impacts upon the following settlements d have been considered in the assessment given their theoretical visibility of the proposed grid connection:

- Climpy;
- Forth;
- Kilncadzow;
- Cartland;
- Kirkfieldbank (beyond study area for OHL, no operational impacts of underground cable);
- Linnville (no operational impacts of underground cable).

6.88 For each settlement, the relevant landscape character type and landscape designation (where applicable) is identified and considered alongside the assessment of visual impacts. All settlements are considered to be of **high** sensitivity as they represent the views experienced by receptors from residential properties.

Routes

6.89 Potential visual impacts upon sequential views from the following have been considered in the assessment given their theoretical visibility of the proposed grid connection. Their locations are shown in **Figure 6.6**.

- A706;
- A721;
- A73;
- A72;
- A71;
- B7056;
- B715;
- Minor roads;
- West Coast Mainline Railway Line;
- The Clyde Walkway;
- Public Rights of Way (PRoW)[14] - SL21, SL26 & SL154[15].

[14] Impacts upon views from these routes are considered in this assessment and impacts upon recreational users are considered in **Chapter 13: Land Use.**
[15] SL154 follows the route of the Clyde Walkway which is considered separately in the assessment.

6.90 For each route, the corresponding landscape character type and landscape designation (where applicable) is identified and considered along with its potential receptors and usage before reaching a consideration regarding sensitivity. Generally, views from road and rail routes are deemed to be of **low** sensitivity, as receptors will often be travelling at high speed and the main focus will be that of the route ahead. Views from minor roads to settlements and residential properties are deemed to be of higher sensitivity as they are often frequented by local residents, and views from long distance footpaths and cycle routes are often deemed to be of **high** sensitivity as they are often designated due to the scenic views possible from the route.

The 'Do Nothing' Scenario

6.91 In the absence of the proposed grid connection, the landscape is likely to be influenced by a number of 'forces for change'. Commercial windfarm development is likely to continue within the study area. The emergence of domestic and Feed in Tariff (FiT) wind turbines is prevalent across the study area, with turbines of varying heights and rotor diameters being constructed within agricultural fields as farmers diversify income and seek opportunities to generate energy for domestic and commercial use. There is a long history of open cast coal extraction within the study area, however commercial coal extraction is unlikely to occur again within the study area, following the exhaustion of much of the existing resources; however, ground restoration of former coal extraction areas may be undertaken, to create areas of agricultural land, commercial forestry and opportunities for new built development. Agriculture within the study area, including land management practices, pastoral grazing and minor arable farming, is likely to remain an important land use, but may experience pressures from urban expansion on urban fringes of settlements. It is also anticipated that commercial forestry activities will continue, predominantly within the central and northern areas of the study area, with localised changes as a consequence of rotational felling and replanting.

Routeing and Design Considerations

6.92 The design of the OHL route is described in **Chapter 3**.

6.93 The final route of the proposed grid connection was designed to prevent, reduce, and where possible offset potential significant landscape and visual impacts. The approach adopted throughout the design of the route ensured that adjustments and alterations could be made in response to constraints and opportunities identified during the EIA, ensuring a considered and tailored 'fit' within the landscape where possible.

6.94 The following design considerations influenced the design of the route for the proposed grid connection to minimise landscape and visual impacts:

- reduce visual impacts from a number of locations and sensitive receptors;
- maximise opportunity for backclothing against forestry, woodland and topography;
- minimise the requirement to fell trees and woodland.

Sources of Potential Impacts

6.95 The OHL, underground cable and substation extension comprise works which, when operational, shall be both above ground and underground. Potential impacts arising from the OHL section of the route and substation extension will be from construction and operation. It is anticipated that potential impacts arising from the underground cable section of the route will be from construction only.

OHL

6.96 The construction phase of the OHL route includes a number of construction activities which are outlined in more detail in **Chapter 4**, however those activities which may result in potential landscape and visual impacts are outlined below:

- preparation of accesses and construction compounds;
- excavation of foundations;
- delivery of poles;
- erection of poles;
- undergrounding/deviation of lower voltage lines where necessary for safety clearances;
- delivery of conductor drums and stringing equipment;
- insulators and conductor erection and tensioning;
- clearance and reinstatement.

Underground Cable

6.97 The construction of the underground cable includes a number of activities which are discussed in more detail in **Chapter 4**; however, those activities which may result in potential landscape and visual impacts are outlined below:

- excavation of cable trench and installation of cable ducts;
- storage of excavated material and topsoil (separately for reinstatement);
- delivery of underground cable sections;
- installation of cable, use of cable pulling winch at each cable joint bay;
- clearance and reinstatement.

Linnmill Substation

6.98 The construction of the extension of the HV compound at Linnmill substation includes a number of activities which are discussed in more detail in **Chapter 4**; however, those activities which may result in potential landscape and visual impacts are outlined below:

- construction of hardstanding area for HV compound extension (approximately 23 x 20m);
- erection of HV compound security fencing;
- erection of switchgear infrastructure;
- installation of conductors (wires) from tower YR23

Impact Assessment

6.99 The assessment of landscape and visual impacts is based upon the development description outlined in **Chapter 4** and is structured as follows:

- construction and operational impacts on the landscape;
- construction and operational impacts on visual amenity;
- cumulative construction and operational impacts.

Impacts on the Landscape

Direct Impacts on Landscape Resources

6.100 Impacts upon each landscape resource are considered to be direct impacts within 100m radius from the proposed grid connection in all directions. Direct impacts upon landscape resources within the study area, during operation and construction, are described below in **Table 6.11**.

Table 6.11: Impacts on Landscape Resources

A Black Law - Central Scotland Forest	
Plateau Moorlands LCT and *Uplands Fringe LCT* This landscape resource is considered to be of **low** sensitivity.	
Assessment of Impacts – Construction: This localised landscape resource will experience substantial change during the construction of the Black Law Windfarm Extension, including the felling of all coniferous forestry between the onsite substation and the Black Law Windfarm access track. Changes to the landscape resource as a result of the proposed OHL works will be limited to temporary ground disturbance from construction vehicles and the temporary removal of post and wire fencing which runs along the northern edge of the access track, which will be restored following construction. Young mixed woodland planting within this resource will be removed during construction; however this could be easily reinstated over a short time period. The landscape resource will experience a low magnitude of change, resulting in direct short-term impacts of **minor** significance.	*Assessment of Impacts - Operation:* The proposed grid connection will pass alongside the existing turbines of Black Law Windfarm and the proposed turbines of Black Law Windfarm Extension. The proposed wood pole infrastructure will cross the area of felled forestry and the rough moorland to the west of the B715; avoiding the stands of deciduous and coniferous trees located around the Black Law Windfarm visitor car park and access track. Although the proposed OHL will introduce new infrastructure to the resource, it will appear in the context of the neighbouring Black Law Windfarm and Extension turbines. The landscape resource will experience a low magnitude of change, resulting in direct long-term impacts of **minor** significance.
B Black Law Windfarm to Springfield Reservoir	
Plateau Moorlands LCT VP1 and VP2 This landscape resource is considered to be of **low** sensitivity.	
Assessment of Impacts – Construction: Construction access will be required within this landscape resource, along the route of the proposed OHL and will lead to ground disturbance from construction vehicles. Due to the large scale nature of the resource and surrounding landscape, loss of landscape features will be minimal; however a small strip of existing mixed broadleaf woodland (young birch and conifers) to the east of the Birniehall farmstead will be removed to create the 25m wayleave (see **Figure 13.3**). This woodland is considered to be of low sensitivity and the impact will be minor and localised. The landscape resource will experience a low magnitude of change, resulting in direct short-term impacts of **minor** significance.	*Assessment of Impacts - Operation:* Long term impacts upon the landscape resource will occur as a result of the presence of the proposed OHL; however this change will be small and limited to a localised area where the wood pole infrastructure is present across the landscape. Due to the large scale of the moorland landscape, the lack of distinguishable landscape features and the presence of existing OHL infrastructure and wind turbines, the OHL will not substantially alter the landscape resource. The landscape resource will experience a low magnitude of change, resulting in direct long-term impacts of **minor** significance.

C Springfield Reservoir to the A721 Road	
Plateau Moorlands LCT and *Rolling Farmland LCT* VP2, VP3, VP4 and VP5 This landscape resource is considered to be of **low** sensitivity.	
Assessment of Impacts – Construction: Construction activities will directly impact the landscape resource along the route of the OHL, with ground disturbance from construction vehicles likely to result in short term impacts which will be reversible. Post and wire fencing and dry stone walls disturbed to create access points will be restored and will result in short term small changes to the landscape resource. The disturbance of pastoral farmland will be reversible, with no loss of hedgerows, field boundary trees or woodland required. The landscape resource will experience a low magnitude of change, resulting in direct short-term impacts of **minor** significance.	*Assessment of Impacts - Operation:* The proposed OHL will cross this landscape resource which consists of predominantly enclosed pastoral farmland, where wood pole OHL infrastructure is already a feature of the landscape resource and the wider surrounding landscape, along with a number of domestic/FiT scheme turbines which lie within close proximity to the proposed OHL. A number of coniferous shelterbelts and linear deciduous shelterbelts lie within the landscape resource; however these will not be affected. As any impacts upon landscape features will be reversible, it is considered that the landscape resource will experience a low magnitude of change, resulting in direct long-term impacts of **minor** significance.
D A721 Road to West Coast Mainline Railway	
Rolling Farmland LCT and *Plateau Farmland LCT* VP6, VP7 and VP8 Middle Clyde Valley SLA This landscape resource is considered to be of **medium** sensitivity.	
Assessment of Impacts – Construction: Construction impacts will be limited to ground disturbance of pastoral farmland and areas of scrub/rough grazing which will be reinstated. Areas of coniferous forestry will be felled to accommodate the wayleave, with additional felling required to ensure a windfirm edge is maintained (see **Figure 13.3**). Temporary disturbance to post and wire fencing and stone wall field boundaries will occur to create access points within the landscape resource, however these will be reinstated following completion of the works. The landscape resource will experience a medium magnitude of change, resulting in direct short-term impacts of **moderate** significance.	*Assessment of Impacts - Operation:* The operational OHL will have a direct impact upon the landscape resource, as the introduction of the wood pole infrastructure will introduce a new feature to the existing landscape, which is for much of its length currently unaffected by OHL development. The loss of forestry is not considered to be detrimental to the landscape resource, as felling of this mature coniferous forestry will be due to occur in the coming years. The loss of landscape features is largely reversible and the introduction of the OHL it is considered that the landscape resource will experience a low magnitude of change, resulting in direct long-term impacts of **minor** significance.
E West Coast Mainline Railway to the A73 Road	
Plateau Farmlands LCT and *Incised River Valley LCT* VP9 Middle Clyde Valley SLA This landscape resource is considered to be of **low** sensitivity.	
Assessment of Impacts – Construction: Construction impacts upon this landscape resource will lead to the temporary removal of some post and wire fences and dry stone wall field boundaries, as well as direct disturbance of pastoral farmland along the route of the OHL. The line also passes through a linear row of deciduous field boundary trees directly north-west of Cartland, where a small number of deciduous trees will be removed to accommodate the wayleave. The loss of broadleaf trees and other works will create a medium magnitude of change, resulting in direct short-term impacts of **moderate** significance.	*Assessment of Impacts - Operation:* Once operational the direct impacts upon the landscape resource will result from the presence of the wood pole infrastructure within the enclosed pastoral farmland through which it passes. The loss of deciduous field boundary trees during the construction phase will be irreversible, as the wayleave will be required throughout the operational phase of the OHL; therefore these landscape features will be lost as a result of the proposed grid connection. The terminal pole will be located within this landscape resource where the OHL terminates and the underground cable route begins. As a result of the direct impacts upon and localised loss of landscape features which contribute to the surrounding landscape character, it is considered that this small landscape resource will experience a low magnitude of change, resulting in direct long-term impacts of **minor** significance.
F A73 Road to Linnmill Substation Extension	
Incised River Valley LCT and *Plateau Farmland LCT* Middle Clyde Valley SLA This landscape resource is considered to be of **low** sensitivity.	
Assessment of Impacts – Construction: Direct construction impacts upon the landscape resource as a result of the underground cable will be experienced along the length of the cable route. Direct impacts upon the pastoral farmland, as a result of the underground cable route, will be reversible; however the loss of a small number of deciduous trees along the existing access track to the OHL termination point may be unavoidable (working area required is 5 to 6m, Wayleave requirement up to 10m wide). Approximately 2km of the cable route is located beneath the A73, Sunnyside Road and the B7018. Temporary disturbance to post and wire fencing, dry stone walls and deciduous hedgerow field boundaries will be experienced during the open trench installation of the cable across the enclosed pastoral farmland between Sunnyside Road and Stonebyres Falls. The cable will then follow the route of the B7018 between the A72 and the Linnmill substation extension where the cable will be installed beneath the road resulting in no loss of landscape resource. Direct construction impacts upon the landscape resource as a result of the proposed substation extension works will be experienced within close proximity to the existing Linnmill substation during the extension of the HV compound and installation of switchgear and conductors. The landscape resource will experience a low magnitude of change, resulting in direct short-term impacts of **minor** significance.	*Assessment of Impacts - Operation:* Once operational direct impacts upon the landscape resource resulting from the underground cable route will be imperceptible, however operational impacts arising from the proposed substation works will result in direct impacts upon the area surrounding the existing Linnmill substation. The proposed substation extension will occupy a small area of rough grazing which surrounds the existing substation within existing SPT operational land and will result in a no loss of the landscape resource. Overall the landscape resource will experience an imperceptible magnitude of change, resulting in direct short-term impacts of **negligible** significance.

Direct and Indirect Impacts on Landscape Character

6.101 Direct and indirect impacts upon landscape character types and sub-types are described below in **Table 6.12**. Where variations in the direct and indirect impacts are predicted locally (within 500m of the proposed grid connection) and for the LCT as a whole, they are defined accordingly in the assessment.

Table 6.12: Impacts on Landscape Character Types

Glasgow and Clyde Valley Landscape Character Assessment	
4 Rolling Farmland LCT (area 4d Lanark)	
Contains part of the proposed grid connection. VP5 and VP6 The landscape character type is considered to have **medium** sensitivity to the proposed grid connection.	
Extent of LCT within study area: This LCT covers part of the study area to the north of Lanark and east of the A706 south-east of Forth. A short section of the proposed OHL passes through this LCT, where the route crosses the A721 close to Hole and the unnamed minor road to the south. Elsewhere the LCT lies on the periphery of the study area flanked by the more widespread Plateau Farmland LCT.	
Assessment of Impacts – Construction: Construction impacts upon this LCT shall be limited to the short section of the OHL, north and south, south-west of the A720. The removal of drystone walls and post and wire fences to allow construction vehicle access shall be required in three locations alongside the A720, and temporary access tracks will cross the pasture farmland. Construction vehicles, machinery and partially constructed infrastructure will add additional man-made elements to the LCT. The LCT will experience an imperceptible magnitude of change, resulting in short-term impacts of **negligible** significance.	*Assessment of Impacts - Operation:* Once operational, the OHL shall dissect this LCT and introduce further wood pole OHL infrastructure to the LCT as a whole. The defining characteristics of the LCT will not be affected by the OHL, with the pastoral farmland enclosed by drystone walls and post and wire fences restored following construction and a 25m wayleave maintained from the linear shelterbelt of deciduous trees north of the A720. The LCT will experience an imperceptible magnitude of change, resulting in long-term impacts of **negligible** significance.
5 Plateau Farmland LCT (area 5a Central Plateau)	
Contains part of the proposed grid connection. VP2, VP3, VP4, VP7, VP8 and VP9 The landscape character type is considered to have **low** sensitivity to the proposed grid connection.	
Extent of LCT within study area: The central section of the study area between Springfield Reservoir and Cartland is covered by this LCT, defined by predominantly pastoral farmland with stone wall and post and wire fence field boundaries, with deciduous linear shelterbelts trees, with areas of coniferous forestry present to the south. A large proportion of the proposed OHL route lies within this LCT.	
Assessment of Impacts – Construction: Construction activity along a large proportion of the OHL route shall introduce additional man-made features to the LCT throughout the construction period. The temporary removal of pastoral farmland boundaries (drystone walls and post and wire fencing) and presence of access tracks will be perceptible across the LCT local to the OHL. A short section of the underground cable route and the proposed substation works lie within this LCT and will result in direct impacts during the construction period, resulting from the extension of the existing HV compound and installation of the necessary switchgear and conductors. The LCT will experience an imperceptible magnitude of change, resulting in short-term impacts of **negligible** significance.	*Assessment of Impacts - Operation:* The important characteristics of the LCT will not be diminished by the presence of the operational OHL appearing alongside the existing wood pole OHL infrastructure and other man-made elements which are located across the pastoral farmland. No removal of tree cover will be required to maintain a 25m wayleave along its route. Due to the relative small vertical scale of the OHL, it is considered that the OHL will not detract from the open nature of the gently undulating landform found within this LCT as the OHL will rarely be viewed on sensitive skylines and will be backclothed for much of its route against the surrounding landscape. A number of small areas of coniferous forestry will be removed in order to maintain an appropriate wayleave from the OHL, including mitigation felling to ensure a windfirm edge is maintained.
	Direct impacts upon a small area of the LCT which surrounds the existing Linnmill substation, will arise during the operation of the proposed substation works, however these will be limited to the loss of a small area of rough grazing land adjacent to the existing substation, as a result of the extension to the existing HV compound. The LCT will experience an imperceptible magnitude of change, resulting in long-term impacts of **negligible** significance.
8 Incised River Valley LCT (area 8h Mouse Water)	
Contains part of the proposed grid connection. The landscape character type is considered to have **medium** sensitivity to the proposed grid connection.	
Extent of LCT within study area: This LCT occurs within the southern extent of the study area and defines the landscape of the River Clyde Valley, with heavily wooded valley slopes along the river corridor and scattered settlement and enclosed pastoral farmland found on less steep ground of the valley. The route of the underground cable predominantly lies within this LCT, along with a short section of the OHL and the terminal pole location.	
Assessment of Impacts – Construction: Construction of the underground cable route, a short section of the OHL route and the terminal pole will be perceptible within this LCT, with the temporary removal of drystone walls, deciduous hedgerows and post and wire fences required to allow access along the cable route. Excavation of the underground cable trench will be perceptible locally across the pastoral farmland within the Middle Clyde Valley. The temporary presence of construction vehicles and machinery along the route of the cable route will introduce additional man-made features to this pastoral landscape. The LCT will experience a low magnitude of change locally and an imperceptible magnitude of change for the LCT as a whole, resulting in direct short-term impacts of **minor** significance locally and indirect short-term impacts of **negligible** significance for the LCT as a whole.	*Assessment of Impacts - Operation:* Once operational and following the restoration of pastoral farmland and field boundaries the underground cable route will be largely imperceptible within this LCT. The 10m wayleave of young deciduous woodland along the northern edge of the A73 will be maintained throughout the lifespan of the proposed grid connection. The presence of the terminal pole and OHL to the north of the A73 will not affect the key characteristics of the LCT, located within close proximity to existing OHL infrastructure in the landscape. The LCT will experience an imperceptible magnitude of change, resulting in long-term impacts of **negligible** significance.
18 Plateau Moorlands LCT (area 18a Central Plateau)	
Contains part of the proposed grid connection. VP1 The landscape character type is considered to have **low** sensitivity to the proposed grid connection.	
Extent of LCT within study area: This LCT occurs within the northern extents of the study area between the Black Law Windfarm Extension substation and Springfield Reservoir, consisting of predominantly open moorland, with blocks of coniferous forestry and accommodates both the Black Law Windfarm Extension substation and a large proportion of the proposed OHL route.	
Assessment of Impacts – Construction: Construction activity along the route of the OHL will introduce construction vehicles and machinery within this LCT, along with temporary access tracks and access points which will extend man-made features, albeit temporarily across the open moorland landscape.	*Assessment of Impacts - Operation:* Although the key characteristics of the LCT are of remoteness and naturalness, the presence of Black Law Windfarm and the existing wood pole and steel tower OHLs reduce the sensitivity of this LCT to man-made features and the presence of the proposed OHL will be largely imperceptible across the open moorland landscape, with the turbines of

The LCT will experience an imperceptible magnitude of change, resulting in short-term impacts of **negligible** significance.	Black Law Windfarm, the steel tower OHLs and coniferous forestry forming the defining features of the LCT. A small area of young mixed woodland will be removed to maintain an appropriate wayleave from the OHL. The LCT will experience an imperceptible magnitude of change, resulting in long-term impacts of **negligible** significance.
The Lothians Landscape Character Assessment	
2 Upland Fringes LCT (area 5 North-West Pentlands Fringe)	
Contains part of the proposed grid connection The landscape character type is considered to have **low** sensitivity to the proposed grid connection.	
Extent of LCT within study area: This LCT occurs within the northern extent of the study area and covers a large proportion of the existing Black Law Windfarm and Black Law Windfarm Extension. The LCT is predominantly defined by coniferous forestry, which will be felled prior to construction of the consented Black Law Windfarm Extension.	
Assessment of Impacts – Construction: Construction of the Black Law Windfarm Extension will be preceded by the felling of the coniferous forestry which covers much of this LCT to the west and east of the B715. Construction of the OHL will appear secondary alongside the construction of the Black Law Windfarm Extension, with the presence of construction vehicles and machinery commonplace within the LCT. The LCT will experience an imperceptible magnitude of change, resulting in short-term impacts of **negligible** significance.	*Assessment of Impacts - Operation:* The key local characteristics of this LCT have been diminished through the presence of Black Law Windfarm and other windfarm developments within the LCT as a whole. The operational OHL will dissect the western extent of the LCT, between the turbines of the existing Black Law Windfarm and the consented Phase 1 extension, and although the removal of the existing forestry cover will increase visibility of the proposed grid connection, it will appear alongside the windfarm as a relatively small feature within the landscape. The LCT will experience an imperceptible magnitude of change, resulting in long-term impacts of **negligible** significance.
South Lanarkshire Landscape Character Assessment	
1 Urban Fringe Farmland LCT	
1,900m from the proposed grid connection at its closest point. The landscape character type is considered to have **low** sensitivity to the proposed grid connection.	
Extent of LCT within study area: This LCT occurs within a small area of the study area, around the settlement of Bradwood, north-west of Lee Castle and is dissected by the A73. The LCT is unlikely to experience impacts as a result of the proposed grid connection.	
Assessment of Impacts – Construction: No construction impacts are predicted upon this LCT due to the distance of the LCT from the proposed grid connection, and the presence of intervening built form and woodland cover. The LCT will experience an imperceptible magnitude of change, resulting in short-term impacts of **negligible** significance.	*Assessment of Impacts - Operation:* No operational impacts are predicted upon this LCT due to the distance of from the proposed grid connection and the presence of intervening built form and woodland cover. The LCT will experience an imperceptible magnitude of change, resulting in long-term impacts of **negligible** significance.
4a Rolling Farmland, Forestry LCT sub-type	
200m from the proposed grid connection The landscape character type is considered to have **low** sensitivity to the proposed grid connection.	
Extent of LCT within study area: This LCT occurs within a small area of the study area, and consists of an area of mature coniferous forestry which makes up Cartland Muir Plantation. The LCT is unlikely to experience impacts as a result of the proposed grid connection.	
Assessment of Impacts – Construction: No construction impacts are predicted upon this LCT due to the distance of the LCT from the proposed grid connection. The LCT will experience an imperceptible magnitude of change, resulting in short-term impacts of **negligible** significance.	*Assessment of Impacts - Operation:* No operational impacts are predicted upon this LCT due to the distance of from the proposed grid connection. The LCT will experience an imperceptible magnitude of change, resulting in long-term impacts of **negligible** significance.
5a Plateau Farmland, Forestry LCT sub-type	
1,000m from the proposed grid connection The landscape character type is considered to have **low** sensitivity to the proposed grid connection.	
Extent of LCT within study area: The small occurrence of this LCT sub-type is located east of Whaup Knowe, defined by coniferous forestry within an area of Plateau Farmland. Although an isolated instance of this sub-type within the study area, other small blocks of forestry are located within the Plateau Farmland LCT.	
Assessment of Impacts – Construction: No construction impacts are predicted upon this small LCT sub-type due to the distance of the LCT from the proposed grid connection, and the presence of intervening forestry cover. The LCT will experience an imperceptible magnitude of change, resulting in short-term impacts of **negligible** significance.	*Assessment of Impacts - Operation:* No operational impacts are predicted upon this LCT due to the distance from the proposed grid connection and the presence of intervening forestry cover. The LCT will experience an imperceptible magnitude of change, resulting in long-term impacts of **negligible** significance.
6a Plateau Moorland, Forestry LCT sub-type	
1,100m from the proposed grid connection The landscape character type is considered to have **low** sensitivity to the proposed grid connection.	
Extent of LCT within study area: This LCT sub-type occurs to the east of the B715 adjacent to the ribbon settlement of Climpy and north of Forth. Defined by dense commercial forestry, it also lies adjacent to the eastern extent of the Black Law Windfarm Extension.	
Assessment of Impacts – Construction: No construction impacts are predicted upon this small LCT sub-type due to the distance of the LCT from the proposed grid connection, and the presence of intervening forestry cover and the Black Law Windfarm and Phase 1 Extension. The LCT sub-type will experience an imperceptible magnitude of change, resulting in short-term impacts of **negligible** significance.	*Assessment of Impacts - Operation:* No operational impacts are predicted upon this small LCT sub-type due to the distance of the LCT from the proposed grid connection, and the presence of intervening forestry cover and the Black Law Windfarm and Phase 1 Extension. The LCT sub-type will experience an imperceptible magnitude of change, resulting in long-term impacts of **negligible** significance.
6c Plateau Moorland, Windfarm LCT sub-type	
Contains part of the proposed grid connection VP1 The landscape character type is considered to have **low** sensitivity to the proposed grid connection.	
Extent of LCT within study area: This LCT sub-type covers an extensive area of plateau moorland which has been the subject of windfarm development as a result of the introduction of wind turbines, which are now defining features of the LCT. A large proportion of the proposed OHL route will pass through this LCT subtype.	

Assessment of Impacts – Construction: Construction activity along the route of the OHL will introduce construction vehicles and machinery within a small area of this LCT sub-type, along with temporary access tracks and access points which will extend man-made features, albeit temporarily across the open moorland landscape. The turbines of Black Law Windfarm will still remain the main focal features of the sub-type throughout the construction period. The LCT sub-type will experience an imperceptible magnitude of change, resulting in short-term impacts of **negligible** significance.	*Assessment of Impacts - Operation:* The key characteristic of this sub-type are the presence of large scale windfarm and OHL development which have reduced the sensitivity of this sub-type to man-made features. The presence of the proposed grid connection will be largely imperceptible across the open moorland landscape, appearing consistent with existing development across the LCT, with the turbines of Black Law Windfarm, the steel tower OHLs and the remaining coniferous forestry forming the defining features of the LCT. A small area of young mixed woodland will be removed in order to maintain an appropriate wayleave from the OHL. The LCT sub-type will experience an imperceptible magnitude of change, resulting in long-term impacts of **negligible** significance.

Impacts upon Designated Landscapes

6.102 Direct and indirect impacts upon designated landscapes within the 2km study area, during operation and construction, are described below in **Table 6.13**.

Table 6.13: Impacts upon Designated Landscapes

Middle Clyde Valley SLA	
Contains part of the proposed grid connection. VP8 and VP9 The designated landscape is considered to have **medium** sensitivity to the proposed grid connection.	
Assessment of Impacts – Construction: There will be direct impacts upon this designated landscape as a result of construction of the OHL and underground cable route and the proposed substation works at the existing Linnmill substation. Construction of the proposed grid connection will locally alter the scenic qualities of some views however the designated landscape as a whole will experience a low magnitude of change and the short-term direct impacts will be of **minor** significance.	*Assessment of Impacts - Operation:* The proposed OHL and underground cable route will pass through, and the terminal pole location will be located within, this locally designated landscape. The operational proposed grid connection will locally alter the scenic qualities of some views, between the A73 and Kilncadzow; however the designated landscape as a whole will experience a low magnitude of change and the short-term direct impacts will be of **minor** significance.

Proposed Mitigation

6.103 Measures to reduce landscape impacts were embedded in the design of the proposed grid connection including reinstatement. No further mitigation measures are proposed.

Residual Landscape Impacts

6.104 All residual landscape impacts during construction and operation are as predicted in the assessment section above.

Impacts on Visual Amenity

Visual Impacts on Representative Viewpoints

6.105 Visual impacts during construction and operation, experienced from each of the nine representative viewpoints, are described below in **Table 6.10** and locations shown on **Figure 6.7**. Views from each representative viewpoint are illustrated by a panoramic photograph, bare ground wireframe image and fully rendered photomontage, shown in **Figures 6.7** to **6.15**.

Viewpoint 1 – B715 near Climpy

Viewpoint 1 – B715 near Climpy			
Grid Reference	NS 93158 54893	**Figure Number**	**Figure 6.7**
LCT	*Plateau Moorland LCT*	**Landscape Designation**	None
Views towards Grid Connection	Clockwise, north-west to south-west	**Approx. Distance to Proposed Grid Connection**	840m
Viewpoint Sensitivity: The sensitivity of this viewpoint is considered to be **medium**.			
Existing View: The operational Black Law Windfarm is visible in views west from this viewpoint, appearing across a large proportion of the available view, above the plateau moorland and coniferous forestry beyond. An existing 11kV wood pole OHL crosses the foreground of views north-south across the open moorland adding vertical elements to the expansive horizontal landscape. Blocks of forestry appear as dark features in views towards Whaup Knowe to the south-west. The existing steel tower transmission line to the north of Black Law Windfarm is perceptible beyond the existing forestry of Lark Law. The consented turbines of Black Law Windfarm Extension will extend visibility of turbines north-eastwards in views north from this viewpoint, with turbines appearing above deciduous woodland which lies to the west of the B715. The telecommunication masts at Kilncadzow Hill and Hill Rig are visible in the far distance to the south-west.			
Assessment of Visual Impacts – Construction: Visibility of construction activities will be visible from this viewpoint, with visibility of construction traffic perceptible along the B715 to the east, and construction vehicles and machinery visible along the route of the proposed line to the west and north-west between Black Law Windfarm and the coniferous forestry at Whaup Knowe. Partially constructed infrastructure will be visible along this section of the OHL route, although all construction vehicles, machinery and temporary access provision will be backclothed against the open moorland, and will be visible in the context of the turbines of Black Law Windfarm and the existing 11kV OHL which passes across the view in the foreground. Viewers will experience a low magnitude of change from this viewpoint, resulting in short-term impacts of **minor** significance.			
Assessment of Visual Impacts - Operation: A section of the OHL, of approximately 1.5km between Black Law Windfarm to the north-west and the coniferous forestry at Whaup Knowe, will be visible in the middle distance of views west from this viewpoint. The OHL will be visible across approximately 120° degrees of the available view from this viewpoint, clockwise from south-west to north-west, appearing as a long linear feature over the open moorland of Whaup Knowe, backclothed against the dark plateau landscape with the turbines of Black Law Windfarm appearing beyond as large defining features within the view. Although the OHL will be visible from the viewpoint, it will form a relatively small element in the view, backclothed for its entirety, and will integrate with the existing 11kV OHL development in the foreground and the 33kV OHL to the south of Whaup Knowe. The presence of the large turbines of Black Law Windfarm to the west will further diminish the vertical scale of the proposed OHL within the view, and will remain the key focus of the view. Viewers will experience an imperceptible magnitude of change from this viewpoint, resulting in long-term impacts of **negligible** significance.			

Viewpoint 2 – Springfield Reservoir

Viewpoint 2 – Springfield Reservoir			
Grid Reference	NS 90688 52024	**Figure Number**	**Figure 6.8**
LCT	*Plateau Farmland LCT*	**Landscape Designation**	None
Views towards Grid Connection	Clockwise, north-east to south-east	**Approx. Distance to Proposed Grid Connection**	400m

Viewpoint Sensitivity:

The sensitivity of this viewpoint is considered to be **medium**.

Existing View:

Views from this viewpoint are primarily focussed across Springfield Reservoir, which is surrounding by small clusters of Scot's Pine. Turbines of Black Law Windfarm are visible to the north above the horizon formed by the moorland and coniferous forestry blocks. Open expansive views are possible to the south and east from the viewpoint, across enclosed pastoral farmland, with gently undulating landform. Existing wood pole OHLs cross the view east-west, with farmsteads and coniferous and broadleaf shelterbelts visible in distant views. Several small FiT turbines are visible on rolling hills and ridges in the mid-distance with the telecommunications masts located on Hill Rig and Kilncadzow Hill clearly visible on the horizon to the south, south-west. The consented turbines of Black Law Windfarm Extension are unlikely to be visible in views north-east from this viewpoint.

Assessment of Visual Impacts – Construction:

Construction of the OHL will be perceptible from this viewpoint, with construction vehicles visible along the B7056 to the south of the viewpoint, the access road to Springfield Reservoir to the east and along the route of the OHL. Visibility of partially constructed infrastructure, machinery and construction vehicles will be possible throughout the construction period, however the primary focus of views across Springfield Reservoir will be unaffected, and views east and north-east towards the OHL route will be partially screened by the coniferous shelterbelt to the east of the viewpoint.

Viewers will experience a low magnitude of change from this viewpoint, resulting in short-term impacts of **minor** significance.

Assessment of Visual Impacts - Operation:

Once operational, the OHL will be visible across approximately 120° of the available view from this viewpoint, clockwise from north-east to south. Views north-east towards the OHL route will be partially screened by the coniferous shelterbelt to the east of the viewpoint. The OHL will cross the enclosed farmland and rough grazing to the south-east of the viewpoint, where the wood pole infrastructure and OHL will briefly break the skyline formed by the rolling farmland to the east, before crossing the B7056 close to the residential property of Easterseat and heading south across the enclosed pastoral farmland. The OHL will be backclothed for much of its length in views from this viewpoint, against the topography of the rolling farmland, and the slopes and coniferous forestry shelterbelts located on the northern flanks of Hill Rig, however a number of poles located directly south of the viewpoint will appear skylined across the view, with the overhead cables and bird diverters visible across the backdrop of open sky. The OHL will appear beyond the existing wood pole OHL infrastructure to the south of the viewpoint, and will not become the key defining feature within views from the viewpoint. Views north from the viewpoint across the primary focus of Springfield Reservoir, with the turbines beyond Black Law Windfarm will remain unaffected.

Viewers will experience a low magnitude of change from this viewpoint, resulting in long-term impacts of **minor** significance.

Viewpoint 3 – B7056 at Netherton Burn

Viewpoint 3 – B7056 at Netherton Burn			
Grid Reference	NS 91469 50844	**Figure Number**	**Figure 6.9**
LCT	*Plateau Farmland LCT*	**Landscape Designation**	None
Views towards Grid Connection	Clockwise, south-west to north-west	**Approx. Distance to Proposed Grid Connection**	490m

Viewpoint Sensitivity:

The sensitivity of this viewpoint is considered to be **medium**.

Existing View:

Views from this viewpoint are focussed along the B7056 which passes over Netherton Burn, through the surrounding pastoral farmland, enclosed by stone walls and post and wire fencing. Existing wood pole OHLs (11kV and telecommunications) run parallel to the B7056 across the foreground of the view to the west, and appear as linear features across the surrounding farmland, adding vertical features to the undulating landform. Farmsteads and agricultural buildings are visible in views north and east, with shelterbelt woodland often located within close proximity to buildings. Several small FiT turbines are visible on rolling hills and ridges in the mid distance. The operational turbines of Black Law Windfarm are visible across the horizon to the north of the viewpoint, however the consented turbines of Black Law Windfarm Extension are unlikely to be visible in views north-east from this viewpoint.

Assessment of Visual Impacts – Construction:

The B7056 on which this viewpoint is located will be used as a key access road for construction traffic during construction of the OHL. Construction access points are also located within close proximity to the viewpoint, to the east and north-west. Visibility of construction traffic along the road and at the access points will be possible throughout the construction period, along with views of construction activity along the route of the proposed OHL to the west and north-west of the viewpoint. Visibility of partially constructed infrastructure, construction vehicles and machinery will be possible across the pastoral farmland to the west of the B7056, partially screened by the new build residential property of Westermains and the associated agricultural buildings and deciduous trees.

Due to the proximity of the construction access points, viewers will experience a low magnitude of change from this viewpoint, resulting in short-term impacts of **minor** significance.

Assessment of Visual Impacts - Operation:

The operational OHL will be visible across approximately 90° of the available view clockwise from south-west to north-west, from this viewpoint. The proposed grid connection will appear as a long linear feature across the view, appearing in the middle distance of the view beyond the existing wood pole telecommunications and 11kV OHLs which cross the foreground to the west of the viewpoint. The OHL will be partially screened by the new build residential property of Westermains and the associated agricultural buildings and deciduous trees, and will appear backclothed to the south of Netherton Burn against the lower northern slopes of Hill Rig and coniferous forestry shelterbelts. Although the proposed grid connection will be visible in the view from this viewpoint, it will appear as minor element in the view and will appear alongside and at the same scale as the existing wood pole OHL infrastructure present within the surrounding landscape.

Viewers will experience an imperceptible magnitude of change from this viewpoint, resulting in long-term impacts of **negligible** significance.

Viewpoint 4 – A706 at Muirfoot

Viewpoint 4 – A706 at Muirfoot			
Grid Reference	NS 91686 49055	**Figure Number**	**Figure 6.10**
LCT	*Plateau Farmland LCT*	**Landscape Designation**	None
Views towards Grid Connection	Clockwise, west to north-west	**Approx. Distance to Proposed Grid Connection**	820m

Viewpoint Sensitivity:

The sensitivity of this viewpoint is considered to be **medium**.

Existing View:

The primary focus of views is along the busy road corridor of the A706, flanked by pastoral farmland enclosed by post and wire fencing and intermittent deciduous hedgerows. Broadleaf shelterbelts lie to the east and west of the road corridor, often located alongside residential properties, farmsteads and agricultural buildings. The settlement of Forth is partially screened in views north along the road, and views south towards Lanark are screened by intervening landform. Turbines of Black Law Windfarm are perceptible above the horizon to the north-west, appearing as blade tips and hubs above the undulating farmland and coniferous shelterbelts in the mid-distance. Expansive views towards the Tinto Hills are possible to the east, with large expanses of coniferous forestry visible in the mid-distance. The telecommunication mast at Hill Rig is visible directly west of the viewpoint, and an existing wood pole OHL runs parallel with the A706 to the east.

Assessment of Visual Impacts – Construction:

The A706 will be a key access route for construction traffic during construction of the OHL route, and views of construction vehicles travelling north and south along the route will be possible from this viewpoint. Constriction of the OHL route will be perceptible to the west of the viewpoint, with potential visibility of construction vehicles, machinery and partially constructed infrastructure along a short section of the OHL route possible across the pastoral farmland which lies between the shallow valley of Back Burn and the A706. Visibility will be limited to glimpsed views of construction activity, which will be backclothed by the topography of Hill Rig which lies directly west of the viewpoint.

Viewers will experience a low magnitude of change from this viewpoint, resulting in short-term impacts of **minor** significance.

Assessment of Visual Impacts - Operation:

The operational OHL will be visible to the west of this viewpoint, with a section of approximately 0.75km visible across a small proportion (<50°) of the available view. The wood pole infrastructure and overhead cables with bird converters will potentially appear above the enclosed pastoral farmland which lies between the A706 and the shallow valley of Back Burn directly west of the viewpoint, and will be partially screened by intervening topography, mixed woodland shelterbelts and deciduous field boundary tries and hedgerows. The OHL will form a minor element in the view and will be backclothed against the topography of Hill Rig beyond, appearing as a linear feature below the skyline, with the large turbines of Black Law Windfarm visible on the skyline to the north-west. The majority of viewers at this viewpoint will be roads users, who will see glimpsed views of the OHL at a perpendicular angle of view to the view, whilst travelling at speed.

Viewers will experience an imperceptible magnitude of change from this viewpoint, resulting in long-term impacts of **negligible** significance.

Viewpoint 5 – A721 near Muirhead

Viewpoint 5 – A721 near Muirhead			
Grid Reference	NS 90465 48065	**Figure Number**	**Figure 6.11**
LCT	*Rolling Farmland LCT*	**Landscape Designation**	None
Views towards Grid Connection	Clockwise, south-west to north	**Approx. Distance to Proposed Grid Connection**	430m

Viewpoint Sensitivity:

The sensitivity of this viewpoint is considered to be **low**.

Existing View:

Views from this slightly elevated viewpoint are focussed across rolling pastoral farmland to both the north and south of the A721. Enclosed by stone walls and post and wire fence, large pasture fields are scattered with shelterbelt trees and forest blocks and farmsteads and agricultural buildings. The telecommunication masts at Hill Rig and Kilncadzow Hill are visible on the horizon directly west of the viewpoint. Small scale existing wood pole OHLs form minor elements in the view, crossing the A721 west of the viewpoint. The dark coniferous forestry of Cartland Muir Plantation is visible to the south-west of the viewpoint, with long distance views possible to the Tinto Hills beyond and the operational turbines of Hagshaw Hill Windfarm. Turbines of Black Law Windfarm are visible beyond the pastoral farmland located on the flanks of Hill Rig to the north, and the consented turbines of Black Law Windfarm Extension will extend visibility of turbines across the horizon once constructed. A number of FiT turbine clusters located close to farmsteads and agricultural buildings are visible in views to the east and north of the viewpoint.

Assessment of Visual Impacts – Construction:

The A721 lies adjacent to this viewpoint and will be a key access route during the construction of the proposed OHL. Construction traffic will be visible travelling west and east from the viewpoint, and construction activity along the route of the OHL to the north, west and south-west of the viewpoint, will be visible in the form of construction vehicles, machinery and partially constructed infrastructure. The OHL route crosses the road to the west of the viewpoint, where traffic management will likely be required during the winching of the cable line between the wood pole infrastructure to the north and south of the A721.

Viewers will experience a low magnitude of change from this viewpoint, resulting in short-term impacts of **minor** significance.

Assessment of Visual Impacts - Operation:

The operational OHL will be visible within approximately 100° of the available view from this viewpoint, clockwise from south-west to north. The OHL will appear as a linear feature following the low lying shallow valley of Back Burn between Kilncadzow Hill to the west and the hill occupied by Muirhead Farm to the east, before heading south across the A721 passing a farmstead located at Hole. Due to the elevated nature of the viewpoint views of a large section of the OHL route are possible, however the OHL appears backclothed for the entirety of its length against the topography and pastoral farmland of Hill Rig and Kilncadzow Hill and the linear deciduous shelterbelt of trees which lies to the north of the A721. The key focus of views from the viewpoint will still be the linear views along the A721 to the west and views to the telecommunication masts located on Hill Rig and Kilncadzow Hill which is a prominent vertical feature in the view. Although the OHL will be perceptible, it will form a relatively small feature within the view.

The majority of viewers at this viewpoint will be roads users, who will see glimpsed views of the OHL at a perpendicular angle of view to the view to the north and views of the OHL crossing the road when travelling at speed along the A721.

Viewers will experience a low magnitude of change from this viewpoint, resulting in long-term impacts of **minor** significance.

Viewpoint 6 – Minor Road, near Collielaw Cottage

Viewpoint 6 – Minor Road, near Collielaw Cottage			
Grid Reference	NS 89870 647744	**Figure Number**	**Figure 6.12**
LCT	*Rolling Farmland LCT*	**Landscape Designation**	None
Views towards Grid Connection	Clockwise, south-west to north-east	**Approx. Distance to Proposed Grid Connection**	220m

Viewpoint Sensitivity:

The sensitivity of this viewpoint is considered to be **medium**.

Existing View:

Elevated views over the surrounding pastoral farmland are possible to the west of this viewpoint, with stone wall enclosed pasture fields, broadleaf field boundary trees and shelterbelts across the mid-distance slopes of the shallow valley with coniferous forestry blocks and Cartland Muir Plantation forming the dark horizon in expansive views across the valley. Farmsteads and residential properties are located alongside the minor road and A721 to the north of the viewpoint and the eastern fringe of Kilncadzow is visible to the north-west of the viewpoint. The telecommunication masts at Hill Rig and Kilncadzow Hill are visible on the elevated horizon to the north of the viewpoint. Long distance views to the Tinto Hills directly to the south and the turbines of Hagshaw Hill Windfarm to the south-west. Turbines of Black Law Windfarm are visible beyond Hill Rig to the north, and the consented turbines of Black Law Windfarm Extension will extend visibility of turbines rightwards across the horizon once constructed.

Assessment of Visual Impacts – Construction:

This viewpoint is located in a key proposed access route for construction of the OHL, and within close proximity to two construction access points. Visibility of construction traffic north and south along this road will be possible from the viewpoint along with visibility of construction activity along the route of the OHL to the west and east of the unnamed minor road which it crosses. The OHL route crosses the road to the north of the viewpoint, where traffic management will likely be required during the winching of the cable line between the wood pole infrastructure to the west and east of the road. Partially constructed wood pole infrastructure will be visible across the enclosed pastoral farmland which lies to the west and east of the road, with wood poles breaking the skyline to the east of the road. Construction vehicles, machinery and access tracks will be visible within the pastoral farmland to the west of the road, where the topography slopes down towards Fullwood Burn.

Viewers will experience a medium magnitude of change from this viewpoint, resulting in short-term impacts of **moderate** significance.

Assessment of Visual Impacts - Operation:

The operational OHL will be clearly visible from this viewpoint across approximately 120° of the available view, clockwise from south-west to north. The OHL will appear to the east and west of the unnamed minor road, and the overhead cables and bird converters will appear against open sky as it crosses the unnamed road directly north of the viewpoint, the wood pole infrastructure will be backclothed elsewhere in the view against the backdrop of enclosed pastoral farmland. The wood pole infrastructure will run parallel with the field boundaries within the enclose pasture farmland to the west of the viewpoint and appear as a linear feature, diminishing in scale as it descends south-west towards Fullwood burn, where it will be screened and backclothed by the coniferous forestry. The presence of the OHL within close proximity to this viewpoint will introduce additional man-made features to the view, where the wood pole infrastructure will appear as vertical features to either side of the road, and the OHL will frame views northwards along the minor road. The proposed grid connection will, however, form a minor element in views west from the viewpoint across the Fullwood Basin, and will be backclothed against the pastoral farmland.

Viewers will experience a low magnitude of change from this viewpoint, resulting in long-term impacts of **minor** significance.

Viewpoint 7 - A721 near Kilncadzow

Viewpoint 7 - A721 near Kilncadzow			
Grid Reference	NS 88609 48651	**Figure Number**	**Figure 6.13**
LCT	*Plateau Farmland LCT*	**Landscape Designation**	None
Views towards Grid Connection	Clockwise, South-east to south	**Approx. Distance to Proposed Grid Connection**	1,200m

Viewpoint Sensitivity:

The sensitivity of this viewpoint is considered to be **medium**.

Existing View:

This elevated viewpoint offers wide expansive views focussed the across the rolling pastoral farmland to the south, south-east of the A721 road corridor. Enclosed pasture fields defined by stone walls, post and wire fences and broadleaf boundary trees and shelterbelts form the foreground views with blocks of coniferous forestry appearing as dark features across the middle distance. Long distance views to the Tinto Hills form the distinguishable horizon to the south-east beyond the settlements of Lanark and Carstairs, and the surrounding rolling and plateau farmlands. Visibility of the operational Black Law Windfarm is not possible from this location; however the operational turbines of Hagshaw Hill Windfarm are perceptible in long distance views to the south-west. Views west from the viewpoint are screened by the settlement of Kilncadzow, and views north are screened by the intervening topography of the Hill of Kilncadzow and Hill Rig and the existing telecommunication masts.

Assessment of Visual Impacts – Construction:

Limited visibility of construction activity will be possible from this viewpoint, with partially constructed infrastructure and construction vehicle movements perceptible to the south-east within the valley of Fullwood Burn, in middle-distance views from this viewpoint. The presence of intervening deciduous hedgerows and field boundaries in the foreground of views will partially screen some visibility of construction activity during the construction period, where the visible wood poles will appear as minor features in the view.

Viewers will experience an imperceptible magnitude of change from this viewpoint, resulting in short-term impacts of **negligible** significance.

Assessment of Visual Impacts - Operation:

The operational OHL will form a minor linear element within the enclosed pastoral farmland which slopes southwards towards Fullwood Burn, south-east of the viewpoint. The OHL will appear in long-distance views from the viewpoint, backclothed against the sloping topography, deciduous field boundary trees and coniferous forestry and partially screened by the intervening deciduous hedgerows and linear deciduous shelterbelts of trees which lie in the middle-distance of the view. The OHL may go unnoticed in views from this viewpoint, especially by road users travelling east at high speed along the A721 and long distance views to the Tinto Hills will be unaffected by the presence of the OHL.

Viewers will experience an imperceptible magnitude of change from this viewpoint, resulting in long-term impacts of **negligible** significance.

Viewpoint 8 - Craigenhill Road, north of Railway line

Viewpoint 8 - Craigenhill Road, north of Railway line			
Grid Reference	NS 86759 46338	**Figure Number**	**Figure 6.14**
LCT	*Plateau Farmland LCT*	**Landscape Designation**	Middle Clyde Valley SLA
Views towards Grid Connection	Clockwise, south to south-west	**Approx. Distance to Proposed Grid Connection**	100m

Viewpoint Sensitivity:

The sensitivity of this viewpoint is considered to be **low**.

Existing View:

Views from this viewpoint are framed by the coniferous forestry located directly east, north and north-west of the viewpoint, with views south to south-west across enclosed pasture and arable farmland to the south of the West Coast Mainline Railway. The railway line runs west-east, perpendicular to Craigenhill Road, directly south of the viewpoint, however due to the elevated nature of the viewpoint and the deep railway sidings; the line is almost imperceptible from this viewpoint. The OHL transmission infrastructure can be seen in the foreground of the view, beyond the rough scrub ground which lies adjacent to the road. Blocks of coniferous forestry are present across the horizon directly south of the viewpoint, with broadleaf trees and shelterbelts located along field boundaries to the east. The small settlement of Cartland is visible in views to the south-west, with residential properties and agricultural buildings appearing in the middle distance in front of the rolling farmland on the south side of the Clyde Valley beyond. Large steel tower transmission lines are visible to the south on the horizon in the far distance. The turbines of Black Law and Hagshaw Hill Windfarms are not visible, and the turbines of Black Law Windfarm Extension will not be visible from this viewpoint once constructed.

Assessment of Visual Impacts – Construction:

Construction activity will be visible to the south of this viewpoint, where the proposed OHL route crosses Craigenhill Road, parallel with railway line to the south. The cutting of a wayleave through the stand of coniferous forestry directly east of the viewpoint will be visible along with visibility of construction traffic along Craigenhill Road and Moor Road to the south and the proposed access point directly south of the viewpoint. The construction of wood pole infrastructure will be visible across the centre of the view, with partially constructed infrastructure, construction vehicles and machinery visible, within the area of rough grazing/scrub to the south–west of the viewpoint.

Viewers will experience a medium magnitude of change from this viewpoint, resulting in short-term impacts of **minor** significance.

Assessment of Visual Impacts - Operation:

The operational OHL will cross the foreground of views south from this viewpoint, theoretically appearing across approximately 70° of the available view from the viewpoint. The wood pole infrastructure will appear to the west and east of Craigenhill Road, and the overhead cables will appear against the open sky to the south. Due to the presence of existing wood pole OHLs and the electrified West Coast Mainline Railway to the south, the introduction of the OHL will not introduce new features to the view and the proposed OHL will not become a key feature in views south from this viewpoint. A short section of the OHL will be skylined across the view; however the wood pole infrastructure will be largely backclothed against the surrounding arable farmland from the viewpoint.

Viewers will experience a medium magnitude of change from this viewpoint, resulting in long-term impacts of **minor** significance.

Viewpoint 9 - Cartland, south of Greentowers Farm

Viewpoint 9 - Cartland, south of Greentowers Farm			
Grid Reference	NS 87736 47064	**Figure Number**	**Figure 6.15**
LCT	*Plateau Farmland LCT*	**Landscape Designation**	Middle Clyde Valley SLA
Views towards Grid Connection	Clockwise, south-west to north-east	**Approx. Distance to Proposed Grid Connection**	290m

Viewpoint Sensitivity:

The sensitivity of this viewpoint is considered to be **medium**.

Existing View:

Views north from this viewpoint are along Moor Road towards the railway line, which is perceptible beyond New Greentowers Farm which lies to the west of the road. Cartland Muir Plantation and small coniferous forest blocks in the foreground of the view form the horizon to the north and north-west, with post and wire enclosed arable and pasture fields visible across the foreground and middle distance views. An existing twin wood pole OHL runs north-south across the enclosed farmland directly west of the viewpoint, backclothed across much of its length by coniferous forest and broadleaf shelterbelt trees. Directly south of the viewpoint lies the small settlement of Cartland, where built form and vegetation and trees within private gardens screen views towards the Clyde Valley and Tinto Hills beyond. The turbines of Black Law and Hagshaw Hill Windfarms are not visible, and the turbines of Black Law Windfarm Extension will not be visible from this viewpoint once constructed.

Assessment of Visual Impacts – Construction:

Visibility of construction activity will be possible from this viewpoint throughout the construction period, as the minor road on which it is located will act as a key access route for construction traffic and a proposed access point lies directly north close to New Greentowers Farm. Visibility of construction activity along the route of the OHL will be possible, with construction vehicles, machinery and partially constructed infrastructure visible within the enclosed pastoral farmland to the west of the viewpoint.

Viewers will experience a low magnitude of change from this viewpoint, resulting in short-term impacts of **minor** significance.

Assessment of Visual Impacts - Operation:

Once operational, the proposed OHL will be visible within views west and north from this viewpoint, appearing as a linear feature located within the enclosed pastoral farmland, partially screened by the agricultural buildings of New Greentowers Farm to the north-west and a small stand of coniferous forestry to the north, east of Moor Road. The OHL will appear beyond the 11kV and 33kV wood pole OHLs which lie within the pastoral farmland directly west of the viewpoint, and will be backclothed against the block coniferous forestry west of New Greentowers Farm and the southern tip of Cartland Muir Plantation, with a short section appearing above the skyline above the railway line to the north-west. Directly west of Cartland, the OHL will pass through a linear shelterbelt of mature deciduous trees before descending the shallow slope towards the terminal pole location, partially screened by deciduous woodland to the east of the route. The terminal pole will not be visible in views from this viewpoint. The OHL will form a relatively minor element in views from this viewpoint due to the existing presence of 11kV and 33kV wood pole infrastructure and will therefore integrate within the existing landscape.

Viewers will experience a low magnitude of change from this viewpoint, resulting in long-term impacts of **minor** significance.

Visual Impacts on Settlements

6.106 All settlements are deemed to be of **high** sensitivity due to the presence of residential receptors. Visual impacts during construction and operation, experienced from settlements within the study area are described below in **Table 6.14**.

Table 6.14: Assessment of Impacts on Settlements

Climpy	
800m from the proposed grid connection. VP1	
Existing View: This ribbon development lies along the route of the B715 to the east of the operational Black Law Windfarm and consists of residential properties of one and two storeys located predominantly to the west of the road. Many residential properties have expansive views west across the open plateau moorland, towards the turbines of Black Law Windfarm, which form the key focus of the view, as large vertical features within the wide horizontal views from the properties. An existing 11kV OHL runs parallel to the road to the west and appears in the foreground of views west from properties and a 33kV line is visible in views towards Whaup Knowe plantation to the south-west of the settlement.	
Assessment of Visual Impacts – Construction: During the construction period, construction vehicles will be visible along the B715 which passes through the settlement, and construction activity along the route of the OHL between Black Law Windfarm and the Whaup Knowe plantation will be perceptible from the west facing gardens and windows of properties within this small settlement. Construction vehicles, machinery and the partially constructed infrastructure will be backclothed against the open moorland and the turbines of Black Law Windfarm from the settlement. Viewers will experience a low magnitude of change from this settlement, resulting in short-term impacts of **minor** significance.	*Assessment of Visual Impacts - Operation:* Visibility of the operational OHL will be possible from properties within this settlement, with the OHL appearing as a linear feature across the plateau moorland in middle distance views. The OHL will be backclothed by the open moorland for all of its length, and will be screened by coniferous forestry where it passes to the west of Whaup Knowe plantation to the south-west. The OHL will form a minor element in the view to the west of the settlement, located between the existing 11kV OHL and the turbines of Black Law Windfarm, thus adding another man made feature to the open moorland. Viewers will experience an imperceptible magnitude of change from this settlement, resulting in long-term impacts of **negligible** significance.
Forth	
1,400m from the proposed grid connection. VP1	
Existing View: This settlement lies to the southern extent of the B715 on the A706 and consists of a large number of residential properties of one and two storeys, located to the west and east of the A706 road corridor. Expansion of the settlement over the last century has seen new residential areas built to the west of the original settlement, located on the edge of the plateau moorland. The operational turbines of Black Law Windfarm are visible from residential properties located on the western and northern fringes of the settlement, appearing above the open moorland and blocks of coniferous forestry to the north-west of the settlement. Views south towards the Tinto Hills are possible from properties on the southern and eastern edge of the settlement.	
Assessment of Visual Impacts – Construction: Visibility of construction activity will be limited to views of construction traffic using the A706 and B715 from this settlement, and will be restricted to properties located adjacent to these road corridors. Visibility of construction activities along the OHL route will be limited to long distance views of construction vehicles in long distance views from a small number of properties located on the northern edge of the settlement, with views towards the OHL route screened from the majority of properties by intervening topography and coniferous forestry. Viewers will experience an imperceptible magnitude of change from this settlement, resulting in short-term impacts of **negligible** significance.	*Assessment of Visual Impacts - Operation:* Visibility of the operational OHL will be limited to long distance views from a small number of residential properties located on the northern edge of the settlement, appearing backclothed against the open moorland, in the context of Black Law Windfarm beyond, with the majority of views from properties screened by intervening topography and coniferous forestry located to the north-west of the settlement. Viewers will experience an imperceptible magnitude of change from this settlement, resulting in long-term impacts of **negligible** significance.
Kilncadzow	
1,100m from the proposed grid connection. VP7	
Existing View: This settlement is located in an elevated position on the route of the A721 and consists of residential properties, located predominantly along the southern edge of the A721 and along Craigenhill Road. Long distance views from residential properties located along the eastern, southern and western fringes of the settlement are focussed on the Tinto Hills to the south and the distance hills west of the M74 to the south-west. Properties located on the eastern edge of the settlement often offer views across enclosed pasture farmland within the valley of Fullwood Burn to the south-east of the settlement.	
Assessment of Visual Impacts – Construction: Visibility of construction activity will be limited to views from properties located on the eastern edge of the settlement, to the OHL route across the sloping farmland between Hole and Fullwood, with views partially screened by the presence of coniferous forestry and deciduous field boundary trees and hedgerows. Visibility of construction vehicles and partially constructed infrastructure will be perceptible from residential properties, but will form a minor element in the view. Viewers will experience an imperceptible magnitude of change from this settlement, resulting in short-term impacts of **negligible** significance.	*Assessment of Visual Impacts - Operation:* Once operational the OHL will be partially visible across the sloping enclosed farmland between Hole and Fullwood. The OHL will appear as a minor linear feature, backclothed against the topography and screened in some sections by intervening coniferous forestry and deciduous field boundary trees and hedgerows. The existing long distance views towards the Tinto Hills to the south will be unaffected by the presence of the OHL in middle ground of views from this settlement. Viewers will experience an imperceptible magnitude of change from this settlement, resulting in long-term impacts of **negligible** significance.
Cartland	
270m from the proposed grid connection. VP9	
Existing View: This small hamlet of residential properties and farmsteads lies within farmland between the A73 to the south and the railway line to the north, with properties located along Moor Road, Greentowers Road and Cartland Road. Primary views from properties are predominantly outward from the minor roads, across the enclosed pasture and arable farmland. Long distance views west and north are screened by coniferous forestry and deciduous woodland which form the horizon, however views south across the Clyde Valley towards the Tinto Hills are possible from properties located on the southern and eastern edge of the settlement. Existing OHL infrastructure lies directly west (33kV OHL) and north (electrified railway line) of the settlement.	
Assessment of Visual Impacts – Construction: The minor roads through this settlement will be used for access during the construction of the proposed grid connection, and access points are proposed to the north and south-west. Visibility of construction activity will be possible throughout the construction period, with visibility of partially constructed infrastructure, construction vehicles and machinery possible from properties located on the north and west fringe of the settlement. Viewers will experience a low magnitude of change from this settlement, resulting in short-term impacts of **minor** significance.	*Assessment of Visual Impacts - Operation:* When operational the OHL and terminal pole location will be visible beyond the existing 33kV OHL which runs north-south to the west of the settlement. The OHL will appear as a linear feature backclothed against the coniferous forestry and deciduous field boundary trees which lie to the west, and will be partially screened in its southern section where it approaches the terminal pole, by deciduous field boundary trees and hedgerows. The underground cable route will not be visible from the settlement once operational. Viewers will experience a low magnitude of change from this settlement, resulting in long-term impacts of **minor** significance.

Kirkfieldbank
200m from the proposed grid connection
Existing View: This outlying settlement lies on the southern slopes of the Clyde Valley to the west of Lanark and consists of ribbon development of residential properties located along the A72. Properties are predominantly orientated with views north across the River Clyde Valley, with sloping topography and woodland screening views to the south from the settlement.
Assessment of Visual Impacts – Construction: Views of the underground cable construction will be possible from elevated properties located within this settlement where views are possible across the River Clyde Valley to the enclosed farmland around Nemphlar, however views from properties located along the A72 corridor will be screened by deciduous tree cover along the river corridor. Visibility of construction vehicles and machinery will be possible throughout the construction period within the enclosed pasture farmland. Viewers will experience a low magnitude of change from this settlement, resulting in short-term impacts of **minor** significance.
Linnville
100m from the proposed grid connection
Existing View: This small modern residential development lies directly east of the Linnmill substation adjacent to the B018 and the A72. Properties are elevated above the River Clyde Valley to the north and offer views north across the valley to the farmland around Nemphlar beyond and views north-east across Lanark. Residential properties located on the western fringe of the settlement have views west across the existing substation to enclosed pasture and arable farmland, partially screened by intervening deciduous hedgerows and field boundary trees.
Assessment of Visual Impacts – Construction: Construction of the underground cable route between Nemphlar and Linnmill substation extension will be possible from residential properties located on the western and northern fringe of the settlement, with views of construction vehicles, machinery and groundwork's possible within the enclosed farmland to the north and west of the settlement, often screened by the presence of deciduous hedgerows and field boundary trees. Visibility of construction traffic along the A72 and B7018 will also be possible from the western and northern fringes of the settlement. The proposed works at the existing Linnmill substation will include a small extension to the existing HV compound at the south-east corner of the substation. The extended HV compound, installed switchgear, conductors and boundary security fencing will be perceptible from the western edge of Linnville, but will appear within the context of the existing substation. Viewers will experience a low magnitude of change from this settlement, resulting in short-term impacts of **minor** significance.

Visual Impacts on Routes

6.107 Visual impacts during construction and operation, experienced from routes within the study area are described below in **Table 6.15** and the assessed routes are shown **Figure 6.6**.

Table 6.15: Assessment of Impacts on Routes

Roads	
A706	
700m from the proposed grid connection. VP4 Views from this route are considered to be of **low** sensitivity to the proposed grid connection.	
Existing Views: This linear route runs north-south parallel with the OHL route between Forth and the roundabout at Harelaw, and offers views west and east perpendicular to the route, sporadically screened by deciduous trees and intervening topography. Key views are focussed towards the Tinto Hills which form the skyline to the south.	
Assessment of Visual Impacts – Construction: This road will act as the key access route during the construction of the OHL route (as shown on **Figure 4.5**).Visibility of construction vehicles and increased traffic will be experienced along this route and the access track near Muirfoot will also visible from the route. Construction of the OHL will be perceptible from some locations south of Newmains, with visibility of partially constructed infrastructure and machinery possible in glimpsed perpendicular views west from the road. Viewers will experience a low magnitude of change from this route, resulting in short-term impacts of **minor** significance.	*Assessment of Visual Impacts - Operation:* Visibility of the operational OHL will be limited to views from a short section of the route, between Newmains and Harelaw, where the OHL will appear within the shallow valley of Back Burn to the west, backclothed against the pasture slopes of Hill Rig. Viewers will experience an imperceptible magnitude of change from this route, resulting in long-term impacts of **negligible** significance.
A721	
Proposed grid connection crosses this route. VP5 & VP7 Views from this route are considered to be of **low** sensitivity to the proposed grid connection.	
Existing Views: This route passes through the study west-east perpendicular to the OHL route which will cross the road to the east of Hole. The route offers views elevated views south towards Lanark and the Tinton Hills as it passes around Kilncadzow Hill and views north along the shallow valley of Back Burn before ascending to Muirhead to offer long distance views east towards the Pentland Hills.	
Assessment of Visual Impacts – Construction: The eastern section of the route between the Harelaw roundabout and Hole will act as a key access route for construction traffic during construction of the OHL, and construction activities will be perceptible to the north and south of the road within close proximity of Hole. Views of construction activity will also be possible from the elevated western extent of the route, east of Kilncadzow, where the route crosses farmland south-west towards Fullwood Burn. Viewers will experience a low magnitude of change from this route, resulting in short-term impacts of **minor** significance.	*Assessment of Visual Impacts - Operation:* The operational OHL will run parallel to a short linear stand of deciduous trees which lie to the north of the road, before crossing at its lowest point to the east of Hole. The stand of trees forms a key linear feature in the view from the road, and although the OHL will be visible when travelling both east and west along the route, it will be backclothed against the rising topography when viewed in either direction. The OHL will also be visible from the elevated western extents of the route, appear as a minor linear element in mid-distance views, with views south towards the Tinto Hills remaining unaffected. Viewers will experience a low magnitude of change from this route, resulting in long-term impacts of **minor** significance.
A73	
Proposed grid connection crosses this route. Views from this route are considered to be of **low** sensitivity to the proposed grid connection.	
Existing Views: This route links Lanark with Carluke, crossing the southern extent of the study area north of the River Clyde. The southern section of the route follows the Clyde Valley before ascending the steep slopes on the north of the Clyde Valley before heading north towards Carluke. Large sections of this route are enclosed by deciduous trees to the west and east, and sloping topography to the north.	
Assessment of Visual Impacts – Construction: The underground cable route will follow the route of the road between the terminal pole location at Brocklinn Bridge and Lanark, therefore construction activities and increased traffic will be perceptible throughout the construction period. A section of approximately 1.5km will be directly affected by	*Assessment of Visual Impacts - Operation:* Once operational the underground cable route will not be perceptible from this road, and visibility of the proposed grid connection will be limited to glimpsed views through deciduous woodland, of the terminal pole location to the east of the road near Brocklinn Bridge.

the construction activities. Viewers will experience a low magnitude of change from this route, resulting in short-term impacts of **minor** significance.	Viewers will experience an imperceptible magnitude of change from this route, resulting in long-term impacts of **negligible** significance.
A72	
Proposed grid connection crosses this route. Views from this route are considered to be of **low** sensitivity to the proposed grid connection.	
Existing Views: This road follows the route of the River Clyde westwards along the Clyde Valley from Lanark, with ribbon development located along much of its length and evidence of market gardening prevalent within the valley bottom. Large sections of the route are enclosed by deciduous woodland and the steep slopes of the Clyde Valley limit views from the route.	
Assessment of Visual Impacts – Construction: The proposed underground cable route will cross this road north-west of Linnville, where construction activities and increased traffic will perceptible as groundwork's are undertaken beneath the road. A section of approximately 0.25km will be directly affected by the construction activities. Viewers will experience a low magnitude of change from this route, resulting in short-term impacts of **minor** significance.	*Assessment of Visual Impacts - Operation:* Once operational the underground cable route will not be perceptible from this route, with views north towards the terminal pole location and OHL screened by the intervening topography around East Nemphlar to the north of the route. Viewers will experience an imperceptible magnitude of change from this route, resulting in long-term impacts of **negligible** significance.
A71	
Proposed grid connection crosses this route. Views from this route are considered to be of **low** sensitivity to the proposed grid connection.	
Existing Views: This route runs west-east linking the settlements of Newmains and West Calder, to the north of Black Law Windfarm. Only a short section (approx. 1.5km) of the route, close to the Headless Cross, lies within the study area, offering views across the elevated plateau in all directions. Views are possible southwards across a landscape of former open cast coal extraction, coniferous forestry, high voltage transmission lines and Black Law Windfarm.	
Assessment of Visual Impacts – Construction: Access by construction traffic will be via the B715 to the south of the route, and no visibility of construction activity will be perceptible from this route, due to the presence of intervening screening by topography and coniferous forestry. Viewers will experience an imperceptible magnitude of change from this route, resulting in short-term impacts of **negligible** significance.	*Assessment of Visual Impacts - Operation:* No visibility of the operational OHL will be possible from this route due to the presence of intervening screening by topography and coniferous forestry. Viewers will experience an imperceptible magnitude of change from this route, resulting in long-term impacts of **negligible** significance.
B715	
500m from the proposed grid connection. VP1 Views from this route are considered to be of **low** sensitivity to the proposed grid connection.	
Existing Views: This road runs between Headless Cross, Climpy and Forth, parallel with the northern extent of the OHL route. Large sections of the northern part of the route are enclosed by coniferous forestry, to the east of Black Law Windfarm. The route offers open expansive views south south-west from its central section across the open plateau moorland of Whaup Knowe and the enclosed farmland north-west of Forth. The turbines of Black Law Windfarm form a key focus in views from this route, however long distance views south towards the Tinto Hills are possible when travelling south between Climpy and Forth. Existing OHL infrastructure is visible from much of this route.	
Assessment of Visual Impacts – Construction: This route will form a key access route during the construction of the proposed grid connection, and construction traffic will be clearly perceptible when travelling along the road between Forth and the access point for the Black Law Windfarm Extension substation. Visibility of construction activity along the route of the OHL between the substation and Whaup Knowe will be perceptible from this route, appearing above the open plateau moorland of Whaup Knowe to the west. Viewers will experience a low magnitude of change from this route, resulting in short-term impacts of **minor** significance.	*Assessment of Visual Impacts - Operation:* The operational OHL will be visible from the central section of the route between the Black Law Windfarm access entrance and Forth Mains. The OHL will appear as a linear feature in the middle distance of the view, running north-south, backclothed against the dark moorland beyond. The OHL will appear in the context of the turbines of the existing Black Law Windfarm, which will diminish the vertical scale of the wood pole infrastructure at this distance from the route. Viewers will experience an imperceptible magnitude of change from this route, resulting in long-term impacts of **negligible** significance.
B7056	
Proposed grid connection crosses this route. VP3 Views from this route are considered to be of **medium** sensitivity to the proposed grid connection.	
Existing Views: This route links the A706 with the A721 via the settlement of Yieldshields and several farmsteads and clusters of residential properties. The road is predominantly used by residents of nearby residents when accessing and leaving their properties, and offers views across the surrounding enclosed pasture farmland, with views possible south to the Tinto Hills and north to the turbines of Black Law Windfarm from several sections of the road. The telecommunication masts on Hill Rig and Kilncadzow Hill are visible from much of the route and form key vertical landmarks within the surrounding landscape. The proposed OHL route crosses this route close to Easterseat, south-west of Springfield Reservoir.	
Assessment of Visual Impacts – Construction: The eastern section of this road will be used for access during the construction period, with several access points located along the route, where construction traffic will be perceptible. Construction of the OHL will be visible from the central section of this route, between Westertown and Yieldshields, with the part constructed OHL, machinery and access tracks visible within close proximity to the road, to the north of the road around Springfield Reservoir, and to the south and west of the road around the Netherton Burn. Viewers will experience a medium magnitude of change from this route, resulting in short-term impacts of **minor** significance.	*Assessment of Visual Impacts - Operation:* Once operational, the OHL will pass to the south of Springfield Reservoir, crossing the low lying enclosed rough grazing before crossing the road west of Easterseat, and continuing south across enclosed pasture farmland. The OHL will be visible from much of the central section of the route when travelling north and south, appearing as a linear feature alongside the existing OHL infrastructure which dissects the farmland. The presence of existing small scale domestic/FiT turbines within close proximity to the OHL at Easterseat will form the key feature in views from this section of the route. The OHL will appear backclothed against the lower slopes of Hill Rig and the small coniferous shelterbelts in views west from Westertown. Viewers will experience a low magnitude of change from this route, resulting in long-term impacts of **minor** significance.
Minor Roads	
Proposed grid connection crosses several minor routes. VP6, VP8 & VP9 Views from this route are considered to be of **medium** sensitivity to the proposed grid connection.	
Existing Views: A number of minor roads are located across the study areas which offer existing views of the proposed grid connection. The key routes considered are; Craigenhill Road, Moor Road, Greentowers Road and Cartland Road. These minor roads are most frequently used by local residents of Cartland, farmsteads and scattered residential properties located within close proximity to the road network. Views from these minor roads are typically across enclosed pasture and arable farmland, occasional screened by coniferous and deciduous tree cover, with some long distance views south possible towards the Tinto Hills from roads south of the railway line.	

Assessment of Visual Impacts – Construction: Each of the minor roads considered are located to the south of the A721 and will be extensively used for access during the construction period. Several access points are proposed from Moor Road and the unnamed road south of the A721 at Hole, where visibility of construction activity will be experienced by passing road users. These narrow roads will experience increased traffic movement during the construction period, and visibility of the partially constructed infrastructure, terminal pole and underground cable infrastructure will be possible from many sections of these routes between Hole and Cartland. Viewers will experience a medium magnitude of change from minor routes, resulting in short-term impacts of **minor** significance.	*Assessment of Visual Impacts - Operation:* Once operational, the OHL will be visible from, and cross the unnamed road south of Hole, and views will be possible from Moor Road, Craigenhill Road and Cartland Road. The OHL will appear as a linear feature within the neighbouring enclosed pasture farmland often backclothed against the surrounding topography and coniferous forestry to the north of the railway line, and appearing alongside the existing OHL infrastructure of the railway line and the 33kV line which runs west of Cartland. The proposed grid connection will not form a key feature in views from these minor routes. Viewers will experience a low magnitude of change from minor routes, resulting in long-term impacts of **minor** significance.

Railways

West Coast Mainline Railway

Proposed grid connection crosses this route

VP8

Views from this route are considered to be of **low** sensitivity to the proposed grid connection.

Existing Views:

This route runs west-east across the study area to the north of Lanark. The high speed electrified line has deep sidings for large sections of its route and OHL infrastructure lies along the length of its route. Views from the route are often screened by vegetated sidings, tree cover and built development close to settlements; however some open sections offer long distance views southwards towards the Tinto Hills, including a short section north of Cartland.

Assessment of Visual Impacts – Construction: Visibility of construction activity will be limited to the short section of the route between Fullwood and Cartland, where the railway line lies above the surrounding enclosed farmland. Construction vehicles, machinery and part constructed wood pole infrastructure will be visible to the north and south of the railway during the construction period; however visibility will be limited to glimpsed perpendicular views experienced whilst travelling at high speed along the route. Viewers will experience an imperceptible magnitude of change from this route, resulting in short-term impacts of **negligible** significance.	*Assessment of Visual Impacts - Operation:* During operation, the OHL will be visible to the north of the railway where the OHL runs parallel with the route between Fullwood and Cartland and will be visible to the south of the railway where it runs parallel with the 33kV OHL to the west and north of Cartland. Due to the presence of the existing OHL infrastructure and the glimpsed nature of the views available from this route, it is considered that the OHL will be largely imperceptible once operational and long distance views south towards the Tinto Hills will be unaffected from this route. Viewers will experience an imperceptible magnitude of change from this route, resulting in long-term impacts of **negligible** significance.

Long Distance Footpaths

The Clyde Walkway (also follows the route of Public Right of Way (PRoW) SL154)

Proposed grid connection crosses this route near the Stonebyres weir.

Views from this route are considered to be of **high** sensitivity to the proposed grid connection.

Existing Views:

This long distance footpath route follows the River Clyde Valley for 40 miles between Glasgow and New Lanark. Within the study area, the route follows the steep sided Middle Clyde valley, crossing the river at several points along its course. The valley is often heavily wooded along the river corridor, restricting views from the route, where the river forms the key focus of views.

Assessment of Visual Impacts – Construction:

The proposed underground cable route will cross this route close to Stonebyres Falls, to cross the River Clyde before crossing the nearby A72 to the south. Visibility of construction activity will be possible from a short section of the route (approx. 500m) throughout the construction of the underground cable route.

Viewers will experience a low magnitude of change from this long distance footpath route, resulting in short-term impacts of **minor** significance.

Public Rights of Way (PRoW)

PRoW SL21

Proposed grid connection crosses and lies within close proximity to this PRoW

Views from this route are considered to be of **medium** sensitivity to the proposed grid connection.

Existing Views:

A number of Public Rights of Way (PRoW) are located within the study area for both the OHL route and underground cable route. Recreational users of these routes are likely to experience visibility of the proposed grid connection during both construction and operation.

Assessment of Visual Impacts – Construction: A short section of this PRoW, which provides access to Hainginhead Farm and Springfield Reservoir, will be used for construction access; however recreational user access will not be restricted throughout this construction period. Visibility of construction activity will be limited from the eastern sections of this PRoW, due to the intervening topography and tree cover. Recreational viewers will experience a low magnitude of change from this PRoW, resulting in short-term impacts of **minor** significance.	*Assessment of Visual Impacts - Operation:* Once operational, the proposed grid connection will be visible to the west, north-west of this PRoW appearing backclothed against the forestry and topography around Springfield Reservoir, with the turbines of Black Law Windfarm remaining the key focus of the view, to the north. The proposed grid connection will appear as a relatively minor feature in the wider landscape and will not become a key focus of views from this PRoW. Recreational viewers will experience an imperceptible magnitude of change from this PRoW, resulting in long-term impacts of **negligible** significance.

PRoW SL26

Proposed grid connection crosses and lies within close proximity to this PRoW

Views from this route are considered to be of **medium** sensitivity to the proposed grid connection.

Assessment of Visual Impacts – Construction: Construction access will also be required along a short section of this PRoW to the west of the B7056/Yieldshields Road; however recreational user access will not be restricted throughout this construction period. Visibility of construction activity will be possible from a large proportion of this PRoW which occupies a slightly elevated position around the north-eastern and eastern flanks of Hill Rig. Construction vehicles, machinery, partially constructed infrastructure and access tracks will therefore be visible from this PRoW. Recreational viewers will experience a low magnitude of change from this PRoW, resulting in short-term impacts of **minor** significance locally[16].	*Assessment of Visual Impacts - Operation:* The operational OHL will be visible from this PRoW from the entirety of the route. Due to the largely elevated nature of the PRoW on the north-eastern and eastern flanks of Hill Rig, the OHL will appear backclothed against the pastoral farmland and will not break the skyline in views from the route towards the Tinto Hills to the south. The OHL will also be back backclothed against the gently undulating topography and woodland shelterbelts which exist along the PRoW to the north and east of Hill Rig, and will appear alongside the existing network of 11kV wood pole OHLs which lie in close proximity to the route of this PRoW. Recreational viewers will experience an imperceptible magnitude of change from this PRoW, resulting in long-term impacts of **negligible** significance.

[16] Localised impacts are considered to be impacts experienced at locations along the route within 500m of the proposed grid connection.

Proposed Mitigation

6.108 Measures to reduce visual impacts were embedded in the design of the proposed grid connection. No further mitigation measures are proposed.

Residual Visual Impacts

6.109 All residual visual impacts during construction and operation are therefore as predicted in the assessment section above.

Cumulative Impacts

6.110 The cumulative assessment considers the additional impact (over and above that identified in the LVIA) of introducing the proposed grid connection into a landscape with other developments of a similar or related nature, that do not yet exist in the current landscape, but which may exist in the future. Although not all proposals will necessarily gain development consent, it is assumed for the purposes of the assessment that all developments are present in the landscape in future, as this represents the 'maximum development scenario'. Where there is no change in impact with other developments present in the wider setting, there is said to be no cumulative impact.

6.111 Likely cumulative impacts have been defined as the predicted impacts that the proposed grid connection may have in combination with other developments which are at application stage, consented, under construction or operational. Cumulative impacts may arise when other developments are constructed or co-exist concurrently.

6.112 Given the nature of the temporary impacts associated with the underground cable section of the proposed grid connection, and the absence of consented and proposed developments within 1km of that section, it is judged that no significant cumulative impacts will arise in association with the underground cable section of the proposed grid connection. Cumulative impacts arising from the construction and operation of the underground cable route have therefore been scoped out of the cumulative assessment.

Cumulative Baseline

6.113 Cumulative landscape and visual impacts of the proposed grid connection alongside existing, consented and proposed commercial windfarm developments, domestic/FiT turbines and OHL infrastructure located within the cumulative study area are considered within the assessment. **Table 6.16** below lists all existing, consented, and known proposed windfarm and wind turbine developments[17] within the cumulative study area (existing developments within 2km were listed in **Table 6.6** and included in the LVIA). The locations of these developments are shown on **Figure 6.16**.

Table 6.16: Developments located within Cumulative Assessment Study Area[18]

Development Name	Status[19]	No. of Turbines	Blade Tip Height (m)	Distance from Proposed Grid Connection
Windfarm Developments				
Tormywheel	Consented	15	102m	3324m
Black Law Extension Phase 1	Consented	23	126.5m	166m
Black Law Extension Phase 2	Application Submitted	11	126.5m	250m
Domestic/FiT Turbine Developments				
Climpy	Application Submitted	1	99m	1110m
Greenwall Farm	Application Submitted	1	88m	2238m
Gowmacmorran Farm	Application Submitted	1	67m	3030m
Covanhill Farm	Application Submitted	1	51m	1394m
Browshott	Application Submitted	1	45.7m	2702m
Tanhill Farm	Consented	1	54m	977m
Brewshott Farm	Application Submitted	1	67m	3336m
Westerhouse Farm	Application Submitted	1	51m	2028m
Bargarran	Consented	2	24m	2512m
Upper Muirhouse	Application Submitted	1	46.6m	2049m
Nellifield House	Consented	2	47m	1936m
Collielaw Farm	Application Submitted	1	51m	686m
Terracotta Nurseries	Consented	1	24.8m	631m
Cleghorn Mains	Consented	1	12.5m	1509m
Hillcroft	Consented	1	19.36m	3065m
OHL Infrastructure				
No proposed or consented infrastructure identified				

[17] Consultation was undertaken with South Lanarkshire, North Lanarkshire and West Lothian Councils to obtain details of all windfarm and wind turbine developments within the 4km study area, details of consultation undertaken are included in **Table 6.1.**

[18] Existing developments within 2km are listed in **Table 6.6**.

[19] Development status as of 3rd September 2012.

6.114 The cumulative assessment focuses on the potential landscape and visual receptors which are considered most likely to have potential cumulative relationships with the proposed grid connection.

Cumulative Impacts during Construction

6.115 The presence of the consented Black Law Windfarm Extension is interlinked with the proposed grid connection, whereby the successful implementation of each development is required to ensure individual feasibility of each. Construction of the Black Law Windfarm Extension is due to commence in mid-2013 for approximately 18-21 months and it is likely that construction activity of the two developments will coincide for a proportion of the proposed construction period.

6.116 Construction of Black Law Windfarm Extension – Phase 1 and Phase 2, and Tormywheel windfarm developments would most likely result in construction impacts arising across a localised area which may be perceptible across the wider landscape of the study area. Construction activity would be likely to occur over a relatively long duration of time, whilst construction of the proposed grid connection may be concurrent and result in cumulative landscape and visual impacts. Cumulative construction impacts with these commercial windfarm developments are therefore considered within the assessment.

6.117 The construction of consented and proposed domestic/FiT turbines would result in construction impacts over a localised area and short duration of time; therefore it is considered that the construction of these developments would not culminate in significant cumulative landscape and visual impacts alongside the proposed grid connection. Cumulative landscape and visual impacts arising during concurrent construction of these developments and the proposed grid connection have therefore been scoped out of the assessment of cumulative impacts.

Cumulative Impacts on the Landscape

6.118 It is likely that there may be some shared use of the working area and compound located close to the consented Black Law Windfarm Extension substation, giving rise to a low magnitude of change. The impact on the localised landscape resource area of A Black Law - Central Scotland Forest will be of **minor** significance during construction. Any shared use of this area serves to avoid unnecessary additional damage to the surrounding landscape resources. Other landscape resources are judged to have no cumulative impacts.

6.119 Cumulative impacts upon landscape character types during construction are likely to be limited to those close to the consented Black Law Windfarm Extension. *Upland Fringes (Lothians LCT 2)* will experience a low magnitude of change during construction, resulting in an impact of **minor** significance. It is considered that *Plateau Moorlands (LCT 18)* and *Plateau Moorland, Windfarm (LCT sub-type 6c)* will experience an imperceptible magnitude of change during construction, resulting in an impact of **negligible** significance. Other LCTs are judged to have no cumulative impacts.

6.120 There will be no cumulative impacts on designated landscapes.

Cumulative Impacts on Visual Amenity

6.121 It is considered that cumulative visual impacts during construction are likely to be limited to the receptors close to the consented Black Law Windfarm Extensions - Phase 1 (along with the black Law Windfarm Extension - Phase 2, if consent is granted). Viewpoint 1 B715 near Climpy, Viewpoint 2 Springfield Reservoir, the settlement of Climpy, the B715, B7056, and PRoW routes SL21 and SL26, may have visibility of construction activity associated with the Black Law Windfarm Extension – Phase 1 at the same time as that associated with the proposed grid connection. These receptors are predicted to experience a low magnitude of change during concurrent construction of the proposed grid connection and Black Law Windfarm Extension – Phase 1, and the impacts are judged to be of **minor** significance. Other visual receptors are judged to have no cumulative impacts.

Cumulative Impacts during Operation

6.122 It is judged that once operational, the OHL section of the proposed grid connection will be read as one of a number of infrastructure elements in the landscape of the study area, and that there will be no locations where the cumulative impact will be so great as to incur significant impacts with commercial windfarms or domestic/FiT turbines.

6.123 For visual receptors, while there will be views of the operational proposed grid connection, the changes to these views in the context of other cumulative developments will not incur significant impacts.

Proposed Mitigation

6.124 No mitigation measures are proposed for cumulative impacts.

Residual Cumulative Impacts

6.125 All residual cumulative landscape and visual impacts during construction and operation are therefore as predicted above.

Further Survey Requirements and Monitoring

6.126 No monitoring is proposed for landscape and visual impacts.

Summary of Impacts

6.127 **Table 6.17** to **Table 6.19** below, summarise the predicted residual impacts of the grid connection on landscape and visual receptors.

Table 6.17: Summary of Residual Impacts on the Landscape

Landscape Receptor	Construction (direct and indirect, short-term and temporary impacts)	Operation (direct and indirect, long-term impacts)
Landscape Resources		
A Black Law - Central Scotland Forest	Minor	Minor
B Black Law Windfarm to Springfield Reservoir	Minor	Minor
C Springfield Reservoir to the A721 Road	Minor	Minor
D A721 Road to West Coast Mainline Railway	Moderate	Minor
E West Coast Mainline Railway to the A73 Road	Moderate	Minor
F A73 Road to Linnmill substation extension	Minor	Negligible
Landscape Character Types		
Glasgow and the Clyde Valley Landscape Character Assessment		
4 Rolling Farmland LCT	Negligible	Negligible
5 Plateau Farmland LCT	Negligible	Negligible
8 Incised River Valley LCT	Negligible	Negligible
18 Plateau Moorlands LCT	Negligible	Negligible

Landscape Receptor	Construction (direct and indirect, short-term and temporary impacts)	Operation (direct and indirect, long-term impacts)
The Lothians Landscape Character Assessment		
2 Upland Fringes LCT	Negligible	Negligible
South Lanarkshire Landscape Character Assessment		
1 Urban Fringe Farmland LCT	Negligible	Negligible
4a Rolling Farmland, Forestry LCT sub-type	Negligible	Negligible
5a Plateau Farmland, Forestry LCT sub-type	Negligible	Negligible
6a Plateau Moorland, Forestry LCT sub-type	Negligible	Negligible
6c Plateau Moorland, Windfarm LCT sub-type	Negligible	Negligible
Designated landscapes		
Middle Clyde Valley SLA	Minor	Minor

Table 6.18: Summary of Residual Impacts on Visual Amenity

Visual Receptor		Construction (direct and indirect, short-term and temporary impacts)	Operation (direct and indirect, long-term impacts)
Viewpoints			
1	B715 near Climpy	Minor	Negligible
2	Springfield Reservoir	Minor	Minor
3	B7056 at Netherton Burn	Minor	Negligible
4	A706 near Muirfoot	Minor	Negligible
5	A721 near Muirhead	Minor	Minor
6	Minor Road, near Collielaw Cottage	Moderate	Minor
7	A721 near Kilncadzow	Negligible	Negligible
8	Craigenhill Road, north of Railway line	Minor	Minor
9	Cartland, south of Greentowers Farm	Minor	Minor
Settlements			
Climpy		Minor	Negligible
Forth		Negligible	Negligible
Kilncadzow		Negligible	Negligible
Cartland		Minor	Minor
Kirkfieldbank		Minor	-
Linnville		Minor	-
Routes			
A706		Minor	Negligible
A721		Minor	Minor
A73		Minor	Negligible
A72		Minor	Negligible
A71		Negligible	Negligible
B715		Minor	Negligible
B7056		Minor	Minor
Minor Roads		Minor	Minor
West Coast Mainline Railway		Negligible	Negligible
The Clyde Walkway		Minor	-
PRoW route SL21		Minor	Negligible
PRoW route SL26		Minor	Negligible

Table 6.19: Summary of Cumulative Landscape and Visual Impacts

Receptor		Cumulative impact of Construction (direct and indirect, short-term and temporary impacts)	Operation (direct and indirect, long-term impacts)
Cumulative Impacts on Landscape			
Landscape Resources			
Black Law - Central Scotland Forest		Minor	-
Landscape Character Types			
2 Upland Fringes LCT		Minor	-
18 Plateau Moorlands LCT		Negligible	-
6c Plateau Moorland, Windfarm LCT sub-type		Negligible	-
Cumulative Impacts on Visual Amenity			
Viewpoints			
1	B715 near Climpy	Minor	-
2	Springfield Reservoir	Minor	-
Settlements			
Climpy		Minor	-
Routes			
B715		Minor	-
B7056		Minor	-
PRoW route SL21		Minor	-
PRoW route SL26		Minor	-

References

[i] Scottish Government (2010) Scottish Planning Policy

[ii] Scottish Government (2003) Planning Advice Note (PAN) 68: Design Statements

[iii] Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011

[iv] Landscape Institute and Institute of Environmental Management and Assessment (2002) *Guidelines for Landscape and Visual Impact Assessment: Second Edition (GLVIA)*

[v] Countryside Agency and Scottish Natural Heritage (2002) *Landscape Character Assessment: Guidance for England and Scotland*

[vi] Countryside Agency and Scottish Natural Heritage (2004) *Landscape Character Assessment: Guidance for England and Scotland, Topic Paper 6: Techniques and Criteria for Judging Capacity and Sensitivity*

[vii] Scottish Natural Heritage (2006) *Visual Representation of Windfarms: Good Practice Guidance*

[viii] Landscape Institute (2011) *Use of Photography and Photomontage in Landscape and Visual Assessment*. Landscape Institute Advice Note 01/11

[ix] Turnbull Jeffrey Partnership (1996) *Assessment of Visual and Landscape Effects of Overhead Transmission Lines, Version 6.0*.

7 The Water Environment

Introduction

7.1 This chapter considers the potential impacts of the construction and operation of Black Law Windfarm Extension Grid Connection (hereinafter referred to as the 'proposed grid connection') on surface water hydrology, flood risk, surface water quality, groundwater and water resources. Groundwater is also discussed in **Chapter 13: Land Use**, with regard to mineral workings.

7.2 The chapter details the current baseline conditions within the study area focussing on the streams and catchments crossed by the proposed overhead line (OHL) and underground cables; flood risk at the stream crossings; groundwater aquifers; existing water resources along the cable routes and the quality of stream flows in watercourses close to the proposed grid connection.

7.3 The assessment presented in this chapter was undertaken by Kaya Consulting Limited. Other relevant chapters to this assessment are **Chapter 8: Ecology** and **Chapter 13**.

Study Area Description

7.4 The study area for this assessment includes the catchments and streams where the proposed infrastructure is located (see **Figure 7.1**). However, the assessment also considers downstream impacts of the proposed grid connection on surface water hydrology, flooding risk, water quality, groundwater and water resources. The downstream limit of the assessment is the River Clyde at Stonebyres Weir and the Darmead Linn at NS 913568.

7.5 The OHL route passes over open ground to the north of Lanark. The majority of the proposed grid connection lies within the River Clyde catchment area, and the route will pass over, or close to, streams associated with a number of watercourses including Abbett Burn, Netherton Burn, Back Burn, Fulwood Burn, Brocklinn Burn and the Mouse Water; all of which drain to the River Clyde. It will also pass over watercourses that connect to the Springfield Reservoir and close to ponds associated with old mine workings.

7.6 The northern part of the OHL route lies within the catchment of the River Almond, which flows to the north-east of the proposed grid connection. A 1km section of the OHL route is located in the catchment of Craig Burn and the Darmead Linn, which flow into the Breich Water, a tributary of the River Almond (**Figure 7.1**).

7.7 The underground cable route begins at a location north-west of Cartland and the underground cable follows the A73 Lanark Road south towards the Lanark Road Bridge, where it turns west on the Sunnyside Road and cuts through agricultural land to the River Clyde. The cable crosses the River Clyde over the existing Stonebyres Weir associated with the power station and connects to the Linnmill substation extension in the Clyde Valley, see **Figure 7.1**.

Impacts Assessed in Full

7.8 The following potential impacts of the proposed grid connection were assessed in full:

- impacts on hydrology, including flood risk (i.e. modifications to natural drainage patterns, changes to runoff rates and volumes and a consequent increase in flood risk during construction and operation of the proposed grid connection, including localised flooding and watercourse bank erosion caused by impediments to flow during construction);
- impacts on surface water quality during construction (i.e. potential pollution of surface water caused by releases of sediment to watercourses during construction, spillage of oils, fuels etc. or as a result of stream crossings or works near streams);
- impact on water resources, including public/private drinking water supplies during construction of the proposed grid connection.

Impacts Scoped Out

7.9 On the basis of a desk based study, survey work undertaken, the professional judgement of the EIA team, experience from other relevant projects and policy guidance or standards, the following topic areas have been 'scoped out', as proposed in the Scoping Report:

- impacts on geology during both construction and operation;
- impacts on groundwater quality and quantity during construction and operation. Given the nature of the proposed grid connection and the poor condition of the groundwater bodies in the study area; the hydrogeology of the aquifers within the study is considered to be not sensitive. This is consistent with the Scottish Environment Protection Agency (SEPA) consultation response (see **Table 2.1**) which concluded that under careful management of potential impacts on the existing ground conditions and restoration of disturbed areas, impacts on groundwater would not be considered significant. SEPA noted that it was unlikely that they would require more detailed information on this;
- changes to public/private water supply yield as a consequence of changes to run off rates and volumes during both construction and operation;
- pollution of surface water during operation and maintenance of the proposed grid connection;
- increased flood risk caused by impediments to flow in watercourses during operation and maintenance of the proposed grid connection;
- cumulative impacts with other development proposals and installations. Given the nature of the proposed grid connection, once it is operational there is expected to be no impact on the water environment. The only potential impacts on the water environment will be during construction, all of which were assessed to be not significant. Hence, it is unlikely there will be cumulative impacts.

Assessment Methodology

Assessment Structure

7.10 The assessment is structured around the consideration of potential impacts on the following:

- Surface water hydrology, including flood risk: changes to runoff and volumes and increased flood risk downstream;
- Surface water quality: changes in water quality due to erosion and sedimentation in watercourses, risk of pollution from accidental spills, increased suspended sediment during construction works;
- Water resources: changes in water quality of public/private drinking water supplies during construction.

Data Sources and Guidance

7.11 Key data sources used in the baseline and assessment sections of this chapter are shown below:

- Ordnance Survey mapping at 1:50,000, and 1:25,000 and 1:10,000 scales;
- SEPA River Basin Management Plan (interactive map). http://www.sepa.org.uk/water/river_basin_planning.aspx;
- National River Flow Archive: http://www.ceh.ac.uk/data/nrfa/index.html;
- Flood Estimation Handbook (FEH) CD ROM Version 3;
- SEPA Indicative River and Coastal Flood Map;
- Institute of Hydrology (1994). Flood estimation for small catchments. Report No IH124, Wallingford;
- Institute of Hydrology (1992). Low flow estimation in the UK. Report No IH108, Wallingford;
- The UK Hydrological Register;
- Scottish Natural Heritage Interactive Map (http://www.snh.gov.uk/publications-data-and-research/environmental-data/map/); and
- Clyde River Basin Management Plan and results of water quality monitoring (http://www.sepa.org.uk/water/river_basin_planning/area_advisory_groups/clyde.aspx);
- Hydrological Data UK: Hydrometric Register and Statistics 1996-2000, CEH & BGS;

- Hydrogeological map of Scotland, British Geological Survey, 1: 625,000, 1988;
- SEPA Digital Groundwater Vulnerability Maps;
- Institute of Hydrology (IH), 1999. Flood Estimation Handbook and CD ROM;
- SEPA River Basin Management Plan (interactive map). http://www.sepa.org.uk/water/river_basin_planning.aspx;
- British Geological Survey (2012) Hydrogeological Assessment for the Black Law Grid Extension Development Area.

7.12 The assessment was guided by and was undertaken in accordance with the guidance and legislation below:

- Water Environment (Oil Storage) (Scotland) Regulations 2006;
- Water Environment (Controlled Activities) (Scotland) Regulations 2005 (as amended);
- Water Framework Directive (2000/60/EC)(WFD), and Water Environment and Water (Scotland) Act (WEWS Act) 2003;
- Pollution Prevention and Control (Scotland) Regulations 2000;
- Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 (as amended);
- Control of Pollution Act 1974 (as amended) Part II: Pollution of Water;
- EC Freshwater Fish Directive (78/659/EEC), and the Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003;
- Surface Waters (Fish life) (Classification) (Scotland) Directions 2007;
- Habitats Directive (92/43/EEC) – Conservation of Natural Habitats and of Wild Flora and Fauna;
- The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended);
- The Water Supply (Water Quality) (Scotland) Regulations 2001;
- European Drinking Water Directive (Council Directive 98/83/EC);
- Private Water Supplies (Scotland) Regulations 2006;
- Water Environment (Drinking Water Protected Areas) (Scotland) Order 2007;
- The Flood Risk Management (Scotland) Act 2009;
- SEPA Policy, No. 19: Groundwater Protection Policy for Scotland, Dec 2003;
- SEPA Policy, No. 54: Land Protection Policy;
- National Planning Policy Guidelines, Scottish Planning Policy (SPP) (2010);
- PAN 50: Controlling the Environmental Effects of Surface Mineral Workings;
- PAN 58: Environmental Impact Assessment;
- PAN 61: Planning and Sustainable Urban Drainage Systems;
- PAN 69: Planning and Building Standards Advice on Flooding;
- PPG1: General guide to the prevention of water pollution;
- PPG2: Above ground oil storage tanks;
- PPG4: The disposal of sewage where no mains drainage is available;
- PPG5: Works in, near or liable to affect watercourses;
- PPG6: Working at construction and demolition sites;
- PPG8: Safe storage and disposal of used oil;
- PPG21: Pollution incident response planning;
- PPG22: Dealing with spillages on highways;
- SEPA: Water Environment (Controlled Activities) (Scotland) Regulations 2011 – A Practical Guide, August 2011;
- SEPA: Position Statement to support the implementation of the Water Environment (Controlled Activities) (Scotland) Regulations 2005, Culverting of watercourses V1.2, December 2006;
- Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 10 (HA 216/06) 'Road Drainage and the Water Environment';
- CIRIA: Environmental Good Practice on Site, 2005;
- CIRIA: Sustainable Urban Drainage Systems Design Manual for Scotland and Northern Ireland, C697, 2000;
- CIRIA: Control of water pollution from construction sites, C532, 2001;
- CIRIA: Control of water pollution from linear construction projects, C648, 2006;
- Forestry Commission: Forests and Water Guidelines Edition 4, 2003;
- HMSO Preparation of Environmental Statement for Projects that Require Environmental Assessment A Good Practice Guide, 1995;
- SNH: A Handbook on Environmental Impact Assessment;
- SNIFFER: Development of a groundwater vulnerability screening methodology for the Water Framework Directive, September 2004;
- Scottish Executive: River Crossings and Migratory Fish: Design Guidance, April 2000;
- SEPA, WAT-SG-25, Engineering in the Water Environment Good Practice Guide – Construction of River Crossings (April 2005);
- SEPA: Special Requirements for Civil Engineering Contracts for the Prevention of Pollution V2, 2006,WAT-SG-31;
- SEPA: Guidance on the Special Requirement for Civil Engineering Contracts V2, 2006, WAT-SG-32;
- SNH Scottish Wildlife Series (2008). Otters and Development. (www.snh.org.uk/publications/on-line/wildlife/otters/default.asp);
- SNH Constructed tracks in the Scottish Uplands (2006);
- Technical Note on Protecting the Environment during Mechanised Harvesting Operations (Forestry Commission, 2005).

Field Survey

7.13 Field walkover surveys of the proposed grid connection were undertaken on 30 September 2011, 03 October 2011, 28 October 2011, 14 May 2012 and 18 May 2012. Due to issues with site access, not all areas of the route were able to be accessed during the field survey. A section of the OHL route, along the Netherton Burn, south of Springfield Reservoir was not accessed; therefore the assessment for this section was informed by Ordnance Survey 1:10,000 mapping. In addition, there was no access to the land adjacent to the A73 road; again Ordnance Survey mapping was used along with observations from the road.

7.14 The field surveys included:

- a walkover survey of the proposed grid connection route and the surroundings in terms of local land use, topography, soils and surface water features;
- photography and confirmation of dimensions of the existing water features and proposed watercourse crossings;
- assessment of existing areas of stream erosion in the vicinity of the proposed infrastructure; and
- visual assessment of areas of wet ground along the proposed route.

Consultation

7.15 The Scottish Government Scoping Opinion included consultation responses from the statutory consultees (**Chapter 2: Approach to the EIA**). Those relevant to the Water Environment are summarised in **Table**

2.1 and are not repeated here. Additional consultation was carried out to inform this chapter and the consultation responses are summarised in **Table 7.1** below.

Table 7.1: Consultation Responses

Consultee	Scoping/Other Consultation	Issue Raised	Response/Action Taken
SEPA	Consultation response 03/11/2011, 08/12/2011 and 03/07/2011	SEPA was contacted for information on flow, water quality, meteorology and water supply data in the study area. SEPA provided the following data: • Mean daily flow data for nearby watercourses; • Monthly precipitation records for three rainfall gauges in the area; • Water Framework Directive (WFD) surface water chemistry for three watercourses in the area; and • Location and type of discharges within a 1km buffer of the proposed OHL.	The SEPA data was analysed and used to provide baseline environmental information (see Existing Conditions section, below.)
Scottish Water	Consultation response	Scottish Water provided plans of public water infrastructure. One private water supply was identified at the Hainginhead Farm, at NS 917 521.	Data was used to identify public water and private supplies in the area and for the assessment.
North Lanarkshire Council	Consultation response	The Council was contacted for information on private water supplies. North Lanarkshire Council provided a list of all private water supplies in their Council area.	The list of private water supplies was used to inform the assessment.
South Lanarkshire Council	Consultation response	The Council was contacted for information on private water supplies. South Lanarkshire Council replied saying they do not hold records of private water supplies within the area.	Noted

Assessing Significance

7.16 Sensitivity criteria to assess the sensitivity of water features are outlined in **Table 7.2**. The magnitude of impacts has been assessed based on the criteria presented in **Table 7.3**. These criteria are based on professional judgement and experience of other similar studies. The water feature needs to meet one or more criterion/criteria to be classed in the appropriate sensitivity or magnitude class.

Table 7.2: Criteria to assess Sensitivity of Water Features

Sensitivity	Surface Water Hydrology including Flooding	Water Quality
High	A watercourse with: i) important sensitive and protected ecosystems; ii) critical economic and social uses (e.g., water supply, navigation, recreation, amenity etc.); iii) known risk of flooding of properties (or land of great value); iv) large floodplains and other hydrological features providing critical flood alleviation benefits; vi) adjacent sites with international and European nature conservation designations due to water features; vii) a range of morphological features such as pools and riffles; viii) evidence showing channel migration and other morphological changes such as bar evolution.	i) Large (>100km^2) or medium (10-100km^2) watercourse with 'Good' water quality under the Water Framework Directive. Natural or semi-natural ecosystem with sensitive habitats and sustainable fish population; ii) International and European nature conservation sites designated due to water dependent ecosystems e.g. Special Protection Area and EC designated freshwater fisheries. Includes all nature conservation sites of national and regional importance designated by statute including Sites of Special Scientific Interest, National Nature Reserves and Natural Areas (part of a Regional Biodiversity Action Plan); iii) Watercourse supports a range of species and habitats sensitive to a change in suspended sediment concentrations and turbidity, such as migratory salmon or freshwater pearl mussels.
Medium	A watercourse with limited/few: i) sensitive or protected ecosystems; ii) economic and social uses (e.g., water supply, navigation, recreation, amenity etc.); iii) risk of flooding of property (or land of value); iv) floodplains and other hydrological features which provide some flood alleviation benefits; v) morphological features such as pools and riffles; vi) risk of being vulnerable to changes in fluvial processes (e.g., increased bank or channel erosion).	i) Large (>100km^2) or medium (10-100km^2) watercourse with a measurable degradation in its water quality as a result of anthropogenic factors (e.g., 'Medium' or 'Poor' water quality designation under the Water Framework Directive). Ecosystem modified resulting in impacts on the species diversity of flora and fauna in the watercourse. Moderately sensitive habitats; ii) Medium (10-100km^2) or small (1-10km^2) watercourse of 'Good' water quality under the Water Framework Directive that lies upstream of a larger watercourse with 'Good' water quality, where flows in smaller watercourse are minor compared to the larger stream; iii) Includes non-statutory sites of regional or local importance designated for water dependent ecosystems; iv) Watercourse lies upstream of a larger watercourse that supports a range of species and habitats sensitive to a change in suspended sediment concentrations and turbidity, such as migratory salmon or freshwater pearl mussels.

Sensitivity	Surface Water Hydrology including Flooding	Water Quality
Low	A watercourse with minimal hydrological importance to: i) sensitive or protected ecosystems; ii) economic and social uses (e.g. water supply, navigation, recreation, amenity etc.); iii) the flooding of property (or land of value); and which; iv) provides minimal flood alleviation benefits; v) shows no evidence of active fluvial processes and exhibits no morphological diversity.	ii) Large (>100km^2), medium (10-100km^2) or small (1-10km^2) watercourse with 'Poor' water quality designation under the Water Framework Directive', resulting from anthropogenic factor; ii) Minor (<1km^2) watercourse or man-made drainage channel with 'Good' water quality designation under Water Framework Directive, upstream of larger watercourse with 'Good' water quality, where flows in smaller watercourse are minor compared to larger stream; iii) Major change in the species diversity of flora and fauna due to the significant water quality degradation. Fish sporadically present; iv) Low sensitivity ecosystem of local and less than local importance. Does not support any significant species sensitive to changes to suspended sediment concentrations or turbidity.
Not Sensitive	Receptor lies outside sphere of influence of the proposed grid connection.	Receptor lies outside sphere of influence of the proposed grid connection.

Table 7.3: Criteria to assess Magnitude of Predicted Impact on Water Features

Magnitude	Surface Water Hydrology including Flooding	Water Quality
Major	Major shift away from baseline conditions and/or major changes to the flow regime. Considered as >10% change in average flows, > 25% decrease in low flows or > 10% change in peak flows Increased number of properties at risk of flooding and extent of "high risk" areas [classified by the Risk Framework contained in Scottish Planning Policy (SPP)] will be significantly increased. Major impacts on channel morphology resulting in change in channel form or loss of morphological diversity. Major interruption to fluvial processes such as channel plan form evolution or erosion and deposition.	A Major impact will be considered when there is a low dilution available in the watercourse and there is a major potential for accidental spillage of fuel and concrete, the watercourse is a designated fisheries river or has an environmental protection status (e.g. Special Area of Conservation (SAC), Special Site of Scientific Interest (SSSI)); there is water abstraction downstream or the flow pattern is such that sediment may accumulate to significant levels. Any change that downgrades a site from Good status as this does not comply with the Water Framework Directive. Major impacts to the river bed due to deposition or erosion. Major impacts to sensitive species or habitats as a result of changes to suspended sediment load or turbidity.
Moderate	Moderate shift away from baseline conditions and/or major changes to the flow regime. Considered as >5% change in average flows, > 10% decrease in low flows or > 5% change in peak flows Moderate increase in extent of "high risk" areas [classified by the Risk Framework contained in SPP]. Moderate impacts on channel morphology resulting in change in channel form or loss of morphological diversity. Moderate interruption to fluvial processes such as channel plan form evolution or erosion and deposition.	A Moderate impact will be classed when there is moderate dilution potential in the watercourse and medium potential for accidental spillage of fuel and concrete. Additionally, the watercourse is considered of regional ecological value (e.g. supports habitats of county or district importance, District Wildlife Sites (DWS) and Sites of Interest for Nature Conservation (SINS) or the flow pattern is such that sediment may accumulate to moderate levels. Impacts that result in a change in the ecological status of the watercourse. Changes to suspended sediment load or turbidity resulting in a moderate impact on sensitive habitats or species.
Minor	Minor shift away from baseline conditions and/or major changes to the flow regime. Considered as >1% change in average flows, > 5% decrease in low flows or > 1% change in peak flows Any change to the extent of "high risk" areas [classified by the Risk Framework contained in SPP] will be within the errors of method used to estimate the flood extent, e.g., for SEPA flood maps uncertainties in water levels might be of the order of 0.2 m or more.	A Minor impact will be classed when there is reasonable potential of dilution and low potential for accidental spillage of fuel and concrete, the watercourse is a considered of local ecological value (e.g. habitats of local value) or the flow pattern is such that sediment may accumulate to low levels. Minor changes to sediment transport resulting in minimal impacts on species or habitats as a result of changes to suspended sediment concentration or turbidity. Minor impacts to sediment patterns over this area due to either erosion or deposition.
Negligible	Very slight shift away from baseline conditions and negligible changes to the flow regime (i.e. changes that are within the monitoring and prediction errors). Considered as <1% change in average flows, <5% decrease in low flows or <1% change in peak flows	A Negligible impact is anticipated when the proposed engineering works are beside the watercourse and there is only an indirect potential impact from accidental spillage of fuel and concrete. Additionally, the watercourse might be slight impacted through low levels of sediment release, it has great potential for dilution, the flow pattern is such that sediment may not accumulate significantly or it is considered of less than local ecological value (e.g. habitats of limited ecological value). Very slight change from the baseline conditions such that no discernible impact upon the watercourse's ecology results. No change in water quality classification. Negligible changes to sediment transport. No discernible impact to sediment patterns and behaviour over the development area due to either erosion or deposition.

7.17 The predicted significance of impacts was determined through a standard method of assessment based on professional judgement, considering both sensitivity and magnitude of change as per **Table 7.4**.

7.18 Major and moderate impacts are considered significant in the terms of the Electricity Works (EIA) (Scotland) Regulations, 2000 (as amended).

Table 7.4: Significance Criteria

Sensitivity	Magnitude			
	Major	Moderate	Minor	Negligible
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible

Planning Policy

7.19 Planning policies of relevance to this assessment are provided in **Chapter 5**: **Planning Policy**.

Existing Conditions

7.20 This section details the existing topographical, hydrological and groundwater conditions present within the study area.

Surface Water Hydrology

7.21 The general topography of the study area is shown in **Figure 7.2**. Ground levels rise steadily from 145m AOD near Linnmill substation extension near Kirkfieldbank to an elevation of 260m AOD at the proposed Black Law Windfarm Extension substation. A long profile of the proposed route is shown in **Figure 7.2**. The average annual temperature within the catchments crossed by the proposed grid connection is approximately 7.5 – 9°C according to the Met Office regional climate normal for eastern Scotland.

7.22 The Standard Average Annual Rainfall (SAAR) for the catchments in the study area will vary from the high ground down to the River Clyde. For the Darmead Linn catchment, in the upland area, the SAAR is estimated to be 1000mm and for the Netherton Burn catchment it is estimated to be 930mm, based on data from the Flood Estimation Handbook (FEH) CD-Rom Version 3. The FEH CD-Rom also indicates that the percentage runoff for catchments in the study area range from around 40 – 55%, with percentage runoff for the Darmead Linn Catchment at around 53 % (SPRHOST = 52.57) while the percentage runoff for the Netherton Burn is at 43 % (SPRHOST = 42.6). These figures indicate that typically between 40-50 % of the rainfall falling on a catchment becomes river and stream flow. The rest is lost to infiltration to groundwater, soil water storage, evaporation or is used by vegetation. Such values are relatively high (e.g., catchments in the east of Scotland can have percentage runoff values between 30 and 40 %) reflecting soils with high runoff potential.

7.23 Soil conditions will vary locally within the study area; however, the Winter Rain Acceptance Potential (WRAP) Soil Class methodology provides an overview of typical soil conditions in the study area. Soils in the uplands area of the proposed grid connection are considered WRAP Soil Class 4, which indicates relatively impermeable soils with rapid surface runoff following rain. The Clyde Valley has WRAP Soil Class 3, which indicates slightly less impermeable soils but with the potential for shallow groundwater.

7.24 There are a number of operational stream flow stations within the catchments, within which the proposed grid connection infrastructure lies. However, the River Clyde is the only watercourse on which gauged data is available. Streamflows have been gauged on the River Clyde at two locations close to the proposed grid connection; Hazelbank and Tulliford Mill. At the Hazelbank gauge the catchment is 1092.9km^2 with a flow record dating back to 1957. The Tulliford Mill has a catchment size of 923km^2. The average annual flow at the Hazelbank gauge is 28.5m^3/s (26.1L/s/km^2). The catchment size is considerably larger than many of the small watercourses crossed by the OHL and underground cable. These smaller streams will have a more rapid response to rainfall due to the smaller size and generally steeper catchments than the River Clyde.

7.25 Flows are gauged on the River Netham at Kirkmuirhill gauge, which has a catchment of 66km^2. The catchment is larger, but not dissimilar to the Darmead Linn and the Netherton Burn. The River Netham is located approximately 5km west of Lanark. The gauge has stream flow records from 1966 – 2011, although there is a gap in the records from 1982 – 1987 when the station was closed. Average annual flows at this gauge are shown in **Figure 7.3**. At the gauge, the average annual flow is around 1.6 m^3/s (25.3 L/s/km^2), with the flow hydrograph showing a rapid response to rainfall. It is noted that high flows events may occur throughout the year, but generally higher flow events occur within the November to January period. Similar behaviour would be expected for the Darmead Linn, the Netherton Burn and similar watercourses within the study area.

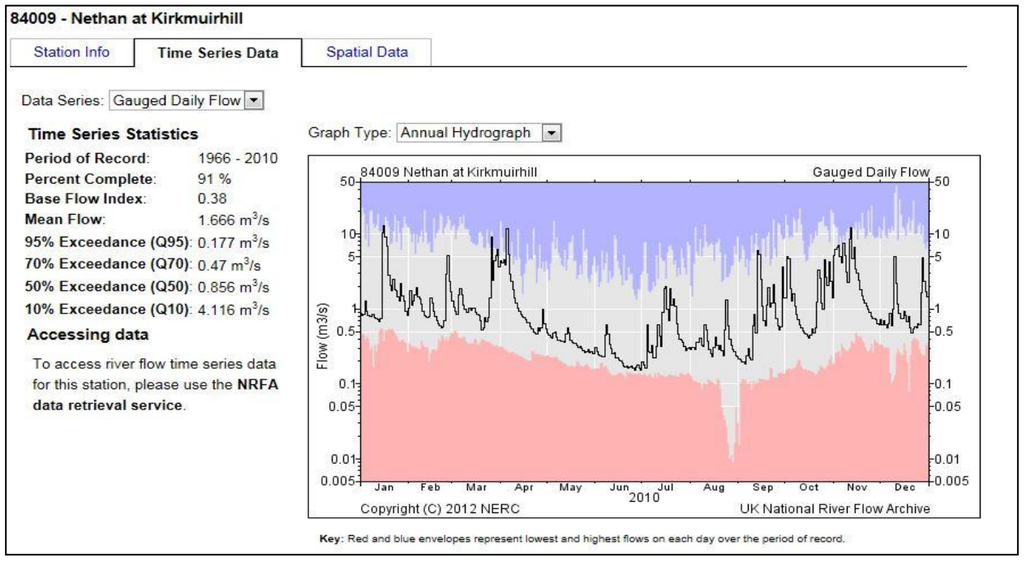
Stream Crossings and Watercourses

7.26 The OHL and underground cable route crosses 29 watercourses identified on Ordnance Survey maps and checked during walkover site visits. Locations of the crossings are shown in **Figure 7.4a-7.4c** and provided in **Appendix 7.1**. The streams crossed by the OHL and underground cable are typically small. In addition, no new permanent structures are proposed at any of the crossings and no infrastructure is proposed in the watercourse channels.

7.27 During design, care was taken to minimise the number of temporary access track crossings required during construction. Access will be provided by using existing tracks and roads as much as possible and extending them when required using temporary access tracks and temporary stream crossings. Based on **Figure 4.2a-4.2g**, only ten of the 29 watercourse crossings will have temporary stream crossings during construction. These are identified in the table in **Appendix 7.1** and are described in detail below, with photographs provided in **Appendix 7.2**.

7.28 The grid connection originates from the proposed Black Law Windfarm Extension substation and continues south-east as an OHL, crossing the Darmead Linn (**Plate 7.1**), Craig Burn (**Plate 7.2**) and two Craig Burn tributaries (**Plate 7.3** and **7.4**). The OHL passes over wet ground between the Darmead Linn and the Craig Burn tributary 1, as identified during site surveys. Craig Burn, its tributaries and part of the existing Black Law Windfarm are within the Darmead Linn catchment that flows to the Breich Water and then the River Almond.

Figure 7.3: Flow Data for the River Nethan at Kirkmuirhill



7.29 The OHL heads south crossing through the access road to Black Law Windfarm. From around this point, the OHL passes out of the River Almond catchment and into the River Clyde catchment. Within the existing windfarm, the OHL crosses an area of wet ground identified during site surveys, road drains (**Plate 7.5**), Abbett Burn (**Plate 7.6**) and Abbett Burn tributary 1 (**Plate 7.7**).

7.30 The OHL turns south-west towards the Hare Hill and follows along one of the Abbett Burn tributaries up to its headwaters. The OHL is within 50m of the tributary for approximately 600m of its length (see **Figure 7.4**). The OHL passes approximately 35m east of a small ponds associated with disused mining workings (**Plate 7.8**) and diverts approximately 140m east of the Springhill Farm Reservoir (**Plate 7.9**) crossing an area of wet, marshy ground, a number of issues and an unnamed watercourse (Unnamed Watercourse 1, **Plate 7.10**) that feed into the reservoir.

7.31 Downstream of the reservoir, the OHL crosses the reservoir outfall/Netherton Burn four times along a roughly 600m long reach (see **Figure 7.4**). Due to difficulties with site access, there are no photographs of this reach of the Netherton Burn. The OHL continues south along Back Burn tributary at the bottom of the Hill Rig. The OHL crosses the tributary (**Plate 7.11**) and is within 50m of the burn for approximately 1.7km of its length.

7.32 Near the Hole Farm, the OHL heads south-west crossing over Fulwood Burn (**Plate 7.12**) and three of its tributaries (**Plate 7.13, 7.14 and 7.15**). The Fulwood Burn tributary 2 has an existing culvert crossing and the OHL is within 50m of tributary 1 for approximately 430m of its length. The line then crosses over the railway, Brocklinn Burn (**Plate 7.16**), two of its tributaries (**Plate 7.17** and **7.18**) and Unnamed Watercourse 2 (**Plate 7.19**). The Brocklinn Burn tributaries and Unnamed Watercourse 2 crossings have existing culvert crossings.

7.33 At a location east of the Brocklinn Bridge the OHL terminates and the proposed grid connection continues via the underground cable. The underground cable follows the A73 Lanark Road, going over the Brocklinn Burn at the Brocklinn Bridge. Along the road, the underground cable passes along the upstream side of the road and passes the upstream extension of three minor unnamed streams. These streams are shown as channels on 1;10,000 scale Ordnance Survey maps downstream of the road and as minor channel features or depressions upslope of the road.

7.34 At the Lanark Road Bridge, the underground cable turns west on the Sunnyside Road and cuts through agricultural land to the Stonebyres Power Station. It crosses an unnamed watercourse to the south of Westwood Lane Farm. The underground cable crosses the River Clyde over the existing bridge/weir associated with the power station (**Plate 7.20**) and connects to Linnmill substation extension in the Clyde Valley.

Hydrology of Hillslope Sections

7.35 Remote from stream crossings, the proposed underground cable line will cross surface and shallow surface runoff flow pathways on hillslopes along the proposed cable route including areas of poor drainage. However, for much of its length the OHL and underground cable follow valley bottoms and not hillslope sections. From the proposed Black Law Windfarm Extension substation to the Linnmill substation extension there is a drop in elevation of only about 100m, an average gradient of 0.5%.

7.36 For most of the route the land use is generally farmland and forestry, drained by natural and man-made watercourses. There are very few sections of upland slope that are not drained by channels.

Flood Risk

7.37 The OHL route passes through agricultural or open ground and it does not pass close to any significant built-up areas. The underground cable does not cross any significant watercourses or floodplain areas, with the exception of the River Clyde.

7.38 The SEPA Indicative Flood Map for Scotland considers watercourses with upstream catchments >3km^2. It shows indicative 200 year floodplain extents. Along the OHL, the only crossings identified within the SEPA 200 year floodplain are at Darmead Linn (crossing C1) and the Netherton Burn (crossings C10 to C13). The underground cable crosses the SEPA flood map at the River Clyde only, but the proposed crossing of the river will not impact the floodplain as the Clyde sits in a steep valley at this location and the cable will pass above the river surface on Stonebyres Weir.

7.39 Based on site observations, there are likely to be floodplain areas along the route close to Back Burn. However, any floodplains would be expected to be small and confined to 5 -10m either side of the channel. In addition, the Back Burn is small and remote from properties.

7.40 A section of the underground cable passes upslope of Sunnyside Farm, between the Lanark Road bridge and the crossing of the River Clyde. Given the steepness of this hillslope section, any change in drainage patterns or flow rate on the hillslope could potentially increase flood risk to Sunnyside Farm.

7.41 A section of the underground cable will be along the A73, under the road. Hillslopes to the east of the road drain toward the road and to open watercourses on the western side of the road by way of small road culverts. Any changes or blockages to these flow pathways could result in increased flood risk to the A73.

Surface Water Quality

7.42 There are no designated nature conservation areas within the study area. Further downstream on the River Clyde and the River Almond catchments, no water-related SSSIs or SACs were noted.

7.43 The SEPA Water Body Classification for the Water Framework Directive (2008 results) indicate that Darmead Linn has good water quality, but the overall status of the burn is considered poor, due to a number of fish barriers, poor ecological status and morphological pressures. The Forth River Basin management plan indicates that the Darmead Linn will not reach overall good status until 2021 once morphological pressures are removed to allow fish passage among other improvements. Further downstream, the River Almond downstream of the Breich Water confluence was classified as poor water quality by SEPA and is not expected to reach overall good status until 2027. In contrast, the Netherton Burn has good water quality and the overall status of the burn is also considered good.

7.44 A number of watercourses within the study area are considered to be Salmonid waters, based on SEPA's salmonid fisheries map and baseline digital river network. The River Clyde, the River Almond, the Mouse Water and the Netherton Burn are all considered to be Salmonid Rivers. It is likely that smaller watercourses which are tributaries to the above may also have the potential to support salmonids. The River Almond is reported to have a healthy population of Brown trout and improving runs of both Atlantic salmon (*Salmon salar*) and Sea trout (*Salmo trutta*).

Groundwater

7.45 Review of the SEPA River Basin Management Plan (RBMP) database indicated that the site is underlain by the Lanark bedrock and Stirling and Falkirk bedrock aquifers, which also include aquifers within surficial sands and gravels. The SEPA RBMP database indicated that the proposed grid connection is within a Drinking Water Protection Area.

7.46 In 2008, SEPA classified the Lanark bedrock aquifer and Stirling and Falkirk bedrock aquifers as being of 'poor' quality. Mining and quarrying of coal is noted as the main pressure on the water. The Groundwater status of the study area is summarised in **Table 7.5**.

Table 7.5: Groundwater Body Status

Groundwater Body	Water Body ID Code	Quality	Quantity	Overall Status	Associated Surface Waters
Lanark bedrock and localised sand and gravel aquifers	150217	Poor	Poor	Poor	Mouse Water, Netherton Burn and River Clyde
Stirling and Falkirk bedrock and localised sand and gravel aquifers	150234	Poor	Poor	Poor	Darmead Linn

7.47 The hydrogeological conditions within the proposed grid connection route were assessed by the British Geological Survey (BGS) and their findings are discussed in their report, BGS (2012) Hydrogeological Assessment for the Black Law Grid Extension. The geology, drift geology and hydrogeology are mapped and discussed in detail in the BGS report and are summarised below.

7.48 Several different rock types exist along the proposed route of the OHL, belonging to the Passage Formation, the Upper Limestone Formation, the Limestone Formation, the Lower Limestone Formation, the Lawmuir Formation, the Clyde Plateau Volcanic Formation (all of Carboniferous age) and the Devonian Swanshaw Formation. The rocks form a successive stratigraphical sequence increasing in age from north to south along the proposed route.

7.49 Quaternary (superficial) deposits overlie much of the area of the route, with an area of peat in the northern half of the site area. Borehole records within the site area indicate the peat to be of variable thickness, ranging from 0.5 to 6m thick, but typically less than 4m. Glacial till deposits cover much of the land area along the proposed grid connection route. In the north of the area, the till underlies the peat deposits. Along the northern bank of the River Clyde at Kirkfieldbank, there are likely to be some glaciofluvial sand and gravel deposits, overlain by modern day alluvium from the River Clyde.

7.50 The peat and till deposits are unlikely to contain a significant amount of groundwater anywhere across the area, due to both their low permeability and limited thickness (generally less than 5m thick). If sand and gravel lenses are encountered within the till, these may support small groundwater seepages, and perched water tables. Any glaciofluvial and/or alluvial deposits along the northern bank of the River Clyde at Kirkfieldbank are likely to be highly to moderately permeable and to allow rapid groundwater throughflow.

7.51 Fracture flow was noted to occur within the bedrock aquifers in the study area. The occurrence of fracture flow can rapidly transport pollutants through an aquifer, this combined with the thin (<5 m thick) low permeability overlying protective cover, means that groundwater in these bedrock aquifers is vulnerable to contamination.

7.52 The BGS report identifies a number of groundwater related springs around the Springfield Reservoir, particularly to the east and north of the reservoir up to Hare Hill. Springs are also identified in the south-west area of the proposed route, in the vicinity of Nemphlar on the northern side of the River Clyde valley.

7.53 The BGS report notes that there are few available records of groundwater chemistry in the area. In general, the groundwater quality was considered poor, with concentrations of ions such as sulphate, iron and manganese often elevated above drinking water standards, and elevated manganese has been reported from boreholes within the area. In the north of the study area, former mine activities have resulted in poor quality, highly mineralised groundwater.

Water Resources

7.54 The OHL passes within 140m of Springfield Reservoir, which is operated as a recreational fishery, known as Springfield Fishery, and is regularly stocked with trout for recreational fishing. It is not used as a public water supply. The line crosses wet ground and a number of small streams that drain to the reservoir.

7.55 Scottish Water provided public water infrastructure plans for the study area. One private water supply at Haininghead Farm, approximately 900m east of the Springfield Reservoir, was labelled on the Scottish Water infrastructure plans, **Table 7.6**. In addition, the plans indicate that the OHL will cross Scottish Water distribution mains at the Moor Road and the railway tracks near Cartland, the Carnwath Road and its junction near the Hole Farm and the Yellowshields Road adjacent to the eastern side of the Springhill Reservoir.

7.56 North Lanarkshire and South Lanarkshire Councils were contacted for information on private water supplies. North Lanarkshire Council provided information on all the private water supplies within the Council area. These were assessed with regard to proximity and none of the private water supplies were close to the proposed grid connection; the closest one was near Shotts, some 6km to the north-west. South Lanarkshire Council did not provide information.

7.57 SEPA were contacted for information on private water supplies. Although SEPA were able to provide information on licensed discharges and abstractions, none of these related to private water supplies in the study area.

7.58 Data on wells within the study area were provided in the BGS (2012) report. It is unclear if these wells are used as private water supplies or for water resources; however, they are listed in **Table 7.6**.

7.59 In the absence of information on private water supplies from consultees, an alternative methodology was applied to identify a list of properties within the study area that could have private water supplies. Scottish Water infrastructure plans were studied to identify all properties within a 2km radius of the OHL and underground cable line that are not connected to the Scottish Water systems. Properties not connected to the Scottish Water system were considered as potentially having a private water supply.

7.60 Eight properties were identified that are *not* connected to the Scottish Water system, these are considered potential private water supplies and are the Whitecleugh Farm, Covanhill Farm, Hill of Kilncadzow Farm, Muirhead Farm, Birkenhead farm, the Birks Farm, Terracotta Nursery and Lockhart Mill, shown in **Table 7.6** and **Figure 7.4a-7.4c.**

7.61 To assess if these potential private water supplies could be affected by the proposed grid connection, with regard to risk to the quality of the water supply, the following criteria were used. The results are shown in **Table 7.6**:

- Is the private water supply within SEPA's recommended buffer width of the proposed grid connection infrastructure (i.e. within 250m of construction works or within 100m of temporary tracks and trenches?); and
- Is the private water supply within the same catchment as the proposed grid connection infrastructure?

7.62 In the absence of groundwater level data and given the topography of the area, it is assumed that groundwater flow pathways follow the surface topography. As a result, the general assumption is that if the catchment upslope of a private water supply is unaffected by the proposed grid connection infrastructure, there will be no significant impacts on surface water or groundwater flows to the supply. The groundwater flow pathways may be locally influenced by fracture geometry but this is unlikely to re-direct groundwater flows across topographical divides.

7.63 The assessment identified that several supply catchments are crossed by existing public roads that will be used for site access. However, construction works are not proposed within these areas and, as a result, the proposed grid connection is not expected to impact these potential water supplies.

7.64 Three potential private water supply properties, i.e. Birkenhead Farm, Birks Farm and Terracotta Nursery, lie adjacent to watercourses which are potentially impacted by the proposed grid connection in their headwaters. However, given the relatively poor stream quality in this area, any private water supply would not be directly from the streams. Private water supplies in these locations would be from springs from higher ground above the properties. As no infrastructure is located upslope of these properties, they are not likely to be affected by the proposed grid connection.

Table 7.6: Details of Identified Private Water Supplies, Wells and Potential Private Water Supplies

No.	Property Name	Type	NGR	Infrastructure within buffer zones[a]	Works proposed within the feature catchment	Potentially affected by the proposed grid connection
1	Haininghead Farm	Private Water Supply	291707 652109	No	No	No
2	Well NS84/1	Well	289570 648850	No	No	No
3	Well NS85/13	Well	288150 650280	No	No	No
4	Well NS85/11	Well	287840 650250	No	No	No
5	Well NS85/10	Well	287780 650220	No	No	No
6	Whitecleugh Farm	Potential Private Water Supply	292350 652810	No	No	No
7	Covanhill	Potential	292318	No	No	No

No.	Property Name	Type	NGR	Infrastructure within buffer zones[a]	Works proposed within the feature catchment	Potentially affected by the proposed grid connection
	Farm	Private Water Supply	651719			
8	Hill of Kilncadzow Farm	Potential Private Water Supply	289263 648550	No	No	No
9	Muirhead Farm	Potential Private Water Supply	290789 648027	No[b]	No[b]	No
10	Birkenhead Farm	Potential Private Water Supply	288996 647000	No[b]	No	No
11	The Birks Farm	Potential Private Water Supply	289244 647000	No[b]	No	No
12	Terracotta Nursery	Potential Private Water Supply	289231 646875	No[b]	No	No
13	Lockhart Mill	Potential Private Water Supply	287773 645289	No	No[b]	No

[a]SEPA recommends the construction of tracks and trenches outside a 100m buffer from PWS and a 250m buffer for other infrastructure works.

[b]None of the proposed grid connection is within the 250m buffer of the potential PWS. However, the existing public roads used for site access cross the buffer.

The 'Do Nothing' Scenario

7.65 If the proposed grid connection were not developed, it is expected that current land use practices will continue as present. This may include further windfarm development in the study area. The majority of the proposed grid connection travels over agricultural land, with any changes in farming practices potentially having an impact on water quantity and quality within the study area. There is forested land within the study area although changes in forestry practices are unlikely to significantly change water flows or water quality. The surface water hydrology, water quality and flood risk within the study area will be expected to remain as at present in the 'Do Nothing Scenario', although the ongoing impacts of climate change will produce changes in the seasonal patterns of rainfall and stream flow and have implications for flood flows.

Routeing and Design Considerations

7.66 During the iterative design process of the proposed grid connection, the route was designed to avoid water bodies wherever possible. There are no significant engineering works proposed on any of the watercourses, with the exception of some temporary watercourse crossings during construction. No poles or construction areas are proposed in any of the watercourses.

7.67 The route has also been delineated with knowledge and consideration of stream crossings, sensitive watercourses, hydrological features, wells and private water supplies, SEPA's indicative 200 year flood extents and observations of areas of wet ground and water features identified during site visits.

Impact Assessment

7.68 The assessment of impacts is based upon the development description outlined in **Chapter 4**: **Development Description** and is structured as follows:

- construction impacts;
- operational impacts.

Site Sensitivity

7.69 Based on the baseline assessment and consultation responses, sensitive receptors and locations have been selected for each of the subject areas considered in this chapter; surface water hydrology, flood risk, surface water quality and water resources. The impact assessment focuses on assessing impacts on these sensitive receptors, summarised in **Table 7.7**.

7.70 As the proposed grid connection spans a large number of small catchments and tributaries, four key locations were identified to assess the impact of the proposed grid connection on surface water hydrology and flood risk. These locations are shown in **Figure 7.4a-7.4c** and reflect points in the catchments, which lie downstream of proposed grid connection infrastructure and include the catchments of Darmead Linn, which flows into the Almond Water and the catchments of Netherton Burn, Fulwood Burn and Brocklinn Burn that flow into the River Clyde, **Table 7.7**.

7.71 Given the rural location, the size of the streams and the lack of wide floodplains, the watercourses and crossings within the study area are considered to be of Low sensitivity with respect to flood risk.

7.72 Two areas of hillslopes were considered sensitive receptors. The section of the underground cable route between the Lanark Road Bridge and River Clyde, where the route passes across open farmland upslope of Sunnyside Farm and the River Clyde is considered sensitive, due to the potential changes in runoff affecting the farm down-slope of the cable trench. In addition, the section of the underground cable under the A73 road is considered to be sensitive to flood risk, with Medium sensitivity as there is a risk of flooding of land of value (i.e. A73).

7.73 For surface water quality, sensitive receptors also include several watercourses that lie adjacent to the proposed cable route for sections of their length (i.e. Abbett Burn tributary, Netherton Burn, Back Burn and Fullwood Burn tributary 1). These are considered to be of Medium sensitivity.

7.74 The water resources assessment focuses on impacts to Springfield Reservoir, due to its water use as a recreational fishery, which was considered as a sensitive receptor of Medium sensitivity for water quality.

Table 7.7: Sensitivity Assessment of Potentially Impacted Receptors

Receptor	Reason for Selection	Sensitivity for hydrology	Sensitivity for flood risk	Sensitivity for water quality
Watercourse crossings by the OHL and underground cable	During construction, temporary crossings will be constructed on the watercourses crossed by the OHL and underground cable, which could have local impacts on water quality and flood risk.	Low	Low	Low
Abbett Burn tributary	The OHL runs adjacent to the tributary and is within	Not sensitive	Not sensitive	Medium

Receptor	Reason for Selection	Sensitivity for hydrology	Sensitivity for flood risk	Sensitivity for water quality
	50m for approximately 600m of its length, therefore potential impact on water quality during construction. Lies upstream of River Clyde which is salmon bearing.			
Netherton Burn	The OHL runs adjacent to the burn and crosses it four times along a 600m reach. Lies upstream of River Clyde which is salmon bearing.	Low	Low	Medium
Back Burn	The OHL runs adjacent to the burn and is within 50m of the burn for approximately 1.7km of its length. Lies upstream of River Clyde which is salmon bearing.	Not sensitive	Not sensitive	Medium
Fullwood Burn tributary 1	The OHL runs adjacent to the burn within 50m of the tributary for approximately 430m of its length. Lies upstream of River Clyde which is salmon bearing.	Not sensitive	Not sensitive	Medium
Darmead Linn catchment downstream of the proposed grid connection	Development infrastructure (temporary and permanent) is located within catchment.	Low	Low	Medium
Netherton Burn catchment at the confluence with Candymill Burn	Development infrastructure (temporary and permanent) is located within catchment.	Low	Low	Medium
Fulwood Burn catchment at the Mouse Water confluence	Development infrastructure (temporary and permanent) is located within catchment.	Low	Low	Medium
Brocklinn Burn catchment at Brocklinn Bridge	Development infrastructure (temporary and permanent) is located within catchment.	Low	Low	Medium
Hillslope section of the underground cable route between the Lanark Road bridge and River Clyde	The underground cable runs across the slope upslope of Sunnyside farm and may interact with natural flow paths.	Low	Low	Not sensitive
Section where the underground cable will pass under the A73.	Sediment and debris during construction may intercept or interact with natural flow paths and/or cause blockage to existing road culverts.	Low	Medium	Not sensitive
Springfield Reservoir	The OHL passes within 140m of the reservoir, which is operated as a recreational fishery.	Not sensitive	Not sensitive	Medium

Construction Impacts

Predicted Impacts

Predicted Impacts on Surface Water Hydrology and Flood Risk

7.75 The construction works have the potential to impact on natural drainage patterns and runoff rates. The primary impact is likely to be an increase in runoff rates due to hard standing areas or compacted/disturbed ground during construction. A further issue is the potential for the works to act to divert existing flow pathways, either through runoff entering the underground cable trench or water being diverted by ditches or spoil on the upstream side of the trench. There is the potential for excess surface runoff to be retained within the trench short-term.

7.76 The underground cable will cross the River Clyde utilising the cable ducts installed during the refurbishment of Stonebyres Weir and there are no works in or close to the watercourse.

7.77 The footprint of the proposed grid connection during construction is summarised in **Table 7.8** divided into the four catchments identified for assessment (see **paragraph 7.70** above). For the purpose of this assessment, the following conservative methodology has been used to assess the risk of additional surface water runoff:

- In terms of total runoff volumes during an event, data from FEH CD-Rom Version 3 suggests that around 40% of the precipitation falling on a catchment reports to streams as runoff. In the worst case that 100% of the precipitation landing on compacted or disturbed ground converts to runoff, a 1% increase in impermeable area in a catchment would increase runoff by around 1.2%. Assuming a doubling of runoff from compacted ground (i.e., 80% runoff), a 1% increase in impermeable area in a catchment would increase runoff by around 1%.
- For flood flows, the standard Rational Method of estimating peak flows on ungauged catchments provides a simple and conservative method of calculating peak flows from a catchment. Based on appropriate variables for the study area, the Rational Method would suggest that an increase of 1% of the catchment area in impermeable hardstanding would result in a 1.2% increase in peak flows from the catchment. An increase of 1% of compacted ground with 80% runoff under high flow conditions would result in approximately 1% increase in peak flows from the catchment.
- The temporary construction areas could be considered as compacted ground with increased surface runoff. Laydown/working areas are also considered as compacted ground. In the worst case, it is considered that 100% of the precipitation landing on these compacted areas is converted to runoff, i.e., disturbed areas are 100% impermeable. This is a worst case and assumes no mitigation for excess surface runoff such as Sustainable Urban Drainage Systems (SuDS).

- Loss of trees is also likely to increase surface water runoff, as approximately 9.98hectares (ha) of tree felling is required for the construction of the OHL and underground cable, i.e. 25m on either side of the OHL and a 10m corridor for the underground cable. A further 2.47ha will be felled as part of the woodland management strategy (see **Chapter 12** for further details). However, the impact of felling would be expected to be less than increases in runoff associated with temporary construction areas. A conservative approach is taken for this assessment in assuming that felled areas will produce a doubling in runoff compared to the pre-development forested areas.

7.78 Potential impacts on surface runoff rates and flood flows within key catchments are summarised in **Table 7.9**. The results presented in the table are conservative as they do not take into account mitigation measures and consider the full construction footprint occurring at the same time.

7.79 The results indicate that the catchment areas disturbed by the proposed grid connection are all less than 1.06% of the natural catchment areas, ranging from 0.31% for the Netherton Burn catchment to 1.06% for the Darmead Linn, **Table 7.9**. Based on the methodology above, the resultant predicted increase in annual surface runoff as a result of the proposed grid connection is very low (i.e. between 0.31 and 1.06%) and the predicted increase in flood flow is less than 1.06% at all locations. Using the criteria in **Table 7.3**, the magnitude of impact, pre-mitigation on surface water hydrology, including flood flows, is considered to be Minor at Darmead Linn and Negligible at the other assessment locations.

Table 7.8: Proposed Grid Connection Footprint within Potentially Impacted Catchments

Point	Location	Catchment Area (km^2)	Co-ordinates	Temporary Working Areas (m^2)[a]	Forestry felling (m^2)[a]	Underground cable (m^2)[a]	Total (m^2)
1	Darmead Linn downstream of the proposed grid connection	6.4	291279 656766	2,930	65,000	0	67,930
2	Netherton Burn at the confluence with Candymill Burn	10	290918 650712	6,300	24,700	0	31,000
3	Fulwood Burn at the Mouse Water confluence	6.3	288321 645635	5,630	32,100	0	37,730
4	Brocklinn Burn at Brocklinn Bridge	1.3	286233 646188	2,930	2,700	12	5,630

[a] Calculated with the GIS layout of the proposed grid connection and the **Chapter 4** design specifications

Table 7.9: Maximum Impact of Grid Connection on Surface Runoff and Flood Flows for potentially Impacted Catchments

Point	Location	Catch-ment Area (km^2)	Area disturbed during develop-ment (km^2)	Percentage of catchment impacted[a]	Possible maximum increase in annual runoff (no mitigation)[b]	Possible maximum increase in flood flows (no mitigation)[b]	Magnitude of impact, pre-mitigation
1	Darmead Linn	6.4	0.068	1.06%	1.06%	1.06%	Minor
2	Netherton Burn	10	0.031	0.31%	0.31%	0.31%	Negligible
3	Fulwood Burn at the Mouse Water confluence	6.3	0.038	0.60%	0.60%	0.60%	Negligible
4	Brocklinn Burn at Brocklinn Bridge	1.3	0.006	0.43%	0.43%	0.43%	Negligible

[a] Estimated by comparing the impacted catchment with the natural catchment area.
[b] Estimated with the methodology described in para. 7.77.

7.80 The River Clyde catchment at Stonebyres Power Station is approximately 1,082km^2. Given that the total development footprint is very small (<0.1km^2), the magnitude of the impact on surface water runoff and flood flows in the River Clyde is predicted to be Negligible for such a large catchment.

7.81 As no permanent stream crossings or temporary culverts are proposed for any watercourse and post-construction ground levels along the corridor will be returned to pre-development conditions, there would be expected to be no long-term changes to flood storage in any areas.

7.82 Flood risk at all crossings along the route is considered Low. The physical design of the OHL is unlikely to affect the hydrological characteristics of the catchments and it does not interact directly with any of the watercourses. Watercourse crossings of the underground cable will use existing road bridges on the A73 (e.g. the Brocklinn Burn crossing) and will use the existing Stonebyres Weir at the River Clyde. Hence, there is unlikely to be any impact on flood risk as there will be no new works within the watercourses.

7.83 Along the OHL, the only crossings identified within the SEPA 200 year floodplain are at Darmead Linn (crossing C1) and the Netherton Burn (crossings C10 to C13). In this area, two OHL poles are located within the SEPA flood map, numbers 68 and 71 adjacent to Netherton Burn.

7.84 Temporary stream crossings or construction debris (vegetation, sediment) entering streams during construction has the potential to cause blockage or restrictions within channels crossed by the OHL or underground cable, which can increase flood risk. Along the OHL, no permanent crossings are proposed. During construction, watercourses will be crossed by temporary bridges at ten crossing locations; these will be in the form of a mat of timbers (**Figure 4.6**), due to the narrow width of the watercourses crossed. In order to minimise the number of temporary crossings required and avoid larger or more sensitive water features, existing access roads and tracks will be used where possible. Crossings would be expected to be in place for very short periods of time of a few days at most. Based on the design of the temporary crossings, it is not anticipated that they would increase flood risk, as during high flow conditions, water would flow over and/or around the temporary structure.

7.85 In addition, there are no properties adjacent to any of the crossings. Hence, even in the worst case that high discharge events occur at the same time as a temporary crossing is in place, flows would not inundate

any properties, but would likely flood land adjacent to the channel and re-enter the channel downstream of the crossing.

7.86 The key areas of flood risk that were identified include the hillslope upstream of Sunnyside Farm and maintaining continuity of flows across A73. During construction of the trench, there is the potential for runoff upslope of the trench to be diverted from its natural flowpath toward the Farm. The impacts are likely to be small as there is limited catchment area upslope of the trench and a substantial distance between the trench and the farm, hence although there is a theoretical risk of an increase in flooding the pre-mitigation impact is considered to be unlikely and of minor magnitude.

7.87 During construction of the trench under the A73, there is the potential for sediment and debris from the construction works to cause blockage of drainage culverts under the road or the diversion of natural flow pathways away from the culverts. If the culverts were blocked or flows were unable to reach the culverts there is a risk that flood waters could flow onto the road. Given the small catchment area upstream of the road, it is unlikely that flooding would reach a depth sufficient to cause a blockage to traffic, however any flood waters on the road could be a hazard to drivers. This scenario is considered unlikely as heavy rainfall would need to occur during construction of this section of the route. In addition, as the cable trench will be under the road, the construction phase is not likely to generate significant amounts of sediment and debris, therefore the magnitude is considered to be Minor.

7.88 The underground cable will cross the River Clyde at Stonebyres Weir and will be well above the water level. This will not result in any change in flood risk on the Clyde.

7.89 A summary of the pre-mitigation impact assessment of the proposed grid connection on surface water hydrology, including flood risk is provided in **Table 7.10**. The assessment shows that pre-mitigation impacts on surface water hydrology and flood risk are considered to be of Negligible significance at all receptors, with the exception of the impact to flood risk at the section of underground cable along the A73, where the pre-mitigation impact is assessed to be of Minor significance.

Table 7.10: Pre-mitigation Construction Impact Assessment for Surface Water Hydrology, including Flood Risk

Receptor	Impact	Sensitivity of Receptor	Magnitude of Impact	Likelihood of impact occurring	Significance of Impact (prior to mitigation)
Watercourse crossings by the OHL and underground cable	Increase in surface runoff and flood flows	Low	Negligible	Possible	Negligible
Netherton Burn	Increase in surface runoff and flood flows	Low	Negligible	Possible	Negligible
Darmead Linn catchment downstream of the proposed grid connection	Increase in surface runoff and flood flows	Low	Minor	Possible	Negligible
Netherton Burn catchment at the confluence with Candymill Burn	Increase in surface runoff and flood flows	Low	Negligible	Possible	Negligible
Fulwood Burn catchment at the Mouse Water confluence	Increase in surface runoff and flood flows	Low	Negligible	Possible	Negligible
Brocklinn Burn catchment at Brocklinn Bridge	Increase in surface runoff and flood flows	Low	Negligible	Possible	Negligible
Hillslope section of the underground cable route between the Lanark Road bridge and River Clyde (Sunnyside Farm)	Increase in surface runoff and flood flows	Low	Minor	Unlikely	Negligible
Section where the underground cable will pass under the A73.	Increase in surface runoff	Low	Minor	Unlikely	Negligible
	Increase in flood flows	Medium	Minor	Unlikely	**Minor**

Predicted Impacts on Water Quality

7.90 The key risk to surface water quality as a result of the construction works relates to an increase in suspended sediment concentrations. All construction activities that involve ground movement (e.g., opening of the trench, construction of temporary access tracks, construction compounds, temporary watercourse crossings, tree felling and temporary working and pulling areas around the wood poles) have the potential to expose bare soil and to result in increased erosion and sedimentation. Sediment in runoff and drainage from construction areas and access tracks may give rise to unacceptable levels of suspended solids and turbidity in watercourses. Increased sediment load in streams can impact the ecology and health of a stream by smothering micro-invertebrates or by changing the oxygenation state of the stream bed.

7.91 Proximity of construction works to watercourses is a key risk factor. The OHL and underground cable crosses 29 mostly small watercourses along its length (see **Figure 7.4a-7.4c** and **Appendix 7.1 and 7.2**) and some minor field drains and runs adjacent to several watercourses for some sections of its length. During construction of the OHL, the number of access tracks that need to cross watercourses has been minimised. However, where a temporary access track is required to cross a watercourse, a temporary bridge will be utilised (see **Chapter 4**, **Figure 4.6** for proposed crossing design); the construction plans only involve construction of temporary track crossings at ten of the 29 OHL crossings (see **Appendix 7.1 and 7.2**). At the other crossings, there will be no works in the watercourse and the OHL will pass over the watercourse.

7.92 The watercourses that have temporary crossings are narrow, with widths ranging from <0.5m to a maximum of 2.5m and during site visits there was no evidence of existing bank erosion.

7.93 Areas where the OHL is located close to watercourses and/or runs adjacent to watercourses is a risk factor for water quality during construction, due to the proximity of temporary access tracks and working areas during pole construction being close to the watercourses. Four watercourses were noted as being at risk (see **Figure 7.4a-7.4c**):

- Abbett Burn tributary where the OHL is approximately 50m from the stream for approximately 600m of its length (poles 97 to 101). The watercourse here is a narrow, minor stream (<0.5m wide) with well vegetated banks (**Plate 7.7**). Given the distance of construction activities from the watercourse, the

limited amount of ground movement and the presence of dense vegetation (which would act as a natural filter for any contaminants or suspended sediment), any impacts will be of Negligible magnitude.

- Netherton Burn where the OHL runs adjacent to the burn and crosses it four times along a 600m reach (poles 66 to 71); two of the pole working areas (68 and 70) are adjacent to the watercourse, however it is noted that there are no temporary crossings proposed and the access track is set back from the channel. Due to problems with site access, this reach of Netherton Burn could not be visited during field surveys. Given uncertainties with the watercourse and the proximity of the construction works to the watercourse, this is considered of Minor magnitude.
- Back Burn where the OHL runs adjacent to the burn and is within 50m of the burn for approximately 1.7km of its length (poles 42 to 54); there are four temporary pulling areas, a temporary access track, 13 temporary working areas around the poles and one temporary crossing on this reach of the Back Burn. The Back Burn is a narrow channel (approx. 1m) with a well vegetated buffer strip (around 5m wide) between the channel and agricultural land, which is in short grass (**Plate 7.11**). The buffer zone will act as a natural filter for any sediment or contaminants entering from construction work. The construction activities will not encroach on the vegetated buffer areas and will be within the agricultural land, given the buffer strip and the limited ground disturbance during constructions, any impacts will be of Negligible magnitude.
- Fullwood Burn tributary 1 where the OHL runs adjacent to the burn within 50m of the tributary for approximately 430m of its length (poles 33 to 35); two temporary working areas around poles located close to the watercourses and there is also a temporary crossing proposed here. Again this watercourse is narrow (0.75m) with a well vegetated buffer strip (around 10m wide) between the channel and agricultural land, which is in short grass (**Plate 7.13**). This is similar to the Back Burn described above, and hence, any impacts are considered of Negligible magnitude.

7.94 Tree felling in the vicinity of streams can be a major cause of erosion risk. As noted in **Chapters 4** and **13**, there will be tree felling and clearance of vegetation along the route to enable access to pole locations, construction of the OHL, installation of cable connections and for woodland management. In total, an area of approximately 12.45ha will be felled. The key areas of tree felling are noted on **Figure 13.3** and include an area between poles 120 and 128 near the Darmead Linn and tributaries of Craig Burn; a section of OHL that runs adjacent to a woodland area, north of Springfield Reservoir between poles 87 and 91; sections of OHL adjacent to woodland between poles 20 and 21, 13 and 17 and 8 and 10, close to Fulwood Burn tributary 3 and Brocklinn Burn tributary 1. In addition, tree felling will take place where the OHL changes to the underground cable and on the right bank of the River Clyde adjacent to the Stonebyres weir.

7.95 In addition to water quality impacts due to suspended solids, pollution incidents may occur from spillage of fuels, oils or lubricants during the operation or refuelling of construction vehicles. Pollutants could enter watercourses through direct spills and also overland flow if spilled adjacent to watercourses.

7.96 Construction compounds will be required for delivery, storage and assembly of materials and dispersal of plant and equipment and temporary welfare facilities. Temporary toilet facilities will be required for construction staff in the construction compounds. Effluent will be retained within the toilets and disposed offsite. Two temporary construction compounds are proposed for the proposed grid connection, and will be located within a farm complex or similar location where existing hard standings and convenient road access facilitate delivery of materials. As discussed in **Chapter 4**, these locations will be agreed between SPT and the landowners; however indicative locations are given in **Figure 4.2a-4.2g.** One compound is proposed on an area of higher ground, approximately 100m to the west of Netherton Burn. The other proposed compound is located adjacent to the railway line at NS 880467 and is not close to a watercourse.

7.97 A summary of the pre-mitigation impact assessment of the proposed grid connection on surface water quality is provided in **Table 7.11**. Due to the nature of the proposed grid connection, it is noted that potential significant impacts on surface water quality are localised to small watercourses that lie close to the OHL (i.e. a 600m reach of the Netherton Burn), which is considered to have an impact of Minor significance prior to mitigation during construction, **Table 7.11**. Further downstream at the catchment scale, the pre-mitigation impacts are considered to be Negligible at all assessment locations, due to the increased dilution and mixing available in the watercourses. It is noted that mitigation measures incorporated in the construction phase will minimise impacts and all impacts during construction will be temporary and very short-lived.

Table 7.11: Pre-mitigation Construction Impact Assessment for Surface Water Quality

Receptor	Sensitivity of Receptor	Magnitude of Impact	Likelihood of impact occurring	Significance of Impact (prior to mitigation)
Watercourse crossings by the OHL and underground cable	Low	Minor	Possible	Negligible
Abbett Burn tributary	Medium	Negligible	Possible	Negligible
Netherton Burn reach	Medium	Minor	Possible	**Minor**
Back Burn reach	Medium	Negligible	Possible	Negligible
Fullwood Burn tributary 1	Medium	Negligible	Possible	Negligible
Darmead Linn catchment downstream of the proposed grid connection	Medium	Negligible	Possible	Negligible
Netherton Burn catchment at the confluence with Candymill Burn	Medium	Negligible	Possible	Negligible
Fulwood Burn catchment at the Mouse Water confluence	Medium	Negligible	Possible	Negligible
Brocklinn Burn catchment at Brocklinn Bridge	Medium	Negligible	Possible	Negligible

Water Resources

7.98 No private water supplies were considered as receptors sensitive to impacts from construction activities, therefore there are no predicted significant impacts on private water supplies. However, one recreational fishery at Springfield Reservoir was considered as a sensitive receptor for the water resources impact assessment, due to its use as a recreational fishery.

7.99 The key impact on the reservoir water quality will be potential releases of sediment from construction activities with increased sediment concentrations in the reservoir potentially having an impact on fish. In addition, releases of oils and other pollutants from machinery would also have a potential impact on water quality in the reservoir.

7.100 As noted in **Chapter 4**, temporary pulling areas will be formed either through stone laid on a membrane or by aluminium panels, neither of which would be expected to pose a high risk of generation of sediment. The length of temporary access tracks has been minimised in this area and these tracks are not considered to pose a high risk of sediment release to watercourses. However, given there are six poles within 200m of

the reservoir and other poles close to watercourses flowing to the reservoir (see **Figure 7.4**) the potential impact on water quality of the reservoir without mitigation is considered of Minor significance, **Table 7.12**.

Table 7.12: Pre-mitigation Construction Impact Assessment for Water Resources

Receptor	Impact	Sensitivity of Receptor	Magnitude of Impact	Likelihood of impact occurring	Significance of Impact (prior to mitigation)
Springfield Reservoir	Change to quality of water in recreational fishery due to pollution from construction activities	Medium	Minor	Possible	**Minor**

Proposed Mitigation

Hydrology and Flood Risk

7.101 Standard runoff mitigation measures will be employed (such as SuDS) which will attenuate surface runoff during development to greenfield conditions. For the substation works, standard SuDS measures such as filter trenches and attenuation ponds would be expected to attenuate runoff rates. For temporary access tracks, drainage ditches and check dams would provide some degree of attenuation of surface runoff.

7.102 Blockages of channels causing localised flooding will be minimised by the use of existing access roads for the construction of the proposed grid connection at most crossing locations (**Appendix, Table 7.1**). However, temporary crossings will be required for ten watercourses; as these are all narrow channels this will comprise of a mat of timber (see **Figure 4.6c**).

7.103 There may be culverted field drains, field ditches and other minor drains (not visible on 1:10,000 scale mapping) crossed by the OHL, such as the field drain close to the Fullwood Farm identified in the baseline assessment. At these locations, construction would not be expected to increase flood risk, but existing flow pathways (or alternatives) will be maintained during construction (e.g., temporary culverts, pumps or bypass channel), so as not to increase flood risk to properties. The open trench excavated for the underground cable should not provide an alternative flood flow pathway that would flood adjacent land, properties or public roads. However, the need for channel diversions and other measures to minimise flood risk during construction will be considered at detailed design stage or during construction in response to local conditions. Minor field drains and ditches intercepted during construction will be secured in advance through the installation of cut-off drains and all drainage will be reinstated following cable installation.

7.104 For all locations, the risk of flooding will be minimised by the remediation of the working areas as the works progress, limiting the time that bare ground is exposed or streams are being crossed. Much will depend on weather conditions during construction, with a risk of flooding only if construction activities coincide with heavy rainfall. Daily weather reports for the construction sites will be made available with further mitigation measures put in place if extreme weather conditions are forecast. These measures will include the removal of temporary crossings and stoppage of work in advance of extreme rainfall.

7.105 Authorisation for construction activities within or close to watercourses is managed by SEPA under The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (termed CAR). Different levels of authorisation are required for river crossings depending on watercourse conditions and the type/purpose of crossing. Full details of the requirements under CAR will be agreed with SEPA at the detailed design stage; however, it is assumed that no CAR licenses will be required, with works covered by General Binding Rules or through basic registration.

Water Quality

7.106 Standard sediment and pollution management measures to be put in place during construction will be set out in a Construction Method Statement and complemented through the Environmental Management Plan (EMP). The Management Plan will comply with SEPA's Pollution Prevention Guidelines and will be informed by best practice from key publications for management of sediment and pollution in linear construction projects including:

- Forests and Water Guidelines (Forestry Commission, 2003);
- Technical Note on Protecting the Environment during Mechanised Harvesting Operations (Forestry Commission, 2005);
- Control of Water Pollution from Linear Construction Projects. Technical Guidance and Site Guide. (CIRIA, 2006a and 2006b);
- SuDS Manual (CIRIA, 2007); and
- The Water Environment (Controlled Activities) (Scotland) Regulations 2011, especially General Binding Rule 7 (Pipeline or cable laying by boring).

7.107 Sediment control measures on site will include standard SuDS measures (e.g., filter trenches, attenuation ponds), diversion and slope drains, check dams and sediment traps, straw bales, silt fencing and filter trenches. Additional sediment control could also be achieved by discharging treated water onto natural surfaces (e.g., fields, hillslopes) in a controlled manner at a rate that would not cause erosion.

7.108 If areas of eroding banks are noted during construction, extra care (e.g., geotextile matting on eroding areas, diversion of flows around trenched areas of stream) will need to be taken to ensure that no excess sediment is released to the environment at this location. Care will also be taken during felling works to reduce the risk of sedimentation and erosion into the watercourses.

7.109 All oil and fuel storage will comply with The Water Environment (Oil Storage) (Scotland) Regulations 2006 and no oil storage tanks will be located within 10m of a watercourse.

7.110 Measures to reduce possible environmental impacts on water quality associated with the storage and transportation of waste will include:

- the careful location of stockpiles and other storage areas;
- the use of good practice in the design of waste storage areas and the use of suitable waste containers;
- the use of sheeting, screening and damping where appropriate and practicable;
- the control and treatment of runoff from soil and waste soil stockpiles;
- minimising storage periods;
- minimising haulage distances;
- the sheeting of vehicles.

7.111 Due to the reasonably flat hillslopes over much of the route, low precipitation, staged manner of construction, stream crossing methods, limited tree felling and presence of existing roads and infrastructure in uplands areas of the route the construction activities are not considered as being very high risk in terms of suspended sediment pollution to watercourses. It is assessed that the risk of sediment generation is no more than would be normally faced at similar construction projects and which can be dealt with through effective control measures outlined in an EMP and good site supervision. The same conclusions are arrived at for risks associated with other pollutants.

Water Resources

7.112 Mitigation measures have already been taken into account as part of the design process, including the use of low impact vehicles. In addition, for Springfield Reservoir, the design has limited the length of access track upstream of the reservoir.

7.113 Additional mitigation measures during construction of the section of the OHL upstream of the reservoir will be consistent with the mitigation measures for water quality impacts on watercourses and they are not repeated again here.

Residual Impacts

7.114 Pre-mitigation impacts on surface water hydrology and flood risk were considered to be of Negligible significance at all receptors, with the exception of the impact to flood risk at the section of underground cable along the A73, which was assessed to be of Minor significance (see **Table 7.10**). With the mitigation measures described above in place, the significance of the residual impact on flood risk on the A73 during construction was assessed to be Negligible.

7.115 The pre-mitigation impact on water quality was assessed to be of Negligible significance at all receptors, with the exception of the Netherton Burn, where the impact was assessed to be of Minor significance (see **Table 7.11)**. With mitigation measures in place, potential impacts of construction on water quality are minimised and the residual impact on water quality at Netherton Burn is considered Negligible.

7.116 The pre-mitigation impact on water quality at Springfield Reservoir was assessed to be of Minor significance, **Table 7.12**. With mitigation measures in place, the potential impacts of construction on Springfield Reservoir will be minimised and after mitigation the residual impact of the construction of the proposed grid connection on water quality in Springfield Reservoir is considered Negligible.

Operational Impacts

Predicted Impacts

7.117 At the end of construction activities, any disturbed ground will be restored back to pre-development conditions and there will be no disturbance during operation, except for inspection and periodic maintenance. OHLs and underground cables generally require refurbishment after approximately 40 years.

7.118 Any tree-felled areas will also have to be managed to maintain the required clearances whilst the connection remains in service. Walk over surveys or flyovers will identify where there is a requirement to clear these areas of new growth.

7.119 During operation of the proposed grid connection, land cover along the development corridor will be re-vegetated, although as noted above, re-growth of trees will have to be cleared to maintain the correct clearance for the OHL. The main changes in land cover that could affect surface water runoff rates will be areas of hard-standing associated with pole foundations and areas where there has been felling. Each wood pole is a maximum 45cm in diameter and would have no impact on surface runoff rates on a catchment scale. The total area of felling is 12.45ha and the impact of felling on surface runoff was assessed for the construction phase of the proposed grid connection and was considered to be of Negligible significance. Therefore, the same is true of the operational phase.

7.120 With the OHL and underground cable operational, there will be no loss of floodplain storage.

7.121 Based on the above discussion, there are no predicted impacts of the proposed grid connection on surface water hydrology, flood risk, water quality, groundwater and water resources during operation.

Proposed Mitigation

7.122 No specific mitigation measures are proposed for the operational period. If maintenance work is proposed during operation, it will follow the same EMP (including sediment control and spill plans) as put in place for construction.

Residual Impacts

7.123 During operation, there are no predicted residual impacts on surface water hydrology, flood risk, water quality, groundwater and water resources as a result of the proposed grid connection.

Further Survey Requirements and Monitoring

7.124 No further monitoring is proposed.

Summary of Impacts

7.125 **Table 7.13** below summarises the predicted impacts of the proposed grid connection on surface water hydrology, including flood risk, water quality and water resources. Negligible impacts, pre-mitigation are not carried forward to this table. Prior to mitigation, the predicted impacts during the construction phase of the proposed grid connection were assessed to be of Minor significance. With mitigation measures in place, the potential impacts are minimised and are considered **Negligible** for all receptors. There are no significant impacts predicted during the operational phase of the proposed grid connection.

Table 7.13: Summary of Impacts

Receptor	Predicted Impact	Significance, prior to Mitigation	Mitigation	Significance of Residual Impact
Section where the underground cable will pass under the A73.	Increase in flood flows during construction; due to possible blockage of drainage culverts under the road or the diversion of natural flow pathways away from the culverts, during construction of the trench.	Minor	Standard runoff mitigation measures will be employed (such as SuDS); remediation of the working areas as the works progress, limiting the time that bare ground is exposed; stoppage of any construction works during periods of heavy rainfall and appropriate management of waste.	Negligible
Netherton Burn reach	Decrease in water quality during construction; increase in suspended sediment in watercourse during construction.	Minor	As above	Negligible
Springfield Reservoir	Change to quality of water in recreational fishery due to pollution from construction activities	Minor	Sediment control measures and effective spill management	Negligible

8 Ecology

Introduction

8.1 The chapter has been prepared by LUC with specialist input from Echoes Ecology in relation to protected mammals.

8.2 Other chapters relevant to Ecology include **Chapter 7: The Water Environment** and **Chapter 9: Ornithology**.

Study Area Description

8.3 For the purposes of the EcIA, the Study Area referred to throughout extends to the Black Law Windfarm Extension Grid Connection (hereinafter referred to as the 'proposed grid connection') and the following buffer areas:

- 2km: search for designated sites;
- 2km: historic faunal/floral records;
- 150m: habitat field survey (NVC survey was limited to notable habitats identified from the Phase 1 Habitat Survey);
- 50m: water vole and badger field survey;
- 100m: bat roost assessment field survey;
- 250m: otter field survey;
- 600m: great crested newt field survey.

8.4 The Study Areas for designated site searches and habitat field survey are displayed in the corresponding results maps, i.e. **Figures 8.1**, **8.2a-8.2g** and **8.3a-8.3g**. Where protected species surveys indicated activity, survey results maps have been produced including the associated Study Areas.

8.5 To provide ecological context in the wider area, the search for designated sites and historic faunal and floral records extended 2km from the proposed grid connection. It was not feasible, or necessary, to adopt this Study Area for the field surveys.

Impacts Assessed in Full

8.6 A detailed account of the potential impacts assessed in this chapter is set out in the section entitled **Ecological Impact Assessment**. However, in summary; the chapter includes an assessment of potential impacts on the Study Area's constituent habitats and the faunal species they support, these include:

- direct habitat loss;
- severance;
- loss of life;
- physical disturbance;
- noise disturbance.

8.7 The potential for these impacts to affect the following ecological features are considered in the following sections of this chapter:

- designated sites;
- habitats (including areas under the influence of the existing Black Law Windfarm Habitat Management Plan);
- mammals.

Impacts Scoped Out

8.8 On the basis of the desk based and survey work undertaken, the professional judgement of the EIA team, experience form other relevant projects and policy guidance or standards, the following topic areas have been 'scoped out', as proposed in the Scoping Report:

- bat activity surveys (excluding features assessed as having a high roost potential and that are likely to be impacted by the proposed grid connection);
- cumulative impacts, due to the small footprint of the proposed grid connection and the limited potential for long-term impacts on ecological features;
- operational impacts.

Assessment Methodology

Assessment Structure

8.9 The assessment is structured around the consideration of potential impacts on the following:

- designated sites;
- habitats;
- protected species.

Data Sources and Guidance

8.10 The EcIA was carried out in accordance with 'Guidelines for Ecological Impact Assessment in the United Kingdom' (IEEM, 2006)[i]. Methods for identifying 'ecological value' and 'impact significance' are derived from this text.

8.11 A Desk Study was undertaken to inform this assessment. The Desk Study extended to a search for statutory and non-statutory designated sites and available species records within 2km of the proposed grid connection. Searches included:

- a statutory designations search[1];
- a non-statutory designations search[2];
- the Ancient Woodland Inventory search[3];
- species record searches[4];
- specialist data recorders (Scottish Badgers).

8.12 The chapter has also been prepared in cognisance of relevant legislation and policy, including European and domestic environmental legislation, UK nature conservation policy and local biodiversity guidance. A detailed account of the relevant legislation and policy is provided in **Appendix 8.1.**

Field Survey

8.13 The ecology assessment has been informed by a series of technical field studies. Technical studies undertaken in the Study Area include:

- Phase 1 Habitat survey;
- National Vegetation Classification (NVC) survey;
- otter survey;
- water vole survey;

[1] Scottish Natural Heritage information service. www.snh.gov.uk/snhi [accessed 13 July 2012]
2 Information sourced from South Lanarkshire Biodiversity Officer, North Lanarkshire Council website www.northlanarkshire.gov.uk/index.aspx?articleid=6407 and the West Lothian Council website http://www.westlothian.gov.uk/media/downloaddoc/1799514/1849418/2083838/adoptedwllp [accessed 11 October 2012].
3 Woodland Trust. www.woodlandtrust.org.uk [accessed 13 July 2012]
4 National Biodiversity Network Gateway. www.searchnbn.net [accessed 13 July 2012]

- badger survey;
- bat habitat survey;
- great crested newt survey.

8.14 Each of the surveys listed above were completed by competent ecologists following current best practice methods. All surveys were completed within appropriate seasonal windows. The technical reports, which are appended, provide detailed accounts of survey methods.

8.15 In summary, the habitat surveys were conducted between August 2011 and May 2012 and the protected species surveys between April 2011 and June 2012.

Consultation

8.16 Consultation was undertaken with the following organisations with a view to identifying specific issues which may require detailed investigation:

- The Scottish Government;
- Scottish Natural Heritage (SNH);
- The Scottish Environment Protection Agency (SEPA);
- Marine Scotland;
- North Lanarkshire Council (Biodiversity Officer);
- South Lanarkshire Council (Biodiversity Officer);
- West Lothian Council (Biodiversity Officer);
- The Scottish Wildlife Trust;
- The Association of Salmon Fishery Boards;
- The Forestry Commission Scotland.

8.17 The results of this consultation are summarised in **Table 8.1**.

Table 8.1: Consultation Responses

Consultee	Scoping Opinion/Other	Issue Raised	Response/Action Taken
The Scottish Government	Scoping Opinion	Recommended that the survey methodologies conform with best practise, as agreed with SNH. Expressed concerns relating to sites designated for nature conservation, habitats and sensitive species. Additionally, the consultee highlighted the potential need for a Habitat Management Plan (HMP) and invertebrate surveys.	This chapter considers potential impacts on designated sites, habitats and protected species. The nature of the works comprised in the proposed grid connection are such that the direct habitat loss will be minimal. Consequently, no HMP is proposed. Given the level of impacts predicted for habitats, no surveys were undertaken for terrestrial or freshwater invertebrates.
SNH	Scoping Opinion	Expressed concern relating to designated sites, habitat impacts, particularly relating to peatlands, and protected species.	This chapter considers potential impacts on designated sites, habitats and protected species.
SEPA	Scoping Opinion	Expressed no ecological concerns.	N/A
Marine Scotland	Scoping Opinion	Expressed concerns relating to water quality, potential construction impact on resident fish populations and suitable fish habitats. Requested details relating to the distribution and abundance of fish species onsite.	Direct impacts on watercourses have been avoided. Therefore, no fish or aquatic invertebrate surveys were undertaken.
North Lanarkshire Council (Biodiversity Officer)	Scoping Opinion.	Referred to ecological issues highlighted in the SNH consultation response.	This chapter considers potential impacts on designated sites, habitats and protected species (as outlined as concerns by SNH).
South Lanarkshire Council (Biodiversity Officer)	Scoping Opinion	Expressed no additional concerns relating to the proposed grid connection.	N/A
West Lothian Council (Biodiversity Officer)	Scoping Opinion	No response.	N/A
The Scottish Wildlife Trust	Scoping Opinion	No response.	N/A
The Association of Salmon Fishery Boards	Scoping Opinion	No response.	N/A
The Forestry Commission Scotland	Scoping Opinion	Expressed general concerns relating to construction and biodiversity.	This chapter considers potential construction impacts on designated sites, habitats and protected species.

Assessing Significance

8.18 The ecological assessment was undertaken following guidelines set out by IEEM. The guidelines recommend that site sensitivity is best described as 'Ecological Value'. The Ecological Value of any given Study Area relates to its habitat assemblages and species populations and their importance to wider ecological processes. The Ecological Value of the Study Area is determined for each of its component habitats and species. The guidelines recommend that Ecological Value should be determined within a defined geographical context. The levels of geographical value adopted in this assessment are set as follows (and described further in **Table 8.2**):

- International;
- UK/National;
- County;
- Local;
- Site.

Table 8.2: Ecological Value Geographical Context

Ecological Value	Qualifying Criteria	Relevant Context
International	A Study Area is considered of international ecological value when it supports: • An internationally designated site or candidate site (SPA[5], pSPA[6], SAC[7], cSAC[8], pSAC[9], Ramsar site[10], Biogenetic Reserve[11]) or an area which SNH has determined meets the published selection criteria for such designations, irrespective of whether or not it has yet been notified. • A viable area of a habitat type listed in Annex 1 of the Habitats Directive, or smaller areas of such habitat which are essential to maintain the viability of that ecological resource on an international scale. • >1% of the European resource of an internationally important species, i.e. those listed in Annex 1, 2 or 4 of the Habitats Directive.	Europe
UK/National	A Study Area is considered of National ecological value when it supports • A nationally designated site (SSSI[12], NNR[13], Marine Nature Reserve[14]) or a discrete area which SNH has determined meets the published selection criteria for national designation irrespective of whether or not it has yet been notified. • A viable area of a priority habitat identified in the UK BAP[15], or smaller areas of such habitat which are essential to maintain the viability of that ecological resource at a national scale. • >1% of the National Resource of a regularly occurring population of a nationally important species, i.e. a priority species listed in the UK BAP and/or Schedules 1, 5 (S9 (1, 4a, 4b)) or 8 of the Wildlife and Countryside Act.	UK/Scotland
County	A Study Area is considered of County ecological value when it supports: • County sites and other sites which the designating authority has determined meet the published ecological selection criteria for designation, e.g. Local Nature Reserves. • Viable areas of legally protected habitat/habitat identified in Council BAP or smaller areas of such habitats that are essential to maintaining the viability of the resource at a county scale. • Any regularly occurring population of an internationally/nationally important species or a species in a relevant UK/Council BAP which is important for the maintenance of the regional meta-population. • Semi-natural ancient woodland smaller than 0.25ha. • Networks of species-rich hedgerows.	South Lanarkshire[16]
Local	A Study Area is considered of Local ecological value when it supports: • Commonplace and widespread semi-natural habitats, e.g. scrub, poor semi-improved grassland, coniferous plantation woodland, intensive arable farmland etc. which, despite their ubiquity, contribute to the ecological function of the local area (habitat networks etc); • Very small, but viable, populations of internationally/nationally important species or a species in a relevant UK/Council BAP which is important for the maintenance of the local meta-population. • Networks of linear features, including species-poor hedgerows	Study Area plus a 2km radius.
Site	A Study Area is considered of Site ecological value when it supports: • Habitats of limited ecological value, e.g. amenity grassland, but which contribute to the overall function of the application site's ecological function.	Study Area

8.19 All potential impacts are assessed against standard parameters set out by IEEM. Via this approach, a scientific and repeatable method is applied whereby all aspects of a potential impact are considered. Impacts are considered with reference to the following parameters:

- positive or negative;
- extent;

[5] Special Protection Area classified under the EU Birds Directive for importance to birds. This is considered further in **Chapter 9: Ornithology.**
[6] Potential Special Protection Area.
[7] Special Area of Conservation Area classified under the EU Habitats Directive for important habitat or non-bird species.
[8] Candidate Special Area of Conservation.
[9] Potential Special Area of Conservation.
[10] Wetland of international importance designated under the Ramsar Convention.
[11] Sites deemed representative examples of particular habitats in Europe.
[12] Site of Special Scientific Interest designated under UK law as being the best examples of the UK's flora, fauna, geological or physiographical features.
[13] National Nature Reserve designated under UK law as containing the best examples of natural or semi-natural ecosystems in Britain.
[14] Marine Nature Reserve designated under UK law to conserve marine flora, fauna and geological features.
[15] The Biodiversity Action Plan identifies targets for improving and protecting biodiversity in an area to meet the UK's commitments under the Rio Convention.

[16] The geographical context for a County level of ecological value has been defined at a local authority level. Despite spanning three local authority districts, i.e. North and South Lanarkshire and West Lothian, the majority of the Study Area is located in South Lanarkshire. Therefore, this local authority is used for a relevant County context.

- duration;
- reversibility;
- frequency.

8.20 A degree of confidence is assigned to assess the likelihood of an impact occurring. The following scale is referred to:

- certain/near-certain: probability estimated at >95%;
- probable: probability estimated at 50 – 95%;
- unlikely: probability estimated at 5 – 49%;
- extremely unlikely: probability estimated at <5%.

8.21 Based on these parameters, an impact is then considered to be either significant or not significant and likely to have either a positive or negative impact. An impact is considered to be significant if it has the potential to affect the integrity of a habitat or the conservation status of a species. Technical definitions of integrity and conservation status follow IEEM guidance (IEEM, 2006).

8.22 The significance of a potential impact is considered, using professional judgement, within the context of the geographically-based ecological value of the feature. For example, the significance of a potential impact on a habitat of Local ecological value is considered at a local level.

8.23 Best practice guidance does not recommend that significance is defined as 'high', 'moderate' or 'low' due to the complexities of ecological processes (IEEM, 2006). Therefore, impacts defined as 'significant' are considered to be significant in the context of the EIA regulations.

Planning Policy

8.24 Planning policies of relevance to this assessment are identified in **Chapter 5**: **Planning Policy Context**.

Existing Conditions

8.25 This section details the findings of the ecological desk study and surveys undertaken to determine the Ecological Values of the Study Area.

8.26 The proposed grid connection will connect the consented Black Law Windfarm Extension to the electricity grid network (scheme details are provided in **Chapter 4: Development Description**).

8.27 In an ecological context, the land types in the north and south of the study area, which can be defined as north and south of the B7056, near Springfield Reservoir, are, generally, distinctive in terms of their altitudinal position, degree of agricultural management and the associated botanical characteristics of the habitats. The north of the route is predominately peatland type habitats and the south is principally pasture and arable fields with scattered pockets of woodland. At the far south of the route, where an undergrounding section is proposed, there are large areas of semi-natural broad-leaved woodland associated with the Clyde River Valley.

Designated Sites

8.28 Designated sites within 2km of the proposed grid connection are displayed in **Figure 8.1**.

8.29 There are two statutory designated sites for nature conservation in proximity to the proposed grid connection. The **Clyde Valley Woods SAC NNR** and the **Cartland Craigs SSSI** are located approximately 30m east (at its nearest point) of the proposed underground section of the cabling route. These sites are designated for the following ecological features:

- Clyde Valley Woods SAC NNR is classified for its internationally important Tilio-Acerion gorge woodlands. The associated ground flora is typical of these woodland types and includes herb-Paris *Paris quadrifolia* and pendulous sedge *Carex pendula*.
- Cartland Craigs SSSI contains upland mixed ash woodland of national conservation importance. The woodland supports a rich ground flora and species with a restricted distribution in southern Scotland, such as mountain melick *Melica nutans* and wood stitchwort *Stellaria nemorum*.

8.30 The other statutory site designated for nature conservation located within 2km of the proposed grid connection is the **Cleghorn Glen SSSI,** located approximately 800m south. The site is classified as nationally important for its extensive upland mixed ash gorge woodland and invertebrate assemblages. The woodland is dominated by ash and elm and has a rich ground flora including some locally rare species, such as wood fescue *Festuca altissima*, Dutch rush *Equisetum hyemale* and toothwort *Lathraea squamaria.* Additionally, the site supports a number of nationally scarce invertebrate species.

8.31 Furthermore, a number of non-statutory designated sites are located within 2km of the proposed grid connection, these include the following:

- In terms of ancient woodland, there are numerous blocks within 2km of the proposed grid connection, predominately in proximity to the south and west. The closest of these to the proposed grid connection are the **Burgh Wood** and an **unnamed wood**, both of which adjoin the underground cable section.
- Non-statutory Sites of Importance for Nature Conservation (SINC) seek to protect areas considered to be of high wildlife value locally, and include semi-natural habitats such as ancient woodland and flower-rich grassland. The proposed overhead line (OHL) crosses the **Fullwood Roadside/Craigenhill SINC** and the proposed underground cabling section passes through the **Stonebyres Woodland SINC**. A further five SINCs are located within 2km of the proposed grid connection.

Habitats

8.32 The Phase 1 Habitat Survey is presented in **Figures 8.2a-8.2g** and NVC Survey maps are presented in **Figures 8.3a-8.3g**. A Habitat Survey report is provided in **Appendix 8.2**.

8.33 In summary, a total of 30 habitats, including transitional habitats and mosaics, were identified within the Study Area. Dominant habitats included improved and poor semi-improved pasture grasslands, fields containing arable crops, coniferous plantation woodlands and marshy grasslands. The north of the Study Area supported habitats of greater ecological interest and intrinsic value, here good quality blanket bog, modified bog, acid flushes and dry heaths were represented in the wider mosaic.

8.34 **Table 8.3** details the habitats recorded during the Phase 1 Habitat Survey.

Table 8.3: Habitats recorded in the Study Area

Habitat types	JNCC Phase 1 Habitat Code (mosaic codes)	Area (ha)	Percentage cover in Study Area (%)
Improved grassland and associated mosaics	B4 (B5)	93	15.82
Marshy grassland	B5	93	15.82
Access tracks and hardstandings	N/A	42	7.14
Arable	J1.1	42	7.14
Poor semi-improved grassland	B6	39	6.63
Coniferous plantation woodland	A1.2.2	37	6.29
Marshy grassland mosaics	B5 (A2/B1.1/B1.2/B2.2/ B6/E1.7/E1.8/E2.1)	34	5.78

Habitat types	JNCC Phase 1 Habitat Code (mosaic codes)	Area (ha)	Percentage cover in Study Area (%)
Semi-improved neutral grassland	B2.2	28	4.76
Broad-leaved semi-natural woodland	A1.1.1	27	4.59
Buildings and gardens	N/A	19	3.23
Dry modified bog	E1.8	16	2.72
Semi-improved acid grassland mosaics	B1.2 (B5/E2.1)	15	2.55
Wet modified bog mosaics	E1.7 (B1.2/B5/E1.8/E2.1)	15	2.55
Dry heath mosaics	D1.1 (A1.2.2/B1.1/E1.8/E2.1)	13	2.21
Blanket bog	E1.6.1	12	2.04
Dense and scattered scrub	A2	8	1.36
Acid flush	E2.1	6	1.02
Amenity grassland	J1.2	6	1.02
Blanket bog mosaics	E1.6.1 (E1.7/E1.8)	6	1.02
Open water	G1.1-G2.6	5	0.85
Tall ruderal	C3.1	5	0.85
Semi-improved acid grassland	B1.2	4	0.68
Semi-improved neutral grassland mosaics	B2.2 (A2/C3.1/D1.1)	4	0.68
Wet modified bog	E1.7	4	0.68
Broad-leaved plantation woodland	A1.1.2	3	0.51
Dry heath	D1.1	3	0.51
Dry modified bog mosaic	E1.8	3	0.51
Not surveyed	N/A	3	0.51
Unimproved acid grassland	B1.1	2	0.34
Mixed plantation woodland	A1.3.2	1	0.17
All habitats (total area)	**N/A**	**588**	**100**

Protected Species

8.35 From the desk study, the following relevant species are known to be active within the 10km grid squares (NS84, NS94 and NS95) in which the proposed grid connection is located:

- Otter *Lutra lutra*;
- Water vole *Arvicola amphibious*;
- Red squirrel *Sciurus vulgaris*;
- Common pipistrelle *Pipistrellus pipistrellus*;
- Soprano pipistrelle *Pipistrellus pygmaeus*;
- Daubenton's bat *Myotis daubentonii*;
- Natterer's bat *Myotis nattereri*;
- Slow worm *Anguis fragilis*;
- Adder *Vipera berus*;
- Common lizard *Zootica vivipara.*

8.36 A Protected Species Survey report (excluding badger) is provided in **Appendix 8.3**, the associated survey maps are presented in **Figures 8.4** and **8.5**. A separate, standalone Confidential Badger Report[17] is provided as an annex to the ES, this includes a supporting figure. In summary, the Study Area was found to support suitable sheltering, commuting and foraging habitat for a range of species, including badger, otter, water vole and bats.

8.37 Otter field signs were limited in extent throughout the Study Area; a single holt was identified on a small unnamed stream draining into the Springfield Reservoir and on the northern bank of the reservoir a hover (transitory resting site) was discovered. The holt is located approximately 30m from a pole construction working area and, consequently, the works may require a licence to disturb the species.

8.38 No evidence of water vole was observed during the field surveys.

8.39 Badgers field signs were identified throughout the route corridor, although the highest densities were associated with drier, agricultural land and woodland to the south and centre of the Study Area. In total, nine main setts, three annex setts, eight subsidiary setts, 15 outlier setts and one disused sett were recorded in the Study Area. One of the main badger setts, located in the north of the Study Area, is located approximately 10m from a pole foundation construction working area and the associated works will require a licence to disturb the species.

8.40 Habitat features suitable for bat commuting and foraging were identified in the Study Area, principally these features were associated with semi-natural broad-leaved woodland in the south of the Study Area. However, roosting opportunities were limited to two woodland shelter belts in the agricultural land, near Cartland, and three large oak trees in the riparian woodland adjoining the River Clyde. In relation to the woodland shelter belts, subsequent scheme design iterations placed the potential roosting areas at a minimum of 700m from the cabling route. The closest of the oak trees to the proposed cabling route is approximately 20m. However, the method of cable installation proposed at this location is relatively unobtrusive, involving the laying of cable overground and vegetation removal restricted to the ground layer and a small number of immature trees. Therefore, if a roost exists, the level of disturbance associated with these works will be negligible and does not necessitate a detailed activity survey.

[17] Historically badgers have been heavily persecuted in the UK. In response to this persecution, certain provisions have been adopted to protect badger welfare. One such measure is to keep details of badger activity confidential. The Confidential Badger Annex has been provided to SNH only.

8.41 In summary, the great crested newt survey identified eight ponds within the Study Area. Of these ponds, four were considered to provide 'good' habitat for the species, according to best practice methods. However, egg searches and torching surveys found no evidence of the species in the Study Area.

The 'Do Nothing' Scenario

8.42 For the purposes of context, it is important to consider how the ecological value of the Study Area will change over time in the absence of the proposed grid connection.

8.43 In the absence of the proposed grid connection, it is likely that there will be little change to the current land management regimes across the Study Area. The blanket bog in the north of the route represents examples of M18 *Erica tetralix – Sphagnum papillosum* and M19 *Calluna vulgaris – Eriophorum vaginatum* blanket mire, climax blanket bog communities dominated by dwarf shrubs and cotton grasses. The M18 bog type is likely to be semi-natural, although varying degrees of grazing modifications were evident. M19 is typically drier that than other blanket bog communities described in the NVC and found on gently sloping ground at moderate to high altitudes. Its presence in the Study Area is likely a result of draining wetter bog types, such as M18. The majority of the blanket bog supported in the Study Area falls within the land leased for the existing Black Law Windfarm. Consequently, a large proportion of this land is under the influence of the schemes Habitat Management Plan, which aims to enhance the quality and extent of blanket bog, including drain blocking to raise the water table and encourage the formation of wetter bog communities.

8.44 There is no indication of a change in land use in the lowland agricultural parts of the Study Area. Consequently, the land will continue to be managed for grazing and crop production. It is likely that the coniferous plantation woodland will remain, although the year-class of the crop is likely to change as the forestry plan progresses, i.e. the woodland will be harvested and replanted in a long-term rotational programme.

Routeing and Design Considerations

8.45 **Chapter 3: The Design Strategy** sets out the design rationale for the proposed grid connection. From an ecological perspective, important aspects of the design include:

- detailed routeing of the OHL to avoid habitats of a high ecological value, i.e. blanket bog;
- design of temporary access tracks to minimise disturbance to habitats of the greatest ecological value, i.e. blanket bog;
- undergrounding of the final section of the cabling route, immediately north and south (through a non-statutory designated site) of the River Clyde to minimise impacts upon semi-natural broad-leaved woodland and minimise the requirement for tree removal. Furthermore, to the north of the river, the cables will run overground, in a cable tray, to further reduce impacts on wooded features;
- detailed routeing to avoid known areas of badger activity;
- minimisation of woodland removal and specific avoidance of felling trees with features likely to support roosting bats;
- minimise the number of watercourse crossings and associated requirements for near-channel works.

Ecological Value of the Study Area

Site and Local Considerations

8.46 The majority of the habitats recorded in the Study Area, excluding the blanket bog resource, are considered to convey a Site or Local level of ecological value. The differentiation between these levels of ecological value is generally determined by the habitats altitudinal position in the landscape, i.e. upland and lowland habitats, and the associated levels of agricultural modification. A description of these habitats is provided below:

- **Lowland habitats:** these habitats include improved, semi-improved and marshy grasslands, coniferous plantation woodland, scrub features and land used for the production of arable crops. The habitat mosaic, in the lowland sections of the Study Area, is strongly associated with agricultural management and botanical modification to maximise agricultural productivity. Consequently, the Study Area is considered to be of a Site level of ecological value for these habitats.
- **Upland habitats**: the upland habitats include, amongst others, modified bog, acid flush, dry heath and unimproved acid grassland. With the exception of the modified bog (including mosaics), which extends across an area of 19ha, these habitats are limited in their distribution and extent. Furthermore, grazing pressures and non-native woodland encroachment has led to varying degrees of degradation. Despite the majority of these upland stands displaying characteristics indicative of modification and degradation, some small areas of good quality habitat are retained and contribute to the overall resource in a Local context. Therefore, the upland habitats supported in the Study Area are considered to be of a Local level of ecological value.

8.47 Otter evidence was identified at a single location in the Study Area, in proximity to the Springfield Reservoir. The Springfield Reservoir is stocked as a trout fishery and provides a useful foraging resource for otters. However, despite an optimal foraging resource, the otter evidence recorded was relatively low, suggesting that other factors that influence otter distributions, such as suitable resting and sheltering habitat, are limited in the Study Area. Thus, otter in the Study Area represents a small, but viable population and, as such, convey a Local level of ecological value.

8.48 **In summary, the Study Area is considered to be of a Site level ecological value for its lowland agricultural habitats. Additionally, it is considered to be of a Local level of ecological value for its upland habitats namely, modified bog, acid flush, dry heath and unimproved acid grassland resources, and for its potential to support populations of otter.**

County Considerations

8.49 At this level, a more in-depth understanding of the baseline conditions must be had to confidently assess the value of ecological features supported in the Study Area. At County level, consideration of the interactions between ecological features present in the Study Area and their contribution towards objectives outlined in relevant local authority policy framework is important when assigning ecological value.

8.50 In the County context, non-statutory Sites of Importance for Nature Conservation (SINCs) seek to protect areas considered to be of high wildlife value, and include semi-natural habitats such as ancient woodland and flower-rich grassland. The proposed cabling route crosses the **Stonebyres Woodland SINC** and the **Fullwood Roadside/Craigenhill SINC**, designated for gorge woodland and base-rich acid grasslands, respectively. Despite the Stonebyres Woodland SINC not falling within the boundary of the Clyde Valley Woods SAC, it does maintain woodland connectivity between the different parts of the SAC complex. Therefore, in this assessment, the Stonebyres Woodland SINC is considered as an extension of the Clyde Valley Woods SAC complex (discussed in **Paragraph 8.52-8.54**). Additionally, part of the OHL route passes through the **Fullwood Roadside/Craigenhill SINC** which supports floral communities and faunal assemblages considered to represent a County level of ecological value. However, the route alignment is sympathetic to the sensitive features of the SINC. The route is restricted to the south of the SINC where the dominate habitat types were hawthorn *Crataegus monogyna* scrubland and species-poor marshy grassland.

8.51 The north of the Study Area supports an area of blanket bog covering 17ha, which is of reasonable quality. Despite this habitat not conveying an International or National level of ecological value, it is considered to be of sufficient quality and extent to contribute to the viability of the resource at the County level. Therefore, the blanket bog communities supported by the Study Area are of a County level of ecological value.

8.52 With regard to faunal species, the Study Area's populations of badger are considered to be of County value. The Study Area supports a complex arrangement of badger territories, with nine main setts and a number of other sett types, suggesting a high population density along the route corridor. Additional signs evident of badger were widespread across the Study Area, forming localised 'hotspots' of activity. Thus, in a County context, the Study Area's badger population is considered to contribute to the overall population status of the species in South Lanarkshire.

8.53 **In summary, the Study Area is considered to be of ecological value at the County level for its contribution to the continuation of SINCs, potential to support populations of badger and for**

its blanket bog resources, which contribute to the South Lanarkshire Local Biodiversity Action Plan.

National and International Considerations

8.54 The desk study has identified that the proposed grid connection is located in proximity to a site designated for nature conservation at the National and International level. The **Clyde Valley Woods SAC** and **NNR** and **Cartland Craigs SSSI** designated sites are located approximately 25m to the east of the proposed underground cable route. The Clyde Valley Woods SAC and NNR generally supports a rich ground flora, with a species range typical of southern limestone woodlands of England and continental Europe, namely herb-Paris *Paris quadrifolia* and pendulous sedge *Carex pendula*. Additionally, the **Cleghorn Glen SSSI** is located 720m south of the route, immediately south of Castlehill Farm. The site is designated for its upland mixed ash woodland and invertebrate assemblages.

8.55 Three ancient woodland sites, the **Burgh Wood** and two **unnamed woods**, listed on the Ancient Woodland Inventory (AWI), fall within the Study Area. Additionally, part the **Stonebyres Woodland SINC** is located within the Study Area on the southern slopes of the River Clyde Valley. All of these woodlands are connected, structurally and functionally, to the Clyde Valley Woods SAC complex.

8.56 The Study Area is considered to be of a National level of ecological value for its designated sites (broad-leaved woodland features).

8.57 No ecological features identified in the Study Area were considered to convey an International level of ecological value.

8.58 **In summary, the Study Area is considered to be of ecological value at the National level for its designated sites (broad-leaved woodland features). No ecological features identified in the Study Area were considered to convey an International level of ecological value.**

8.59 **Table 8.4** provides a summary of the Study Area's ecological value.

Table 8.4: Study Area Ecological Value Summary

Ecological Value	Qualifying Feature
International	N/A
National	Designated sites (broad-leaved woodland resource)
County	Associated SINCs (non-woodland)/badger/blanket bog
Local	Remaining upland habitats/otter
Site	Lowland agricultural habitats and plantation woodlands

Potential Impacts

Sources of Potential Impact

8.60 The assessment of impacts is based upon the development description outlined in **Chapter 4** and relate to the felling and construction phases of the proposed grid connection.

Impact Assessment

8.61 A comprehensive assessment of ecological impacts can be found in **Appendix 8.4**. Those impacts that were assessed as being significant are discussed in detail below and summarised in **Table 8.5**.

Table 8.5: Study Area Ecological Value Summary

Ecological Feature	Impact Type (Negative)	Level of Significance
Habitats	Physical disturbance	Site
Mammals	Physical and noise disturbance	Site

Construction Impacts

Habitats

8.62 The Study Area is considered to have an ecological value at the County level for its blanket bog resource. The remaining upland habitat types were deemed to have a Local level of ecological value. The agricultural, lowland habitats were considered to have an ecological value at the Site level. The relevant potential impacts are **direct habitat loss**, **severance** and **physical disturbance**. However, the only impact assessed as being significant was physical disturbance.

Physical Disturbance

8.63 Physical disturbance of the peatland habitats located in the north of the route could occur during the construction of wood pole foundations. To control vehicle movements and facilitate access of plant and machinery to construction zones, a network of temporary access tracks has been proposed. An effort has been made to align these tracks through habitats identified as having a low ecological value, i.e. agricultural fields.

8.64 To minimise disturbance to the habitats through which the access tracks have been designed, the construction methodology proposes the use of low ground pressure vehicles and, where the design has been unable to avoid encroachment into habitats of a greater ecological value, i.e. blanket bog, protective ground mats. Despite these provisions, it is likely that some tracked plant will damage agricultural grasslands and/or stray onto unprotected sections of peatland.

8.65 Physical disturbance would be a **negative** impact and would be limited to wood pole working areas and access routes. The duration of the impact would be **permanent**. However, where physical disturbance occurred it would be **reversible** through vegetative regeneration, although the recovery period could be long-term in the sensitive peatland habitats. The frequency of the impact would be ongoing during the construction period. Despite specific construction methodologies to control plant movements and reduce the likelihood of physical disturbance, the probability would be **probable**.

8.66 Based on the above, it is considered that physical disturbance of habitats will be a significant impact. However, considering the small areas that would be prone to physical disturbance, it is only considered to be a **significant impact at the Site level**.

Mammals

8.67 The Study Area is considered to have ecological value at the County level for badger populations and at the Local level for otter. The relevant potential impacts are **direct habitat loss**, **severance**, **loss of life**, **physical disturbance** and **noise disturbance**. However, the only impact assessed as being significant was physical disturbance.

Physical and Noise Disturbance

8.68 Physical and noise disturbance of mammals are considered together. These impacts will occur when sheltering and foraging is disturbed by construction activities. Construction works in proximity to badger and otter resting places will cause physical and noise disturbance, particularly during periods when crepuscular mammals are most active (i.e. dusk and dawn) and, therefore, more likely to be affected by construction works. Furthermore, night-time working and artificial floodlighting are likely to causes disturbance to badger and otter.

8.69 Both badger and otter resting sites have been recorded in proximity to proposed construction zones, 10m and 30m respectively. Therefore, it is likely that noise, associated with vehicle movements and construction works, will disturb the species whilst they occupy these sites. However, both otter and badger are transient species with large home ranges. Therefore, at worst, the construction works are likely to temporarily displace some of the resident individuals.

8.70 Physical and noise disturbance will be a **negative** impact and will be limited to construction zones near to protected mammal resting and foraging sites. The frequency of the impact will be limited to a single event, as the construction moves along the route and passes the mammal resting sites. The likelihood of the impact occurring is probable. It is anticipated that a single wood pole can be erected in approximately half a day, therefore the duration of the noise disturbance impact should be relatively short lived. The impact will be **irreversible** and the likelihood of the impact occurring is **probable**.

8.71 Based on the above, it is concluded that physical and noise disturbance impacts **will be a significant impact at the Site**[18] **level**.

Proposed Mitigation

8.72 With respect to EIA, mitigation is only required where significant impacts are identified. Significance may be identified at a range of levels (Site through to International) and mitigation must be appropriate to the level of significance identified.

8.73 Many of the good practice measures identified, i.e. 'built-in' measures such as the adoption of standard SEPA Pollution Prevention Guidance and use of ground protection mats in sensitive habitats, provide a suitable level of mitigation for the proposed grid connection. As such specific mitigation measures have not been identified here for all ecological features.

Ecological Clerk of Works

8.74 An Ecological Clerk of Works (ECoW) will be appointed to supervise the duration of the construction phase of the proposed grid connection. The presence of an ECoW will be beneficial in terms of discharging the detailed mitigation measures, outlined below, and ensuring good practice throughout the 'lifetime' of the construction phase. Furthermore, as an environmental stakeholder, the ECoW can provide recommendations and advice relating to specific aspects of the construction phase that were unforeseen at the planning stage.

Designated Sites

8.75 The assessment has identified that potential impacts (direct habitat loss) on non-statutory designated sites will be significant. To mitigate these impacts, the following measures are proposed:

- Pre-construction, site staff will define the preferred alignment of the cabling trench and, subsequently, walk the route to identify areas of highest risk to physical disturbance, i.e. where low branches over-hang the road or places where tree roots are suspected beneath the road. This pre-construction survey will be completed with an Ecological Clerk of Work (ECoW) present. Where such features exist, micro-siting tolerances of 25m from indicative wood pole locations and access tracks will be afforded to the design. Similarly, in the extreme south of the underground cabling route, where the cable crosses the River Clyde, a pre-construction survey will be completed, with specific emphasis placed on preserving trees likely to support roosting bats and identifying suitable reptile habitats.

- During construction, site staff will be made aware of the need to protect ecologically sensitive sites. This could be achieved through tool-box talks, the presence of an onsite ECoW or the use of barrier fencing and signage around sensitive woodland features. All trees and woodlands to be retained will be protected using the principles of BS5837: Trees and Development.

Habitats

8.76 The Study Area supports a number of notable peatland and woodland habitats and it is necessary to ensure the protection of these features during construction. In particular, the following measures will be adhered to:

- During the excavation of the wood pole foundations and access tracks in peatlands, the fibrous peat layers (including vegetated turves) will be stored adjacent to each pole position or track edge, separately from the sterile, deeper layers of peat. This will assist in the successful reinstatement of the peatland.

- Extraneous disturbance of peatland habitats will be avoided through minimisation of working areas. With the exception of peat turfs and excavated deep peat (see above) materials will not be stored on blanket bog vegetation.

- The length of time excavations and cable trenches are open in which water can gather, collect silts, and hence become problematic to treat will be minimised.

- The incorporation of silt control measures and techniques will be incorporated in tool-box talks delivered by an ECoW.

Mammals

8.77 The assessment has found the Study Area to be of a County level of ecological value for Badger and Local value for otter. The construction of wood pole foundations and temporary access tracks will remain at the maximum possible distance from the identified mammal shelters and clearly demarcated exclusion zones will be erected. The following mitigation measures are considered appropriate to the Study Area:

- It is likely that a licence to disturb badger will be required prior to commencement of works within a minimum of 30m of mammal resting sites. The main badger sett, likely to be disturbed by the works, is located on the edge of plantation woodland immediately west of Sergeants Law. Assuming that such a licence is needed, and granted, there will be a number of mandatory conditions aimed at safeguarding the species. These conditions will be produced by the licence issuing authority, i.e. SNH, and will include a restriction on works deemed likely to disturb the species during the breeding and rearing season, i.e. between December and June, inclusive.

- Similarly, it is possible that the construction works immediately east of Birniehall Farm will require a licence to disturb otter. At this location an otter holt was recorded approximately 30m from a wood pole working area. Assuming that such a licence is needed, and granted, there will be a number of mandatory conditions aimed at safeguarding the species. As a consequence of otters not having a defined breeding season, specific seasonal restriction will not apply.

- Site staff will be made aware of ecological sensitivities, potentially through a tool-box talk or through the presence of an ECoW. A highly visible buffer zone will be established around protected mammal shelters to avoid unnecessary disturbance or damage.

- Site staff will be made aware that mammals are transient species, often occupying large territories. Populations may move around the Study Area during construction works. If site staff find evidence of a protected mammal at the site, including otters or badgers, works will stop in that area and the ECoW contacted for further advice.

- Where temporary site lighting is necessary, e.g. throughout the winter months, it will be directed away from watercourses or known areas of mammal activity. Despite this general working practise being of primary benefit to badger and otter, the prescription will be of benefit to roosting bats, albeit opportunities for roosting bats are limited in the Study Area.

- All open excavations will be covered during the night or ramped to enable easy exit by badger and otter. Additionally, culvert pipes stored onsite will be capped or if caps are not available, stored vertically to prevent the entrapment of mammals.

Residual Impacts

8.78 Residual significance is defined as the level of significance a potential impact can be reduced to following the implementation of mitigation.

8.79 All of the potential impacts, likely to affect the assessed ecological features, can be reduced, following mitigation, to a level of not significant, i.e. all residual impacts are considered as not significant.

8.80 **Table 8.6**, on the following page, sets out a summary of the potential impacts, their significance, appropriate mitigation measures and details of residual significance.

Further Survey Requirements and Monitoring

8.81 The ecological condition of any given site is not static and changes to ecological processes may occur.

8.82 A number of the prescribed mitigation measures operate under the assumption that an ECoW will be appointed during the construction stage of the proposed grid connection, primarily, to inform the site management team of possible ecological sensitivities and supervise general construction works.

8.83 Once it is clear which broad-leaved trees require removal for the underground cabling works, these individual trees will be assessed for their potential to support roosting bats. Similarly, in terms of

[18] The Study Area was valued at a County level of ecological value for its badger resource. However, as the disturbance will be limited to a single badger sett, albeit a main sett, and the likelihood being that the works will be conducted under licence conditions, the impact is consider to be significant at the Site level.

attaching the cabling tray to a section of exposed rock in the south of the Study Area, an inspection of the rock face for its potential to support roosting bats will be undertaken following confirmation of working methods and alignment.

8.84 Where appropriate, the specific mitigation measures set out in this assessment will be built upon and enhanced through the production of detailed construction method statements through further consultation with SNH.

Summary of Impacts

8.85 This assessment has identified three primary ecological sensitivities in the Study Area:

- designated sites;
- habitats;
- mammals.

8.86 The Study Area ranges in its ecological value for these features, from National value for its contribution to the continuity of SACs, SSSIs and Ancient Woodlands, to Site value for its agricultural habitats.

8.87 A range of potential impacts on the features as a consequence of the proposed grid connection have been identified. The significance of these impacts range from not significant to significant at the Local level.

8.88 Mitigation has been put forward to ameliorate the significance of impacts, although it has been noted throughout the assessment that the proposed construction methodologies and design associated with the proposed grid connection already includes extensive 'built-in' mitigation that will safeguard ecological features.

8.89 With adoption of the mitigation measures, it is likely that the significance of all potential impacts will be reduced to 'not significant'.

8.90 **Table 8.6** below sets out a summary of the potential impacts, their significance, appropriate mitigation measures and details of residual significance.

Table 8.6: Summary of Impacts

Ecological Feature	Impact Type (Negative)	Ecological Value of Study Area for Feature	Significance	Mitigation Measures	Residual Significance
Designated Sites	Direct Habitat Loss	National/County	Not significant	• Pre-construction survey to identify sensitive areas; • Tool-box talk and ECoW; • Standard silt management.	Not significant
	Severance				
	Physical Disturbance				
Habitats	Direct Habitat Loss	County/Local/Site	Not significant	• Management of peat and peat turves; • Tool-box talk and ECoW; • Vehicle movements across sensitive habitats will be controlled by the ECoW • Use of ground protection mats and low ground-pressure vehicles; • Standard silt management.	Not significant
	Severance	Site			
	Physical Disturbance	County/Local/Site	Significant (Site)		
Mammal	Direct Habitat Loss	County/Local	Not Significant	• Tool-box talk and ECoW; • Implementation of exclusion zones; • Standard silt management; • Restricted working hours and lighting;	Not significant
	Severance				
	Loss of Life				
	Physical and Noise Disturbance		Significant (Site)		

References

[i] Institute of Ecology and Environmental Management (2006). *Guidelines for EcIA in the UK*. IEEM, Winchester.

9 Ornithology

Introduction

9.1 This chapter considers the potential impacts of the Black Law Windfarm Extension Grid Connection (hereinafter referred to as the 'proposed grid connection') on birds. It details the methods used to establish the bird interest within the Study area, together with the process used to determine the Nature Conservation Importance of the species and populations present. The ways in which birds might be affected by the construction and operation of the proposed grid connection are explained and the magnitude of the potential impacts considered. Finally, the significance of any identified impacts is assessed. The ornithology assessment was undertaken by Natural Research Projects Ltd (NRP).

9.2 Potential impacts on other fauna and flora are detailed in **Chapter 8: Ecology**.

Study Area Description

9.3 Bird populations were surveyed up to a maximum of 2km from the proposed grid connection. The limits of survey areas differed depending on the type of survey being undertaken, the ecology of the species or species group being surveyed and the habitats present. Full details of the extent of different survey areas are given in **Technical Appendix 9.1** and shown in **Figure 9.1**.

Impacts Assessed in Full

9.4 Ornithological interests may be impacted by the following key elements of the proposed grid connection:

- construction activities, including the felling of woodland, creation and removal of access tracks, the erection of poles and stringing of the overhead lines (OHLs);
- operational activities, including the physical presence of the OHL and maintenance activities on the OHL and other components;
- the contribution of the proposed grid connection to cumulative impacts generated by other developments in the context of the activities listed above.

9.5 On the basis of the above, the following types of potential ornithological impacts resulting from the proposed grid connection have been assessed in full:

- indirect habitat loss due to the displacement of birds as a result of disturbance during construction and maintenance activities or as a result of the presence of the OHL causing changes to habitual flight routes or to feeding, nesting or roosting behaviour;
- collision of flying birds with the OHL, resulting in death or serious injury.

Impacts Scoped Out

9.6 On the basis of the desk based and survey work undertaken, the professional judgement of the Environmental Impact Assessment (EIA) team, experience from other relevant projects and policy guidance or standards, the following topic areas have been 'scoped out':

- Direct loss or degradation of key bird habitats as a result of land take associated with erection of wood poles, provision of temporary access tracks or creation of wayleaves. The area of habitat loss is very small (see **Chapter 8**) both in itself and in relation to its wider availability in the surrounding area.
- Impacts arising from the construction of the underground cable element of the proposed grid connection. The route of the underground cable does not pass through any key habitats for birds and the potential temporary disturbance arising from construction of this element has virtually no prospect of displacing birds of Nature Conservation Importance that could lead to discernible impacts on regional populations.
- Impacts arising from the extension to Linnmill substation. The scale and nature of these works mean there is no prospect of displacement of birds of Nature Conservation Importance that could lead to discernible impacts on regional populations.
- Impacts arising from the electrocution of birds on energised (live) elements of the proposed grid connection. The live elements consist of three conductors mounted on insulators (there is no requirement for a separate earth wire). Therefore, the electrocution risk would arise from birds being able to span the gap between adjacent conducting wires or jumpers, which are separated by a distance of at least 2.0m (see **Chapter 4: Development Description**). Of the species of Nature Conservation Importance recorded during baseline surveys, only peregrine and merlin are considered to be potentially vulnerable to electrocution as a result of their use of the poles as perches (these species rarely perch on wires). Peregrine, the larger of the two species, has a maximum dimension from wingtip to wingtip of up to 1.1m (Snow and Perrins 1998). Therefore, neither this species, nor the smaller merlin, are physically capable of spanning the gap between energised elements of the proposed grid connection. As a result, electrocution is considered to present no risk to regional bird populations.
- Impacts on designated sites of ornithological importance. The proposed grid connection is not located within a designated area of national or international importance for birds, such as a Special Protection Area (SPA) or Site of Special Scientific Interest (SSSI). The nearest two SPAs designated for bird interests are the Muirkirk and North Lowther Uplands SPA around 13km to the south-west and the Westwater SPA, around 19km to the east. The Muirkirk and North Lowther Uplands SPA is designated for breeding and wintering hen harrier, and breeding golden plover, peregrine, short-eared owl and merlin. The distance between the proposed grid connection and this SPA, and the nature of the site interest, clearly means that under the necessary assessment steps of the Habitats Regulations, the proposed grid connection is unlikely to have a significant impact on the classified site interest, and an Appropriate Assessment is not necessary. The Westwater SPA is designated for wintering pink-footed geese. Advice from Scottish Natural Heritage (SNH) is that the proposed grid connection is beyond the known foraging range of pink-footed geese roosting at Westwater Reservoir. In the likely absence of a significant impact on these geese, an Appropriate Assessment is not required in respect of this SPA (see **Table 9.1**).

Assessment Methodology

Assessment Structure

9.7 The assessment considers potential impacts which could result in changes to the distribution or abundance of regional bird populations of high and moderate Nature Conservation Importance (see **Table 9.2**). These changes may arise as a result of:

- the destruction or desertion of nests, roost sites or important feeding areas due to construction and maintenance activities;
- short to long-term reductions in breeding success or survival as a result of construction and maintenance activities and due to displacement from key habitats in the vicinity of the proposed grid connection;
- increased mortality due to collision with the OHL.

9.8 The process of evaluating the impacts of the proposals on birds ensures that the consenting authority has sufficient information to determine whether the proposal (either alone or in combination with other plans or projects) is likely to have a significant impact on bird interests.

9.9 Where there is a potential impact on a bird population that forms part of the qualifying interest of an internationally or nationally designated site (or where such designation is proposed), i.e. Ramsar sites, SPAs and SSSIs or a site that would meet the criteria for international or national designation, so far as possible, impacts are judged against whether the proposed grid connection could significantly affect the site population and its distribution. Where bird populations are not protected by such a designation (i.e. where the population does not meet the criteria for designation), then judgement is made against a more general expectation that the proposed grid connection would not have a significant adverse impact on the overall population, range or distribution; and that it would not interfere significantly with the flight paths of migratory birds. In assessing the impacts, emphasis is given to the national and regional populations of the species.

9.10 The following legislation has been taken into consideration during this assessment:

- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 ('The EIA Regulations') (as amended);
- The Council Directive on the Conservation of Wild Birds 2009/147/EC (EU Birds Directive, amended from 1979);
- The Wildlife and Countryside Act 1981 (as amended) (WCA);
- The Conservation (Natural Habitats & c.) Regulations 1994 (as amended); ('The Habitats Regulations');
- The Nature Conservation (Scotland) Act 2004 (as amended).

Data Sources and Guidance

Data sources

9.11 The following data sources were consulted when undertaking the field studies and assessment:

- Environmental Statements and supporting documents relating to the Black Law Windfarm, the Black Law Windfarm Extension and the Black Law Windfarm Extension Phase 2.
- Relevant Environmental Statements, associated documents and bird monitoring reports for developments included in the Cumulative Assessment.
- The Birds of Conservation Concern (BoCC) Red List (Eaton et al. 2009).
- Data on relevant scarce raptor populations supplied by the South Strathclyde Raptor Study Group.

Guidance

9.12 The following guidance has been consulted when undertaking this assessment:

- SERAD (Scottish Executive Rural Affairs Department) Guidance: Habitats and Birds Directives, Nature Conservation: Implementation in Scotland of EC Directives on the Conservation of Natural Habitats and of Wild Flora and Fauna and the Conservation of Wild Birds ('The Habitats and Birds Directives') (SERAD 2000);
- SNH Guidance: Survey Methods for Use in Assessing the Impacts of Onshore Windfarms on Bird Communities (SNH 2010)[1];
- SNH Guidance: Assessing Significance of Impacts from Onshore Windfarms on Birds outwith Designated Areas (SNH 2006);
- SNH Guidance: Assessing the Cumulative Impact of Onshore Wind Energy Developments (SNH 2012a).

Field Survey

9.13 Baseline ornithology surveys were initiated in March 2011 and continued until May 2012. The ornithological survey areas used between March 2011 and April 2012 were defined by the initial route of the proposed grid connection and extended up to approximately 2km from this route, distance from the route being species-dependent (see **Figure 9.1**). In May 2012, the route was modified to the current proposed route and this was used to define a further area in the southern part of the study area to survey breeding birds in 2012 (see **Figures 9.9a-9.9c**). Overall, the route of the proposed grid connection as described by the application does not consistently align with the areas surveyed (**Figure 9.1**). Nevertheless, since the surveyed areas extended well beyond areas of potential influence of the route, all areas potentially impacted by the proposed grid connection and considered to be important for breeding, roosting or wintering birds were surveyed.

9.14 Field surveys were conducted using methods recommended for the assessment of windfarm and other similar developments (SNH 2010) and full details are given in **Technical Appendix 9.1**. The prime objectives were to survey breeding, wintering and migrating birds within prescribed buffers of the proposed grid connection (**Figure 9.1**) and to quantify bird flight activity in the vicinity of the OHL.

[1] SNH documents which give guidance on identifying and assessing potential impacts on birds as a result of windfarms are relevant to the wider infrastructure of windfarm developments, including power lines. No SNH guidance refers specifically to assessing potential impacts of power lines.

Surveys for certain scarce breeding birds (e.g. scarce raptors, owls of Nature Conservation Importance and black grouse) were informed by evaluating the habitats surrounding the proposed grid connection (**Figure 9.4**). The following surveys were undertaken:

- Flight activity survey from vantage points (VPs) during the breeding and non-breeding periods along the length of the proposed grid connection (**Figure 9.2**). Generic vantage points (GVPs) were used to gather comprehensive data on flight activity by a range of target species. In addition, focal vantage points (FVPs) were used to collect flight activity data on a sub-set of bird species at specific times of the year.
- Moorland and farmland breeding bird survey within 500m of the proposed grid connection.
- Woodland breeding bird survey within 500m of the proposed grid connection (see **Figure 9.3**).
- Black grouse survey within 1.5km of the proposed grid connection.
- Scarce breeding raptor and owl surveys within 2km of the proposed grid connection. This included searches for goshawk within 1km of the proposed grid connection, merlin and peregrine within 2km and barn owl within 1km of the proposed grid connection.

Consultation

9.15 Organisations were consulted to inform the ornithological assessment and responses are detailed in **Table 9.1**.

Table 9.1: Consultation Responses

Consultee	Scoping/Other Consultation	Issue Raised	Response/Action Taken
Scottish Natural Heritage	Formal Scoping Consultation by the Scottish Government	Migration watches not required if sufficient vantage point watches at dawn and dusk were undertaken during the migration period	Survey schedule planned accordingly.
	Other consultation: pink-footed geese	SNH agreed that Appropriate Assessment would not be required in relation to impacts on pink-footed geese as birds within the study area were not considered to be part of an SPA population.	Pink-footed goose impacts assessed against national populations.
	Data request by NRP	SNH held no relevant data from within the study area.	N/A
Royal Society for the Protection of Birds	Formal Scoping Consultation by the Scottish Government	Concerns raised about potential collisions with OHL near Springfield Reservoir. RSPB advised that flight diverters be fitted to the line in this area.	The use of diverters is considered in the assessment.
South Strathclyde Raptor Study Group	Data request by NRP	Data on possible nesting locations of bird of prey species of high Nature Conservation Importance was supplied.	The supplied data assisted in survey planning and assessment.

Assessing Significance

9.16 The assessment determines the potential impacts of the proposed grid connection and the likelihood of their occurrence. In judging whether an impact is significant or not, two factors are taken into account:

- the Nature Conservation Importance of the species involved;
- the magnitude of the likely impact.

9.17 In ornithological terms, an impact is defined as a change in the assemblage of bird species present as a result of the proposed grid connection. Change can occur either during or beyond the lifetime of the proposed grid connection. Where the response of a bird population has varying degrees of likelihood, the probability of these differing outcomes is considered. Impacts can be adverse, neutral (nil impact) or favourable.

9.18 The significance of potential impacts is determined by integrating the assessments of Nature Conservation Importance and magnitude of impact in a reasoned way using professional judgement. The magnitude of the likely impacts involves consideration of the behavioural sensitivity of the species involved, together with the spatial and temporal magnitude of the likely impacts. In making judgements on significance, consideration is given to national and regional trends within potentially affected populations, insofar as the impacts may impinge on the conservation status of the species involved at these geographical levels.

9.19 The Nature Conservation Importance of the bird species potentially impacted by the proposed grid connection is defined according to **Table 9.2**.

Table 9.2: Determining Factors for Nature Conservation Importance

Importance	Description
High	Species listed in Annex 1 of the EU Birds Directive. Breeding species listed on Schedule 1 of the Wildlife and Countryside Act, 1981 (WCA).
Moderate	• Other species on the Birds of Conservation Concern (BOCC) 'Red' list (Eaton et al., 2009) or IUCN 'Red list' – 'Near Threatened' (http://www.iucnredlist.org). • Regularly occurring migratory species, which are either rare or vulnerable, or warrant special consideration on account of the proximity of migration routes, or breeding, moulting, wintering or staging areas in relation to the proposed grid connection. • Species present in regionally important numbers (>1% regional population) or species listed in Local Biodiversity Action Plans if the proposed grid connection supports >1% of the regional population.
Low	All other species not covered above.

9.20 The behavioural sensitivity and ability to recover from temporary adverse conditions is considered in respect of each potentially impacted population. Behavioural sensitivity is determined according to each species' ecological function and behaviour, using the broad criteria set out in **Table 9.3**. The judgement takes account of information available on the responses of birds to various stimuli (e.g. predators, noise and disturbance by humans). Behavioural sensitivity can differ even between similar species and for a particular species, some populations and individuals may be more sensitive than others, and sensitivity may change over time. Therefore, the behavioural responses of birds are likely to vary with both the nature and context of the stimulus and the experience and 'personality' of the bird. Sensitivity also depends on the activity of the bird. For example, a species is likely to be less tolerant of disturbance whilst breeding than at other times, and tolerance is likely to increase as breeding progresses.

Table 9.3: Determining Factors for Behavioural Sensitivity

Sensitivity	Description
High	Species or populations occupying habitats remote from human activities, or that exhibit strong and long-lasting reactions to disturbance events
Moderate	Species or populations that appear to be warily tolerant of human activities, or exhibit short term reactions to disturbance events.
Low	Species or populations occupying areas subject to frequent human activity and exhibiting mild and brief reaction (including flushing behaviour) to disturbance events.

9.21 Impacts are judged in terms of their level of magnitude in space and time (Regini, 2000). The magnitude of spatial impact has five levels (**Table 9.4**) and the magnitude of temporal impact has four levels (**Table 9.5**).

Table 9.4: Scales of Spatial Magnitude

Magnitude	Description
Very high	Total/near total loss of a bird population due to mortality or displacement. Total/near total loss of productivity in a bird population due to disturbance. Guide: >80% of population affected.
High	Major reduction in the status or productivity of a bird population due to mortality or displacement or disturbance. Guide: 21-80% of population affected.
Moderate	Partial reduction in the status or productivity of a bird population due to mortality or displacement or disturbance. Guide: 6-20% of population affected.
Low	Small but discernible reduction in the status or productivity of a bird population due to mortality or displacement or disturbance. Guide: 1-5% of the population affected.
Negligible	Very slight reduction in the status or productivity of a bird population due to mortality or displacement or disturbance. Reduction barely discernible, approximating to the "no change" situation. Guide: <1% of population affected.

Table 9.5: Scales of Temporal Magnitude

Magnitude	Description
Permanent	Impacts continuing indefinitely beyond the span of one human generation (taken as approximately 25 years), except where there is likely to be substantial improvement after this period (e.g. the replacement of mature trees by young trees which need >25 years to reach maturity, or restoration of ground after removal of a development. Such exceptions can be termed very long term impacts).

Magnitude	Description
Long term	Approximately 15 - 25 years or longer (refer to above).
Medium term	Approximately 5 - 15 years.
Short term	Up to approximately 5 years.

9.22 Knowledge of how rapidly the population or performance of a species is likely to recover following loss or disturbance (e.g. by birds being recruited from other populations elsewhere) is used to evaluate temporal impacts, where such information is available.

9.23 In accordance with the EIA Regulations, each likely impact is evaluated and classified as either 'significant' or 'not significant'. This involves consideration of the nature conservation importance and behavioural sensitivity of bird populations and the likely magnitude of impacts, as described above. In making professional judgements on significance by this integration, consideration is given primarily to regional trends within potentially affected populations. Should these judgements on impacts at the regional level be deemed significant, then further judgements are made subsequently at the national level.

9.24 At a regional level, and in the case of non-designated sites, magnitude is assessed in respect of an appropriate ecological unit. In the present case, the appropriate unit is taken to be the West Central Belt Natural Heritage Futures area (NHF 17), as defined by SNH (SNH 2002). The West Central Belt covers over 6000km^2 of mainly lowland habitat and the proposed grid connection sits towards the eastern part of this area. Where the available data on bird populations allows, the conservation status of each potentially impacted species is evaluated within NHF 17. Conservation status is then used to inform judgements on the likely magnitude of impact on relevant regional populations. For these purposes, conservation status is taken to mean the sum of the influences acting on a population which may affect its long term distribution and abundance. Conservation status is considered to be favourable where:

- a species appears to be maintaining itself on a long term basis as a viable component of its habitats;
- the natural range of the species is not being reduced, nor is likely to be reduced for the foreseeable future;
- there is (and will probably continue to be) sufficient habitat to maintain the species population on a long term basis.

9.25 Detectable adverse changes in regional populations of nature conservation importance as a result of the proposed grid connection are automatically considered to be significant impacts under the EIA Regulations (i.e. no distinction is made between impacts that may be deemed of 'major' or 'moderate' significance). Non-significant impacts include all those which are likely to result in barely detectable (minor) or non-detectable (negligible) changes in the conservation status of regional (and therefore national) bird populations. If a potential impact is determined to be significant, measures to avoid, reduce or remedy the impact are suggested wherever possible.

Planning Policy

9.26 Planning policies of relevance to this assessment are outlined in **Chapter 5**: **Planning Policy Context**.

Existing Conditions

9.27 This section provides information on:

- key habitat types relevant to bird distribution within approximately 2km of the proposed grid connection;
- the moorland, farmland and woodland breeding bird community within approximately 500m of the proposed grid connection;
- the wintering bird community within approximately 500m of the proposed grid connection;
- scarce raptor and owl populations within up to 2km from the proposed grid connection;
- levels of flight activity across the route of the OHL.

9.28 Habitats surrounding the proposed grid connection to a distance of 2km are mainly improved and rough pastures, areas of grass moor and smaller patches of arable land and heath/bog habitats. There are several stands of commercial forestry plantation, with some areas that have been recently clear-felled or replanted. There are also several small stands of mixed or broadleaved woodland. There are several small watercourses and streams throughout the area and one ca.16ha freshwater reservoir (see **Figure 9.4**).

Wildfowl

9.29 Wildfowl records during baseline field surveys were of whooper swan, pink-footed goose and greylag goose.

Whooper Swan

9.30 Whooper swans were recorded on four occasions. A group of 14 were recorded roosting on Springfield Reservoir (NS 905520) in March 2011 and a group of 20 were recorded feeding on stubble fields approximately 700m from the proposed grid connection at NS 912486 in January 2012. Two flights were recorded, and two birds were recorded transiting[2] the proposed grid connection at below 20m. Another flight by 20 birds was recorded to the east but did not transit the proposed grid connection. Whooper swans are clearly not reliant on habitats surrounding the proposed grid connection for winter foraging and with only two birds recorded transiting the proposed grid connection; the species make little use of the airspace in this area during migration or to move between feeding and roosting areas. As a result, the proposed grid connection is considered to present virtually no risk to the wintering whooper swan population in Scotland and this species, despite being of high Nature Conservation Importance, is not considered further in this chapter.

Pink-footed Goose

9.31 During the autumn and winter of 2011-12, pink-footed geese were recorded in flight from GVPs and from FVPs undertaken at dawn and dusk. They were recorded roosting approximately 1.5km from the proposed grid connection around two temporary pools in an improved pasture field (NS 925491). Pink-footed geese were also recorded feeding in several locations during baseline surveys with the nearest observed feeding area around 450m from the proposed grid connection. The majority of the flight activity detailed below was by foraging birds moving between pasture and stubble fields and most flights occurred in the southern half of the proposed grid connection, to the south of Springfield Reservoir.

9.32 GVP watches in the non-breeding period (August to April) recorded 127 flights by pink-footed goose involving 31,223 birds (**Figure 9.6**). Of these, 45 flights totalling 11,927 birds transited the proposed grid connection, with 20 flights numbering 8,221 birds flying below 20m. During FVPs undertaken at dawn and dusk, 86 flights totalling 23,119 birds were recorded with 33 flights numbering 5,779 birds transiting the proposed grid connection. Of these, 11 flights numbering 3,160 birds were below 20m.

Greylag Goose

9.33 Greylag geese were recorded in flight on three occasions. Two flights of eight and ten birds transited the proposed grid connection at between ten and 30m in September 2011. The other flight, by a single bird, was recorded to the east of the proposed grid connection in April 2011. All these birds are considered to be part of the naturalised central Scotland greylag goose population which is of low Nature Conservation Importance and not susceptible to significant impacts as a result of the proposed grid connection. Greylag geese are not considered further in this chapter.

Scarce Raptors and Owls

9.34 Four raptor species: hen harrier, goshawk, merlin and peregrine; and two owl species: barn owl and short-eared owl of high Nature Conservation Importance were recorded.

[2] A 'transit' of the proposed grid connection is when the recorded flight of a bird or flock of birds crosses the route of the proposed line. Further information on how bird transits are defined is given in 'Operational Impacts' below.

Hen Harrier

9.35 Hen harriers were recorded on four occasions, all in the non-breeding season (September to March). There was no evidence that hen harriers bred within 2km of the proposed grid connection. All records were of single hunting birds, with two of the flights by the same adult separated by a 30 minute period when the bird was perched within view of the observer (**Figure 9.7**). The other two flights were by immature birds. Hen harriers made four transits of the proposed grid connection during GVP watches, with all transits at below 20m. Hen harriers are not considered to be reliant on habitats surrounding the proposed grid connection in either the breeding or non-breeding periods and there are no records of breeding by hen harriers within the wider countryside from any source (e.g. desk-based consultations and searches carried out in suitable habitats adjacent to the proposed grid connection during the assessment of impacts of the Black Law Windfarm and Black Law Windfarm Extensions and monitoring of these sites between the years 2001 – 2010 (ScottishPower Renewables 2010; NRP 2009a; NRP 2009b).

Goshawk

9.36 Goshawks were recorded on six occasions in the non-breeding season. Four of these records came from GVP watches in December 2011 and were of single birds in flight over a small area in the south of the proposed grid connection (**Figure 9.7**). Three of these flights were by the same immature male within a 30 minute period, with a fourth flight by a female. Goshawks transited the proposed grid connection four times and all flights were below 20m. In March 2011, a male was recorded displaying on a single occasion over the north of the proposed grid connection but no evidence of nesting was found and, despite the area being visible from one of the VPs used, this was the only sighting in almost 80 hours of flight activity observations from this VP. Observations of individual territorial goshawks may not necessarily indicate an occupied nesting territory (Hardy et al. 2009) and targeted searches for goshawk in this area in recent years have revealed no signs of breeding (NRP, unpublished data). A male and female were recorded incidentally in suitable habitat in November 2011 over 2km from the proposed grid connection. Despite this record being outside the survey distance buffer for this species, a search of suitable habitat was undertaken but no nesting evidence was located in this area.

Merlin

9.37 Merlins were recorded on three occasions. During the breeding season, a single flight was recorded during GVP watches, which transited the proposed grid connection at less than 20m (**Figure 9.7**). A merlin nest containing young was located around 400m from the proposed grid connection (see **Confidential Bird Annex**[3]). In the non-breeding season, a single flight was recorded during a walk-over survey.

Peregrine

9.38 Peregrines were recorded on 13 occasions, with all these records involving single flying birds (**Figure 9.7**). In the breeding season, four peregrine flights were recorded, with three of these by the same immature bird within a 20 minute period in July 2011. Peregrines made two transits of the proposed grid connection, with one of these below 20m. In the non-breeding season, seven peregrine flights were recorded from GVPs. Seven transits were made over the proposed grid connection, with six below 20m and one above 20m. No evidence of breeding by peregrine was obtained with 2km of the proposed grid connection.

Short-eared Owl

9.39 Four short-eared owl flights were recorded from GVPs within a 15 minute period on a single day in November 2011 (**Figure 9.7**). These flights accounted for eight transits across the proposed grid connection, all at below 20m. No evidence of breeding by short-eared owl was recorded.

Barn Owl

9.40 No sightings of barn owl were made. Searches of potentially suitable barn owl nesting and roosting sites recorded signs of use at two sites. An occasional roost site was located approximately 650m from the proposed grid connection and an active breeding site was located approximately 270m from the proposed grid connection (details provided in the **Confidential Bird Annex**).

[3] The Confidential Bird Annex has been provided to SNH and RSPB only.

Waders

9.41 Of wader species, golden plover, a wader of high Nature Conservation Importance, was recorded along with curlew and lapwing which are of moderate Nature Conservation Importance. Snipe and oystercatcher were also recorded.

Golden Plover

9.42 Five golden plover flights were recorded from GVPs (**Figure 9.8**). One of these flights was by a single bird in late August 2011, with this flight accounting for four transits of the proposed grid connection, all at above 20m. The remaining four flights were in the non-breeding season and accounted for 27 transits of the proposed grid connection by golden plover, with 18 of these at below 20m. Golden plover were also recorded during FVP watches in the non-breeding season. There was no evidence that golden plover nested or roosted within 500m of the proposed grid connection, but in the non-breeding season they did feed in pasture fields in the vicinity of Hill Rig to the north-east of Kilncadzow.

Curlew

9.43 Sixty-five curlew flights totalling 811 birds were recorded during GVP watches. In the breeding season, fifty eight flights totalling 961 birds transited the proposed grid connection (**Figure 9.8**). Of these, 50 flights totalling 416 birds were below 20m. In the non-breeding season, seven flights totalling 38 birds were recorded with three flights totalling 22 birds recorded at below 20m. However, since these non-breeding season flights were recorded in March 2011 they may have related to resident birds which subsequently attempted to breed in the vicinity of the proposed grid connection. Three curlew breeding territories were identified within 500m of the proposed grid connection (**Figure 9.9a-9.9c**). A curlew nest was located approximately 90m from the proposed grid connection and estimated centres of the two other territories were at 350m and 440m from the proposed grid connection.

Other Waders

9.44 Lapwing, oystercatcher and snipe were all recorded occasionally in flight. Six snipe territories were located within 500m of the proposed grid connection but there was no evidence that oystercatcher or lapwing nested in the vicinity (**Figures 9.9a-9.9c**). Due to their absence as a breeding species in the vicinity of the proposed grid connection (lapwing and oystercatcher) and/or their low Nature Conservation Importance (snipe and oystercatcher), these species are not considered further in this chapter.

Additional Species

Herring Gull

9.45 Herring gulls, a species of moderate Nature Conservation Importance, were recorded regularly during surveys, with 268 flights involving 3,638 birds recorded during GVP watches. Almost 70% of these flights were by groups of fewer than ten birds. Seventy-seven percent of flights were recorded in the non-breeding period, accounting for almost 90% of individuals.

Other Non-Passerine Species

9.46 Quail, a species of high Nature Conservation Importance, was recorded in suitable breeding habitat and this species is assumed to have held a single breeding territory, located approximately 500m from the proposed grid connection (**Figures 9.9a-9.9c**). Cuckoo, which is of moderate Nature Conservation Importance, was also recorded during baseline surveys. However, given the scarcity of records and, in the case of quail, the relatively large distance from the proposed grid connection and low site fidelity of this species, the regional populations of both these species are highly unlikely to be impacted as a result of the proposed grid connection, and they are not considered further in this chapter.

Passerine Species

9.47 Of the passerine species recorded during moorland and farmland bird surveys and woodland point counts (**Figures 9.9a-9.9c**), skylark, dunnock, song thrush, grasshopper warbler, spotted flycatcher, starling, house sparrow, lesser redpoll, linnet, bullfinch, yellowhammer and reed bunting are all considered to be of moderate Nature Conservation Importance as they appear on the 'Red' list of Birds of Conservation Concern. However, at least during the breeding season, none of these species are known to be susceptible to the types of potential impact listed in paragraph 9.5. In addition, these species remain widespread and relatively abundant within the NHF and as a result none are considered further in this chapter.

Other Species

9.48 Buzzard, kestrel and raven were recorded frequently during VP watches. There were two buzzard and three kestrel nesting territories within the 500m buffer of the proposed grid connection (**Figures 9.9a-9.9c**).

The 'Do Nothing' Scenario

9.49 In the context of its regional setting, the bird community present within the survey area appears to be fairly typical of this type of mixed agricultural landscape bordering an area of heath habitat and conifer plantation. The land management practices that currently exert the most influence on bird communities are likely to be cropping practices, grazing levels and forest management. The distribution and extent of bird populations may be further modified by local influences arising from factors like vehicle and pedestrian traffic on roads and tracks, the presence of wind turbines and associated maintenance operations and recreational activities. There is no reason to expect that these existing conditions will change substantially in the medium to long-term and as such, bird populations are likely to remain in line with regional and national trends, modified by local conditions.

Routeing and Design Considerations

9.50 No routeing modifications were considered necessary as a result of ornithological interests.

Impact Assessment

9.51 The assessment of impacts is based on the development description outlined in **Chapter 4.** Desk studies and baseline surveys identified ten species of high or moderate Nature Conservation Importance whose populations were deemed susceptible to potential impacts as a result of the proposed grid connection. These are goshawk, hen harrier, merlin, peregrine, golden plover, short-eared owl and barn owl (high Nature Conservation Importance) and pink-footed goose, curlew and herring gull (moderate Nature Conservation Importance).

Construction Impacts

Predicted Impacts

Bird Protection Plan

9.52 The assessment has been undertaken under the assumption that a Bird Protection Plan (BPP), approved by SNH, will be in place prior to the onset of construction activities for the proposed grid connection. The BPP would describe survey methods for the identification of sites used by sensitive bird species (e.g. the nesting sites of Schedule 1 raptors) and would detail operational protocols for the prevention or minimisation of disturbance to birds as a result of activities associated with the construction of the proposed grid connection.

9.53 The BPP would be overseen by an Ecological Clerk of Works, who would coordinate surveys to locate the nests of birds, principally those listed in Schedule 1 of the WCA, within up to 1km of the proposed grid connection (depending on the species to be surveyed). Surveys will be undertaken during the period March-August prior to the commencement of construction activities. In the event that an active nest of a Schedule 1 species is discovered within distances given by Whitfield et al. (2008) (or within a 500m radius of the nest for Schedule 1 species not listed by Whitfield et al. (2008)) then activities, including vehicle movements, would be halted immediately within the specified distance. A disturbance risk assessment prepared under the BPP would be undertaken and any measures considered necessary to safeguard the breeding attempt (e.g. exclusion zones or restrictions on timing of works) would be submitted to SNH for agreement before recommencing work. The BPP would also outline operational protocols, similar to those proposed above for breeding birds, to prevent or minimise disturbance to other sensitive species close to the proposed grid connection during the construction phase.

Displacement

9.54 The construction phase of the proposed grid connection is proposed to take up to six months. Whether all or part of the bird breeding and/or the wintering season is potentially affected by the construction phase, depends on the month that work begins. However, for the purposes of this assessment, and in line with taking a precautionary approach where uncertainty exists, it is assumed that construction work may, for any given species, potentially impact upon one breeding season and one non-breeding season.

9.55 It is possible that noise and visual disturbance associated with construction activities would temporarily displace some of the breeding, roosting and foraging birds present. Birds that are disturbed at breeding sites are susceptible to a variety of potential impacts, including:

- the chilling or predation of exposed eggs or chicks;
- damage or loss of eggs or chicks caused by panicked adults;
- the premature fledging of young;
- a reduction in breeding success and feeding efficiency.

9.56 These impacts may lead to a reduction in productivity and survival rates of bird populations.

9.57 Disturbance impacts on breeding birds would be confined to areas in the locality of the poles, temporary working areas and access tracks. Few attempts have been made to quantify the impacts of disturbance to birds due to activities of this type. However, larger bird species, those higher up on the food chain, or those that feed in flocks in the open tend to be more susceptible to disturbance than small birds living in structurally complex or closed habitats (e.g. woodlands). In agricultural landscapes, such as are found along the majority of the proposed grid connection, the bird populations will be familiar with disturbance sources similar in nature and magnitude to those arising from construction of the proposed grid connection. However, the additional disturbance may result in adverse impacts.

9.58 Construction activities close to the active nest sites of sensitive species will be avoided through the implementation of the BPP. This will be required to ensure compliance with the WCA and, therefore, disruption of active breeding attempts is highly unlikely. The only species of Nature Conservation Importance not listed in Schedule 1 of the WCA that could be prone to construction disturbance during the breeding season is curlew.

9.59 Curlew are judged to have moderate sensitivity to disturbance, and birds breeding within 250m of construction activities are, for the purposes of this assessment, assumed to be susceptible to disturbance. In addition, it is assumed that curlew populations affected by construction activities may suffer a 50% reduction in breeding performance in that year. Both these assumptions are likely to be precautionary because both the distance threshold for impacts and the estimated impact on breeding performance exceed figures that are reported at operational windfarms in one study, although there is evidence that windfarm construction activities may result in greater impacts (Pearce-Higgins et al. 2009; Pearce-Higgins et al. 2012).

Pink-footed Goose

9.60 Pink-footed geese roosted on and around temporary pools in flooded fields during the autumn and winter of 20011/12. These pools were located approximately 1.5km from the proposed grid connection and any disturbance to roosting geese at this distance is highly unlikely. Even if a new roosting area was established at a different location closer to the proposed grid connection during the period of construction works, the proposed timing of works during the winter period would not overlap with the main period of daily occupancy by roosting geese (see **Chapter 4**). Hence, no matter the location of roosting areas during the construction period, roosting activity by pink-footed geese is highly unlikely to be impacted by the proposed grid connection.

9.61 Pink footed geese were recorded feeding in a variety of locations in the vicinity of the proposed grid connection during baseline surveys and it is possible that construction activities may displace feeding geese if the proposed grid connection crosses suitable fields. Whether fields will be suitable or not depends on the crop type, its phase and its condition and this cannot be wholly predicted at this stage. However, at any one time there will be large areas of suitable feeding habitat in the vicinity of the proposed grid connection but away from construction activity, and any displacement that did occur would be temporary and limited to relatively small areas, e.g. displacement of geese for half a day within 500m of a pole. Any displaced geese would likely not have to move further than a kilometre or so to find alternative feeding habitat, with the additional energetic costs of doing so highly unlikely to have a material impact on their over-winter survival.

9.62 Overall, the short-term impact of disturbance to pink-footed geese at roosting or feeding sites as a result of construction activities is predicted to be not significant under the EIA Regulations.

Curlew

9.63 Only one breeding curlew territory was within 250m of construction activities and therefore, under the disturbance threshold applied here, potentially at risk of displacement due to construction activities. However, in reality it is considered highly unlikely that the density of breeding curlews in the vicinity of the proposed grid connection will be influenced by construction activities since there is ample suitable nesting habitat at distances from the proposed grid connection beyond which disturbance impacts might be reasonably expected. Hence, any breeding curlews temporarily displaced are likely to relocate locally, with no net losses to the regional population. In addition, despite evidence of regional declines in recent decades (Sim et al. 2005), curlew remains a relatively common and widespread regional breeder (Forrester et al. 2007), with large areas of suitable nesting and feeding habitat available in the vicinity of the proposed grid connection and in the wider region. Thus, the short-term potential displacement of a single pair of curlew as a result of construction activities is predicted to have a negligible impact on the abundance and breeding success of the regional population and the impact is considered to be not significant under the EIA Regulations.

Goshawk

9.64 Goshawks made very little use of habitats surrounding the proposed grid connection during baseline surveys and there is little prospect of construction activities having any impact on the regional goshawk population. Impacts of construction activity on goshawk are deemed not significant under the EIA Regulations.

Hen Harrier

9.65 Hen harriers made very little use of habitats surrounding the proposed grid connection during baseline surveys and there is little prospect of construction activities having any impact on the regional hen harrier population. Construction impacts on hen harrier are deemed not significant under the EIA Regulations.

Merlin

9.66 Merlins nested around 400m from the proposed grid connection and any future nesting attempt during the construction phase would be safeguarded by following procedures set out under the BPP. Merlins probably forage in the vicinity of the proposed grid connection during the breeding season, however, only a single sighting was recorded during baseline surveys indicating that the area appears to be relatively unimportant. Although the typical size of the foraging range used by breeding merlins is not known in Britain, neighbouring breeding pairs are normally separated by distances of between 3 and 4km (Parr 1991) indicating that most foraging activity is likely to be within approximately 1.5 to 2km from nest sites. Hunting ranges of neighbouring pairs can nevertheless have a large degree of overlap (Sodhi & Oliphant 1992) with breeding birds recorded hunting over 5km from the nest in Scotland (Rebecca et al. 1990). Foraging merlins nesting adjacent to the proposed grid connection could be potentially displaced from localised areas around construction sites during the breeding season and this may impact on breeding success by excluding birds from key hunting areas.

9.67 Assuming that breeding merlins hunt mainly within an area of 12.6km^2, defined as an area of 2km radius centred on the 2011 nesting location, it is estimated that a 1.6km length of the proposed grid connection is enclosed by their core foraging range. Merlins are known to be relatively tolerant of some forms of human activity when hunting, nevertheless a precautionary estimate is that 50% of foraging activity would be displaced within 250m of construction activities (construction activities are assumed to generate a disturbance level of equal magnitude along the whole 1.6km length). The total area enclosed by a 250m buffer on either side of this1.6km stretch of the proposed grid connection is approximately 0.9km^2, or 7% of the core foraging range. A 50% reduction in foraging activity in this area results in an estimated 3.5% net loss in the foraging range of this pair of breeding merlins as a result of construction activities. It is not considered likely that a potential loss of this scale would impact on the productivity of breeding merlins, particularly since any displacement could be compensated for by exploiting additional foraging areas outside the 2km radius, of which there is an abundance within the recorded maximum distance that breeding merlins are known to travel in search of food (Rebecca et al. 1990).

9.68 In summary, the breeding success of merlins occupying a territory adjacent to the proposed grid connection is considered highly unlikely to be affected by short-term construction activities and the impact on the regional breeding merlin population is predicted to be not significant under the EIA Regulations.

Peregrine

9.69 Baseline surveys revealed that peregrine made very little use of habitats around the proposed grid connection in either the breeding or the non-breeding periods. Therefore, the low likelihood of peregrines exploiting habitats surrounding the proposed grid connection, combined with their known ability to tolerate certain human activities, means that that the regional peregrine population is not considered to be at risk of impact as a result of construction activities, with this deemed not significant under the EIA Regulations.

Barn Owl

9.70 Barn owl nesting sites will be safeguarded from construction disturbance through protocols detailed in the BPP. During the breeding and non-breeding periods, barn owls are likely to forage in the vicinity of the proposed grid connection, however, this species is largely nocturnal and their foraging activity is unlikely to be affected by construction activities, which will be undertaken mainly during daylight hours (see **Chapter 4**). Therefore, impacts on the regional barn owl population are deemed not significant under the EIA Regulations.

Proposed Mitigation

9.71 As no significant impacts are predicted as a result of construction activities, no mitigation is therefore necessary or proposed.

Operational Impacts

Predicted Impacts

Displacement

9.72 The presence of the proposed grid connection may result in the displacement of breeding, foraging and roosting birds for three reasons. Firstly, routine or emergency maintenance activities may cause disturbance at nesting, feeding or roosting sites due to the presence of vehicles and humans. Secondly, the OHL might be used for perching by predatory birds and may lead to a reduced likelihood of birds using areas in close proximity to the OHL for nesting or foraging. Thirdly, the OHL may be perceived by birds as an impediment to their preferred flight routes when taking off or landing near to the proposed grid connection, e.g. birds may perceive the line as interfering with their ability to avoid or escape from predators.

9.73 Maintenance activities are likely to be very infrequent and short-term in duration (see **Chapter 4**). There is, therefore, considered to be no prospect of routine maintenance influencing regional or national breeding or wintering populations and this impact is deemed to be not significant for all species.

9.74 It is likely that the proposed grid connection's OHLs and poles will be used for perching by predatory birds, which in this instance will include species such as carrion crows and buzzards. This may improve the foraging efficiency of these species by affording them additional opportunities to scan the surrounding landscape and potentially enhance their ability to detect prey including the nests and chicks of ground nesting birds. Whether this will affect the nest site choice or nesting success of birds that are potentially susceptible to predation by these species is unclear, with different studies into the impacts of predator perches on the distribution of nests and nesting success revealing differing results. For example, Berg et al. (1992) found that lapwing nests had higher nesting success if they were greater than 50m from predator perches, but Seymour et al. (2003) found no such effect for this species. Wallander et al. (2008) and Ottvall et al. (2008) found no relationship between wader nest success and distance to man-made structures such as power-lines, fences and trees, although the former study found that waders nested further from man-made structures than would be expected by chance with mean distances in the range of 40 – 60m. Despite these contradictory studies, it is assumed here that nests located within 50m of the OHL will suffer a 50% reduction in breeding success.

9.75 The presence of the proposed grid connection may also displace wintering birds at feeding or roosting sites. This may occur if birds perceive the OHL as an obstacle to flights into or out of preferred habitats or if its presence reduces the suitability of habitats in other ways, for example by increasing the perceived predation risk near to the OHL. The distance at which a particular activity (feeding, roosting

etc.) might be affected by the presence of the proposed grid connection will vary for different species. In this instance, the only wintering species considered to be potentially at risk of displacement are pink-footed geese, which were recorded feeding and roosting during baseline surveys.

9.76 Several species of high and moderate Nature Conservation Importance recorded during baseline surveys are, due to the nature of the potential impacts described above, not considered susceptible to any displacement impacts in either the breeding or the non-breeding seasons due to the presence of the proposed grid connection. These are goshawk, hen harrier, merlin, peregrine, golden plover, short-eared owl, barn owl and herring gull and operational impacts arising from displacement are deemed to be negligible for all these species and not significant under the EIA Regulations.

Curlew

9.77 One breeding curlew territory (centred approximately 90m from the proposed grid connection) is considered to be at increased risk of failure as a result of its proximity to the OHL. Under the conservative assumption used here, it is predicted that this territory would suffer a 50% reduction in breeding success, equivalent to complete breeding failure every second year for the lifetime of the proposed grid connection. However, given that nest site choice by curlews in future years will take account of the presence of this new feature in the landscape, and assuming that alternative nesting habitat will continue to be available and not occupied by neighbouring pairs, it is considered more likely that overall, the long-term productivity of breeding curlews in the surrounding area will be unaffected by the presence of the proposed grid connection. Hence, impacts on the regional breeding curlew population as a result of displacement are predicted to be barely detectable and are deemed not significant under the EIA Regulations.

Pink-footed Goose

9.78 Pink-footed geese were recorded roosting approximately 1.5km from the proposed grid connection during baseline surveys, however, the roost is not considered to be vulnerable to any displacement impacts during the operational phase. Further, this roosting location may have been used in 2011 only, as there are no known records of roosting pink-footed geese in this location in previous years. Observations during baseline surveys indicated that the roost developed around two temporary pools of flood water in an improved pasture field in November 2011. At inland sites, pink-footed geese normally roost on and around undisturbed permanent freshwater bodies like lochs and reservoirs. Had high rainfall levels not led to these pools forming, it is unlikely that geese would have chosen to roost here. The apparently suitable Springfield Reservoir some 3.5km distant was not used for roosting despite having been regularly occupied by pink-footed geese until 1986 (Mitchell & Hearn 2004).

9.79 Pink-footed geese also foraged within improved grassland and stubble fields in the vicinity of the proposed grid connection. The nearest recorded feeding area to the proposed grid connection, used by up to 6000 pink-footed geese on two dates in November 2011, was in a stubble field approximately 450m distant. However, there may be considerable annual variation in field use depending on whether a suitable arable, grass or root crop has been grown in that year. Field use for feeding is also influenced by physical factors, for example proximity to roads (Keller 1991) and the local pattern of field use will change within a season as food resources are depleted in specific areas.

9.80 Pink-footed geese will regularly feed in suitable fields that are crossed by powerlines and recorded displacement from powerlines in one study was a maximum of 75m (Larsen and Madsen 2000). The proposed grid connection will traverse a mixed agricultural landscape and the suitability of individual areas, i.e. fields, will change over time as described above. Nevertheless, there will likely be many suitable areas sufficiently distant from the proposed grid connection that no impact on foraging would be predicted. For example, no impact on foraging would be predicted based on baseline survey information from autumn/winter 2011 when geese were at least 450m from the proposed grid connection. Any foraging displacement that did occur within a narrow distance band on either side of the proposed grid connection would likely be compensated by the abundance of alternative suitable habitats in the immediate vicinity. Any impact of the proposed grid connection on the foraging efficiency of pink-footed geese is predicted to be slight and the impact on the national population is deemed not significant under the EIA Regulations.

Collision Risk

9.81 Birds in flight will be at risk of colliding with the OHL element of the proposed grid connection. The likelihood of collision depends on a broad range of factors, such as the configuration of the line components, weather and light conditions, local topography and habitat and, most importantly, the species concerned and their level of flight activity over the proposed grid connection. The ability of birds to detect the OHL and take the necessary avoidance action when they perceive it as a risk is a principle factor affecting species susceptibility (Bevanger 1998; Martin & Shaw 2010). This avoidance action may range from their complete displacement from the OHL ('far-field avoidance') to, at the other extreme, making rapid directional or height changes when in close proximity to the line ('near-field avoidance'). Any collision that did occur may result in severe injury or death resulting in a potential impact on the populations of key species.

9.82 A wide range of bird species are known to be susceptible to collision with OHLs. Although there is much evidence for this direct mortality and some information is available on the relative susceptibility of different species or families, the quantification of collision risk remains difficult because of the range of factors influencing the likelihood of collision (see above) and difficulties in quantifying key parameters in the field (e.g. flight rate and number of collision victims). Nevertheless, a number of studies have estimated collision rates with extant powerlines for some species or species groups (Meyer 1978; Anderson & Murphy 1988; Alonso & Alonso 1999). Inevitably, these estimates are site specific, and will be influenced by a range of local factors such as the configuration of power lines (e.g. height and number of wires), the topography and geography, and the composition and ecology of the bird communities at risk (Bevanger 1998).

9.83 Collision risk estimates derived from sites that have power lines in place are also assumed to incorporate a behavioural response by birds to the presence of the power line, i.e. an avoidance rate. Hence, any study that aims to predict potential collisions using data on flight activity over an area that has no obstructions in the airspace may over estimate the future collision rate since an avoidance response will be absent in the data.

9.84 Most studies have shown that the overall number of collisions with OHLs is relatively small with the exceptions being explained by local factors, for example power lines which run over or adjacent to wetlands supporting high densities of relatively susceptible species (e.g. Faanes 1987). In comparison to other causes of mortality in bird populations, the impact of power lines are, in most cases, very small, again with the exception of certain specific situations where a range of factors coalesce to create a genuine conservation problem for some susceptible species (Jenkins et al. 2010). Species known to be at greater risk of collisions tend to be relatively large and with relatively low manoeuvrability, e.g. cranes, grouse species and certain large raptors.

9.85 In relation to this project, the species of Nature Conservation Importance deemed to be at risk of collision with the OHL are those that were recorded transiting the route of the proposed OHL during flight activity surveys. These are pink-footed goose, goshawk, hen harrier, merlin, peregrine, short-eared owl, curlew and golden plover. Barn owl, a species of high Nature Conservation Importance, was present in the vicinity of the proposed grid connection but not recorded during flight activity surveys. Herring gull, a species of moderate Nature Conservation Importance, was recorded in flight but these flights were not mapped in the field[4] so the number of transits over the proposed grid connection could not be calculated. The potential impact of collision on barn owl and herring gull populations has been assessed separately.

9.86 To evaluate the collision risk for the species listed above, the number of bird transits (see below) over the OHL was estimated by calculating a transit rate, i.e. observed transits per hour of observation, and multiplying this by the number of hours that birds were potentially "available" to collide. The number of transits was then combined with bird collision rates derived from several studies (Meyer 1978; Anderson & Murphy 1988; Alonso & Alonso 1999) to estimate the number of annual collisions for each species.

9.87 Flights were plotted within a GIS and the OHL was divided into 250m segments. The first division was 250m from the southern end of the line and in total there were 57 segments of 250m length and a terminal segment at the northern end of 196m (**Figure 9.5**). Any flight that crossed or came within 100m of the OHL was categorised as a transit and a single flight could have multiple transits. During data collection, flight heights were assigned to one of four categories: below 10m, 10-20m, 20-30m and above 30m. The height of the proposed OHL is typically 13-15m; hence, for the purposes of this assessment, birds at risk of collision with the wires are taken to be those recorded flying within the two lowest height bands, i.e. all flights below 20m.

9.88 The species specific estimates of collision rate used here were taken from studies which derived rates from observations of flights at all heights crossing extant powerlines. The number of observed flights within different periods was used to calculate a 'period specific' flight rate, e.g. a breeding season flight rate. Alonso & Alonso (1999) and Anderson & Murphy (1988) estimated the number of collisions by searching beneath the line to count collision victims and then using a number of correction factors to

[4] Herring gull flights are not routinely mapped unless habitual flight routes or unusually large flight movements are detected.

account for errors in this total due to factors like search efficiency and removal of carcasses by scavengers. Meyer (1978) estimated collisions from direct observations.

9.89 The collision rate estimates for the species listed above are given in **Table 9.6**.

Table 9.6: Collision Rate Estimates

Species	Collision rate (%)	Source reference	Notes
Pink-footed goose	0.05	Anderson & Murphy (1988)	Derived rate from all geese.
Goshawk	0.072	Alonso & Alonso (1999)	Used buzzard rate.
Hen harrier	0.072	Alonso & Alonso (1999)	Used buzzard rate.
Merlin	0.012	Alonso & Alonso (1999)	Used kestrel rate.
Peregrine	0.012	Alonso & Alonso (1999)	Used kestrel rate.
Golden plover	0.01	Meyer (1978)	Derived rate from all shorebirds.
Curlew	0.01	Meyer (1978)	Derived rate from all shorebirds.
Short-eared owl	0.072	Alonso & Alonso (1999)	Used buzzard rate.

Pink-footed Goose

9.90 For pink-footed geese, flight activity data was separated into three periods: autumn passage, mid-winter and spring passage. Firstly, data from GVPs and FVPs in the period September to November 2011 was used to estimate collision risk in the autumn passage period. This period is coincident with a concentration of the UK wintering pink-footed goose population in northern Britain, and is when numbers of pink-footed geese in central and southern Scotland peak (Mitchell and Hearn 2008). In support of this, over 80% of pink-footed goose flights and 79% of total numbers recorded during baseline surveys were from the period 15 September to 30 November 2011.

9.91 The autumn passage data were further split into different periods of the day. When pink-footed geese are present in an area, their rate of flight activity throughout the day tends to peak at dawn and dusk coinciding with their movement between over-night roosts and feeding areas. This daily pattern was evident in baseline surveys, as would be expected since a high proportion of pink-footed geese recorded during this period were feeding birds which made daily movements to and from a nearby roost. The dawn period was defined as one hour before sunrise to two hours after sunrise and dusk was defined as two hours before sunset to one hour after sunset. Flights recorded during these periods between 15 September and 30 November were used to calculate a dawn and dusk flight rate, and the time geese were 'available' to collide was taken to be the sum of these hours, i.e. 462 hours. The daytime period during autumn passage was taken to be the hours between dawn and dusk as defined above, i.e. a total of 618 hours, and flights within this period were used to calculate a daytime flight rate.

9.92 During the hours of darkness, a proportion of pink-footed geese also make flights between feeding and roosting areas, and geese will also make longer distance (migratory) flights at night. To account for these unrecorded nocturnal movements, a transit rate equivalent to 25% of the daytime transit rate was assumed and it was further assumed that collision rates were unchanged. This period added 768 hours of potential flight time.

9.93 Data collected from GVPs between December 2011 and February 2012 was used to estimate collision risk in the mid-winter period (900 hours), and data from March and April 2012 were used to estimate collision risk in the spring passage period (854 hours), when pink-footed geese are on their northward migration (**Table 9.7**).

Table 9.7: Estimated Number of Crossings and Collision Estimates during different Periods for Pink-footed Geese

Period	Estimated number of transits	Collision rate estimate (%)	Estimated collisions
September – November Dawn & dusk	41,629	0.05	20.81
September – November Daytime	52,670	0.05	26.33
September – November Night-time	16,363	0.05	8.18
December – February	360,000	0.05	262.24
March - April	3,600	0.05	1.71
Total			319.27

9.94 The estimated number of transits by pink-footed geese over the entire length of the proposed grid connection, based on data collected over the course of a single 'goose winter' (September 2011 to April 2012), is 474,262. Whether the level of flight activity which predicted this number of transits is typical of other years is unknown. However, pink-footed geese do use the surrounding area for roosting and feeding so their presence near to the proposed grid connection is likely in future years, at least in the autumn passage period.

9.95 The very high number of transits and resultant high transit rate for the December to February period is considered to greatly overestimate the predicted number of collisions in this period. The transits recorded were mainly (98% of records) from less than ten pink-footed goose flights in two days in January and February 2012. Some of these flights, by flocks of up to 1,600 birds transited the proposed route several times before birds landed in a field to feed. Extrapolation of these data to the entire period thus resulted in the high estimate of collision.

9.96 The non-breeding (wintering) pink-footed geese recorded during baseline surveys are not considered to form part of the nearest SPA population, which roost at the Westwater SPA around 19km to the east. Therefore, the potential impact of the proposed grid connection on this species is evaluated against the national pink-footed goose population (SNH 2012a).

9.97 The annual trend in the abundance of pink-footed geese is of increase since 2000 and increase since earlier decades (Trinder et al. 2005; Mitchell 2011) with the most recent counts estimating a UK wintering population of 297,798 in 2010 (Mitchell 2011). The conservation status of pink-footed geese is favourable, given that it has shown sustained increases in abundance over recent decades. This is despite about 13,000 birds being shot annually in Iceland and about 25,000 being shot in the UK per annum during much of this period of increase (Trinder et al. 2005). Estimated annual mortality rates of about 14% over this period (Trinder et al. 2005) suggest that the vast majority of mortality is due to shooting by hunters.

9.98 In respect of the proposed grid connection, the annual mortality through collision with the OHL is conservatively predicted to be 320 birds or 0.11% of the national population. This predicted mortality amounts to 0.8% of the combined number that are estimated to be shot annually in Iceland and the UK, and around 1.3% of the number shot in the UK alone. Hence, additional mortality through collisions of the magnitude predicted here will be barely detectable against the background mortality of this population and the impact of collision on pink-footed geese is deemed not significant under the EIA Regulations.

Scarce Raptors and Owls

9.99 The estimated number of annual transits over the proposed grid connection by raptors and owls, and the estimated number of collisions is shown in **Table 9.8**. For all species, data from the breeding and non-breeding seasons have been combined, with at risk periods assumed to be 2448 during the breeding season and 2120 hours in the non-breeding season.

Table 9.8: Estimated Number of Annual Crossings and Collision Estimate for Raptors and Owls

Species	Estimated number of annual transits	Collision rate estimate (%)	Estimated annual collisions
Goshawk	149	0.072	0.11
Hen harrier	194	0.072	0.14
Merlin	70	0.012	0.008
Peregrine	369	0.012	0.15
Short-eared owl	390	0.072	0.28

9.100 All four scarce raptor species plus short-eared owl are predicted to have, both relatively and absolutely, a very low risk of collision with the OHL. Further, the collision rate estimates applied here are derived from data collected on other species, in different habitats and circumstances, and are likely in all cases to exceed collision rates that might be expected for each of the species of concern here. For example, for both hen harrier and short-eared owl, which were present in the non-breeding season, the collision rate estimate applied here is taken from buzzards. The susceptibility of both hen harrier and short-eared owl to collision, in terms of their likelihood of encountering an OHL in the non-breeding season when the majority of flight activity is concerned with foraging, is considered to be lower than that that of buzzard due to their habitual flying height alone. Both hen harrier and short-eared owl tend to hunt by flying relatively low (<10m) over the ground and they also consume their prey on the ground, whereas buzzards tend to fly at heights in excess of 10m and regularly perch on poles, putting them at greater risk of collision with OHLs. Nevertheless, even the application of these potentially high derived collision rates to the baseline survey data does not lead to predictions of mortality through collision that would result in measureable changes to relevant populations of these scarce raptor and owl species.

9.101 For hen harrier, all records were from the non-breeding period so the impact on the species, whose breeding and non-breeding season distribution in the UK varies considerably, cannot be evaluated against the small regional breeding population (found mainly in the western section of NHF 17). There are estimated to be around 1500 hen harriers in Scotland at the beginning of the non-breeding season with around one third of these dying before the following spring (Forrester et al. 2007). The predicted additive over-winter mortality of 0.1% would add virtually nothing to this background mortality rate. Therefore, the impact of collision mortality on hen harriers is predicted to be not significant under the EIA Regulations.

9.102 Goshawk flight activity over the proposed grid connection was restricted to the non-breeding period and was mainly (perhaps all) by immature birds. These birds were likely to have been recently fledged individuals from the relatively productive and expanding southern Scotland breeding population (SRMG 2011) as, during their first winter, goshawks disperse and prospect over wide areas eventually settling up to 70km (median 31.7km) from their natal area (Forrester et al. 2007). The southern Scotland goshawk population numbers in excess of 50 breeding pairs producing over 100 chicks (SRMG 2011). At least a third of these are likely to die over the first winter (Kenward et al. 1999) meaning that the collision rate predicted here, assuming mortality of all collision victims, would add less than 0.5% to the annual mortality rate, i.e. 0.11 deaths per annum as a result of the proposed grid connection compared to an estimated 30 annual deaths of first year goshawks through background mortality in the southern Scotland population. This impact is considered not significant under the EIA Regulations.

9.103 Peregrines were recorded transiting the proposed grid connection occasionally throughout the year. The breeding peregrine population in NHF 17 is estimated to be in the region of 50 pairs (SNH 2012b) and with annual productivity averaging around 1.1 (Forrester et al. 2007), the regional population will be at least 150 birds. Additive annual mortality of 0.15 birds as a result of collision with the proposed grid connection will be barely detectable against background mortality rates, of around 11% annually for adults and 66% for juveniles between fledging and recruitment (Mearns & Newton 1984; Newton & Mearns 1988). Hence, the impact of collision on the regional peregrine population is deemed not significant under the EIA Regulations.

9.104 The predicted risk of collision by merlin, which employs a precautionary collision rate estimate derived from kestrel, predicts mortality equivalent to one bird every 125 years. Therefore, the impact of collision on the regional merlin population is deemed not significant under the EIA Regulations.

9.105 For short-eared owl, several transits of the proposed grid connection over the course of a single flight by an adult in November 2011 resulted in an annual collision estimate of 0.28, using a derived collision rate estimate for buzzard. Both the regional and national populations of short-eared owl fluctuate widely in the breeding and non-breeding season and the species is essentially nomadic across its range with its annual distribution and regional population density tied closely to the cyclical availability of key food resources, principally voles. The upper and lower estimates of the annual Scottish wintering population vary from 300 to 3000 birds (Forrester et al. 2007). Even accepting a Scottish population at the lower end of this range, and assuming combined over-winter mortality of 10%, collision mortality as a result of the proposed grid connection would contribute little additional mortality and the impact of the proposed grid connection is deemed negligible and not significant under the EIA regulations.

Waders

9.106 The estimated number of transits over the proposed grid connection by golden plover and curlew and the estimated number of annual collisions are shown in **Table 9.9**.

Table 9.9: Estimated Number of Crossings and Collision Estimate for Waders

Species	Estimated number of annual transits	Collision rate estimate (%)	Estimated annual collisions
Golden plover	887	0.01	0.09
Curlew			
Non-breeding	150	0.01	0.01
Breeding (April- mid-July)	2,374	0.01	0.24
Post-breeding (mid-July – Aug)	21,056	0.01	2.10

9.107 Golden plover transits were by birds in the non breeding season, when the Scottish golden plover population is in excess of 25,000 birds with coastal and inland areas of NHF 17 supporting many thousands of birds (Forrester et al. 2007). Hence, the small number of estimated collisions is predicted to have a negligible impact on both national and regional wintering populations of golden plover and this is not significant under the EIA Regulations.

9.108 In calculating transit rates for curlew, data from the breeding and non-breeding season were calculated separately. In addition, it was considered necessary to subdivide data within the breeding season to account for the presence of a relatively large number of post-breeding curlews (up to 400 birds) observed during VP watches on two consecutive days in mid-July 2011. Hence, data on flight activity between April and mid-July (a total of 1,696 hours) was used to estimate transit rates relating to resident breeding curlews and data from the mid-July to August (752 hours) was used to estimate transit rates of post-breeding (migratory) birds from the wider area.

9.109 During the breeding season, there was much flight activity by resident breeding curlews due to display, territorial and foraging flights. Three curlew territories were located within 500m of the proposed grid

connection and some of the flight activity may have been by curlews holding breeding territories beyond 500m but close enough to the proposed grid connection for them to have also made transits. With the collision rate estimate employed here, very few curlew collisions are predicted in April to mid-July and impacts on the regional breeding curlew population are predicted to be negligible and not significant under the EIA Regulations.

9.110 The large number of post-breeding curlews in the vicinity of the proposed grid connection in late July 2011 were likely to have comprised females recently arrived from their breeding grounds on route to wintering areas to the south and south-west. Due to the large number of birds recorded and their flight behaviour, e.g. one flock of 50 birds made repeated transits over the proposed grid connection before landing in a field, the estimated number of transits is relatively high. However, close examination of these flight data show that over 80% of flight activity, or nearly 17,000 of the predicted curlew transits during this six week period, are as a result of a single flight by 50 incoming curlew lasting less than five minutes.

9.111 The curlews contributing to transit rates during this post-breeding period were very unlikely to be solely from the regional breeding population. Rather, given what is known about the migratory movements of post-breeding curlews, they may have originated from breeding sites across much of southern and eastern Scotland. These regions combined probably support in excess of 10,000 breeding pairs so the predicted loss of less than three birds annually through collision would be barely measurable alongside annual mortality estimated to be in the region of 10% (Grant et al. 1999). Hence, the impact on the wider breeding population of curlew is judged to be not significant under the EIA Regulations.

Herring Gull

9.112 Herring gulls were frequently recorded in the vicinity of the proposed grid connection during flight activity surveys. Records were mainly of small groups of foraging birds flying between fields or by birds moving into or out of the flight activity survey area to these feeding fields. The majority of the birds were recorded in the non-breeding season and there was no evidence of large dawn and dusk movements in the vicinity of the proposed grid connection. This suggests that these herring gulls probably roosted some distance away, i.e. the presence of a nearby roost would likely have been revealed by peaks in the birds' activity patterns at dawn and dusk. More likely, the recorded birds came from one of two established herring gull roosts; Roughrigg Reservoir about 15km to the north-west of the proposed grid connection, and Strathclyde Loch about 19km to the west. Both these roosts are within the foraging range of herring gulls (Calladine et al. 2006). Herring gulls from these roosts may also have been attracted to the vicinity of the proposed grid connection by the Levenseat Landfill Site 3km east of the northern end of the proposed grid connection.

9.113 A herring gull transit rate across the proposed grid connection was not derived because flights were not mapped. Hence, a collision rate cannot be estimated using the methods outlined above. However, if it is assumed that half of all recorded birds throughout the winter period flew at <20m and that all these flights transited the proposed grid connection twice (e.g. once at the beginning of the day and once at the end), then one could estimate at least 150,000 transits by herring gull. Applying a collision rate estimate derived for gulls from Meyer (1978) of 0.01% would predict around 15 collisions per year.

9.114 Given that the majority of herring gull records were from the non-breeding season, the evaluation of potential collision impact is against the national wintering herring gull population which, despite recent declines, stands at over 250,000 (Banks et al. 2007). Fifteen collisions would lead to the death of up to 0.006% in the national wintering herring gull population and therefore, the impact of collision is deemed not significant under the terms of the EIA regulations.

Barn Owl

9.115 Barn owls were recorded breeding around 270m from the proposed grid connection and are likely to forage locally in the breeding season. The core foraging area of barn owls is typically within 1km of nest sites (Hardy et al. 2009) and much suitable barn owl foraging habitat exists in the surrounding area. The configuration of the nest site in relation to the proposed grid connection means that around 25% of their core foraging range (defined as a circle of 1km radius around the nest) is beyond the 1.8km section of the route that bisects this core range. Hence barn owls are expected to make numerous transits over the proposed grid connection during the breeding season, with these mainly occurring at night or in low light levels at dawn and dusk.

9.116 Despite barn owl's global distribution, they have been infrequently recorded as OHL collision victims (e.g. Bevanger 1998; Alonso & Alonso 1999; Janss 2000; Rubolini et al. 2005; Drewitt & Langston 2008; Shaw et al. 2010; Jenkins et al. 2010). This is despite their high level of flight activity in darkness or in low light levels. However, this is perhaps not surprising given that barn owls spend the majority of their flight time below about 10m and have relatively low flight speeds. Hence they will rarely enter airspace containing overhead wires and if they do, their aural and visual acuity and their low flight speed may combine to enhance their ability to avoid collision (Martin & Shaw 2010). As a result, it is reasonable to assume that barn owls are likely to have very low collision rates with OHLs.

9.117 The breeding barn owl population in NHF 17 is probably at least 150 pairs and is considered to be in favourable conservation status (Forrester et al. 2007). Since the magnitude of potential impact as a result of collision is considered to be very low, it is concluded that the OHL is highly unlikely to lead to detectable changes in the regional breeding barn owl population and hence, the impact of collision mortality is judged to be not significant under the EIA Regulations.

Proposed Mitigation

9.118 No significant impacts on bird populations are predicted as a result of the operational phase of the proposed grid connection and therefore, under the terms of the EIA Regulations, no mitigation is required.

9.119 Nevertheless, due to predicted mortality of flying birds as a result of collision with the OHLs, measures are proposed to reduce the likelihood of these collisions. The minimisation of direct mortality would be considered best practice in these circumstances, even in the absence of significant impacts. In addition, given the uncertainties associated with collision risk predictions, and notwithstanding that these are considered likely to over-estimate the risk to birds, it would also be prudent to take reasonable steps to reduce potential collisions as a precaution against any site specific factors that acted to elevate collision rates above those predicted by the site specific studies undertaken to date.

9.120 OHLs can be made more visible to flying birds by attaching markers ('diverters') to the line, with numerous studies showing that this can significantly reduce collision rates. Appropriate use of markers has been shown to reduce collision rates in day flying birds by over 90% in some instances (Frost 2008) with typical reductions in the region of 60-80% (Jenkins et al. 2010).

9.121 Data from baseline surveys indicated that specific regions of the OHL are likely to pose relatively greater collision risk to flying birds. Relative collision risk to pink-footed geese and curlew in each 250m segment of the OHL is shown in **Figure 9.5**. This is based on the sum of the estimated annual transit rates that were used to predict collisions during relevant periods using data from pink-footed goose in the non-breeding (wintering) period and curlew in the breeding and post-breeding periods (as defined above). These were the two species predicted to suffer the greatest collision impact. The relative risk in each segment is defined as very low (no recorded transits), low (up to 20 transits), medium (20 – 50 transits) and high (above 50 transits).

9.122 Under this approach, it is possible to identify so called 'hotspots' of relatively high potential collision risk. This phenomenon is known from several studies on the collision impact of existing OHLs on birds. One risk of this approach is that it categorises other areas as 'cold-spots', which may be problematic if birds diverted from a marked hotspot have a higher chance of colliding with a neighbouring unmarked section.

9.123 As a precaution therefore, the segments of the OHL with collision risk defined as medium and high will be marked with appropriate diverters to reduce collision risk. In addition, any segments immediately adjacent to medium and high risk segments will also be marked whether they are classified in this way in their own right or not. Further to this, the length of the OHL within approximately 500m of Springfield Reservoir will be marked to reduce collision risk to waterfowl moving to and from the reservoir. This is a precaution against its future re-establishment as a pink-footed goose roost and has also been advised by the RSPB in their response to scoping.

9.124 In line with the above, the OHL within the following numbered segments (see **Figure 9.5**) will be marked with appropriate diverters: segments 9 to 11 (between poles 19 and 24), segments 14 to 18 (between poles 29 and 40), segments 22 to 29 (between poles 48 and 65) and segments 33 to 39 (between poles 72 and 86). In total, this amounts to the marking of approximately 5km of the OHL. Several types of diverter are available for marking OHLs (e.g. see Frost (2008)) with these spaced at distances of between three and 50m depending on the marking method used (Jenkins et al. 2010). The final marking method will be agreed in consultation with SNH.

Residual Impacts

9.125 Assuming that collision rates on marked segments are reduced by a minimum of 60%, the predicted residual impacts on all species as a result of collisions with the OHL are shown in **Table 9.10.** For all species, no significant impacts are predicted in the context of the EIA Regulations.

Table 9.10: Residual Collision Estimates on potentially Impacted Species following Marking of the OHL

Species	Total estimated number of annual collisions
Pink-footed goose	212.50
Hen harrier	0.14
Goshawk	0.09
Merlin	0.008
Peregrine	0.41
Short-eared owl	0.11
Golden plover	0.04
Curlew	0.8

Cumulative Impact Assessment

9.126 The EIA Regulations require that the proposed grid connection be assessed cumulatively along with other projects. In doing so, SNH guidance on assessing cumulative impacts of windfarms has been followed (SNH 2012a). In considering cumulative impacts, it is necessary to identify any impacts which are not significant in isolation but which may be additively.

9.127 'Target' species (or 'sensitive receptors' in a cumulative sense) were taken to be those species of Nature Conservation Importance (**Table 9.2**) for which there was some indication of a potential adverse impact as a result of the proposed grid connection that may be exacerbated cumulatively as regards influencing a species' conservation status. Ten species of Nature Conservation Importance were assessed due to the proposed grid connection in isolation. Of these species, the impact of the proposed grid connection is predicted to be so small on all species other than pink-footed goose that it would not add appreciably to any cumulative regional impacts. For pink-footed goose, although the assessment concludes that the in isolation impacts on the relevant population will be not significant; the predicted mortality may contribute cumulatively to conservation status the national scale.

9.128 Cumulative impact assessment focuses on the operational impacts of relevant schemes within the study area given the normally short-term nature (and fundamentally negligible impact) of construction activities and uncertainties over timing of construction at other projects.

9.129 Projects identified within the area used for the regional scope of assessment, i.e. NHF 17, were exclusively windfarm (WF) developments and an initial screening involving all windfarm projects within this region which were either operational, consented or in the planning process, revealed 39 schemes.

Predicted Cumulative Impacts

9.130 The results of the search for data on the impacts of these 39 projects (largely through Environmental Statements, and therefore predicted impacts only) are presented in **Table 9.11**. From the available information, no impact on pink-footed geese was evident from other projects within NHF 17 and hence the proposed grid connection will not contribute cumulatively to adverse impacts on this population.

Table 9.11: Developments considered as Part of the Cumulative Assessment

Development name	Development type and status	Predicted impact on pink-footed goose	Impact arising from operation
Ardrossan	WF - operational	Unknown	Unknown
Ardrossan Extension	WF - operational	Unknown	Unknown
Birnie Hill	WF – planning	None	N/A
Black Law	WF - operational	None	Unknown
Black Law (Extension Phase 1)	WF - consented	None	N/A
Black Law (Extension Phase 2)	WF - planning	None	N/A
Blantyre Muir	WF - consented	None	N/A
Bracco	WF – planning	None	N/A
Breaker Hill	WF – planning	None	N/A
Calder Water Community windfarm	WF - consented	None	N/A
Craigengelt Hill	WF – operational	Unknown	Unknown
Dalry Community Windfarm	WF - operational	Unknown	Unknown
Earlsburn	WF – operational	None	Unknown
Earlsburn extension	WF – consented	Unknown	N/A
Galawhistle	WF - consented	None	N/A
Greendykeside Windfarm	WF – operational	Unlikely	Unknown
Greengairs Landfill Site	WF – planning	Unlikely	N/A
Hadyard Hill, Barr	WF – operational	Unlikely	Unknown
Hagshaw Hill	WF – operational	None	Unknown
Hagshaw Hill Extension	WF – operational	None	Unknown
Harelaw Renewable Energy Park	WF – planning	Unlikely	N/A
Kelburn	WF – consented	None	N/A
Middleton	WF – consented	None	N/A
Millour Hill	WF - consented	None	N/A
Moorhouse Farmers	WF – planning	None	N/A
Muirhall	WF - construction	None	N/A

Development name	Development type and status	Predicted impact on pink-footed goose	Impact arising from operation
Muirpark	WF – planning	None	N/A
Myres Hill	WF – operational	Unlikely	Unknown
Neilston	WF - planning	None	N/A
Over Enoch & Ardoch	WF - consented	Unlikely	N/A
Pates Hill	WF - operational	None	Unknown
Sneddon Law	WF – consented	None	N/A
Tormywheel	WF - consented	Unknown	N/A
West Browncastle	WF - consented	Unknown	N/A
Whitelee III (East Kingswell)	WF – planning	None	N/A
Whitelee Phase I extension	WF – construction	None	N/A
Whitelee Phase II extension	WF – construction	None	N/A
Whitelee, Eaglesham Moor (Part)	WF - operational	None	Unknown

Proposed Mitigation

9.131 Since no significant impacts are predicted, no mitigation is proposed. However, as a best practice and precautionary measure, it is proposed that marking of some sections of the OHL with bird flight diverters is undertaken to reduce the likelihood of mortality to pink-footed geese as a result of collisions with the proposed grid connection (see above).

Residual Impacts

9.132 The proposed grid connection will not contribute cumulatively to adverse impacts on pink-footed goose populations and this is deemed not significant in the context of the EIA Regulations.

Further Survey Requirements and Monitoring

9.133 No further monitoring is proposed.

Summary of Impacts

9.134 **Table 9.12** summarises the predicted impacts of the proposed grid connection on ornithology.

Table 9.12: Summary of Impacts

Predicted Impact	Significance	Mitigation/precautionary measures	Significance of Residual Impact
Construction All species	Not significant	None proposed.	Not significant
Operation: displacement All species	Not significant	None proposed.	Not significant
Operation: collision mortality All species	Not significant	Precautionary measure of marking sections of the OHL where greatest bird collision risk is predicted.	Not significant
Cumulative All species	Not significant	As above.	Not significant

References

Alonso, J.A. & Alonso, J.C. (1999). Collisions of birds with overhead transmission lines in Spain. In: Ferrer, M. & Janss, G.F.E. (eds) *Birds and power lines – collision, electrocution and breeding*. pp 57-82, Quercus, Madrid.

Anderson B. A. and Murphy S. M. (1988). *Lisburne Terrestrial Monitoring Program – 1986 and 1987: The effects of the Lisburne powerline on birds*. Alaska Biological Research, Inc.

Banks, A.N., Burton, N.H.K., Calladine, J.R. & Austin, G.E. (2007) Winter gulls in the UK: population estimates from the 2003/04-2005/06 Winter Gull Roost Survey. BTO Research Report No. 456.

Berg, A., Lindburg, T. & Kallebrink, K.G. (1992) Hatching success of lapwings on farmland: differences between habitats and colonies of different sizes. Journal of Animal Ecology, 61: 469-476.

Bevanger, K. (1998) Biological and conservation aspects of bird mortality caused by electricity power lines: a review. Biological Conservation, 86: 67-76.

Calladine, J.R., Park, K.J., Thompson, K. & Wernham, C.V. (2006) Review of Urban Gulls and their Management in Scotland. Report to the Scottish Executive.

Drewitt, A.L. & Langston, R.H.W. (2008). Collision Effects of Wind-power Generators and Other Obstacles on Birds. Annals of the New York Academy of Science, 1134: 233-266.

Eaton MA, Brown AF, Noble DG, Musgrove AJ, Hearn R, Aebischer NJ, Gibbons DW, Evans A and Gregory RD (2009) Birds of Conservation Concern 3: the population status of birds in the United Kingdom, Channel Islands and the Isle of Man. British Birds 102, pp296–341.

Etheridge, B., Riley, H.T., Wernham, C.V, Holling, M., Stevenson, A. & Thompson, D.B.A. (2012). *Scottish Raptor Monitoring Scheme Report 2010*. http://www.scottishraptorgroups.org/srmscheme.php

Faanes, C.A. (1987). Bird behaviour and mortality in relation to power lines in prairie habitats. US Fish and Wildlife Service, Technical Report 7: 1-24.

Forrester, R.W., Andrews, I.J., McInerny, C.J., Murray, R.D., McGowan, R.Y., Zonfrillo, B., Betts, M.W., Jardine, D.C. & Grundy, D.S. (eds) (2007). The Birds of Scotland. The Scottish Ornithologists' Club, Aberlady.

Frost, D. (2008). The use of 'flight diverters' reduces mute swan *Cygnus olor* collision with power lines at Abberton Reservoir, Essex, England. Conservation Evidence, 5: 83-91.

Grant, M.C., Orsman, C., Easton, J., Lodge, C., Smith, M., Thompson, G., Rodwell, S. & Moore, N. (1999) Breeding success and causes of breeding failure of Curlew *Numenius arquata* in Northern Ireland. Journal of Applied Ecology 36: 59-74.

Hardey, J., Crick, H., Wernham, C., Riley, H., Etheridge, B., Thompson, D. (2009). *Raptors: A Field Guide for*

Surveys and Monitoring. Scottish Natural Heritage, Inverness.

Janss, G.F.E. (2000). Avian mortality from power lines: a morphologic approach of a species-specific mortality. Biological Conservation, 95:353-359.

Keller, V.E. (1991). The effect of disturbance from roads on the distribution of feeding sites of geese (Anser brachyrhynchus, A. anser), wintering in north-east Scotland. Ardea, 79: 229-232.

Kenward, R.E., Marcstrom, V. & Karlbom, L. (1999). Demographic estimates from radio-tagging: models of

age-specific survival and breeding in the goshawk. Journal of Animal Ecology, 68: 1020-1033.

Larsen, J.K. & Madsen, J. (2000). Effects of wind turbines and other physical elements on field utilization by pink-footed geese (*Anser brachyrhynchus*): A landscape perspective. Landscape Ecology, 15: 755-764.

Lehman, R.N., Kennedy, P.L. & Savidge, J.A. (2007). The state of the art in raptor electrocution research: A global review. Biological Conservation, 136: 159-174.

Martin, G.R. & Shaw, J.M. (2010). Bird collisions with power lines: Failing to see the way ahead? Biological Conservation, 143: 2695-2702.

Mearns, R. & Newton, I. (1984) Turnover and dispersal in a peregrine *Falcon peregrinus* population. Ibis 126, 347-355.

Meyer, J.R. (1978). *Effects of Transmission Lines on Bird Flight Behaviour and Collision Mortality*. Prepared for Bonneville Power Administration, Engineering and Construction Division, Portland, Oregon.

Mitchell, C. (2011). Status and distribution of Icelandic-breeding geese: results of the 2010 international census. Wildfowl & Wetlands Trust Report, Slimbridge.

Mitchell, C.R. & Hearn, R.D. (2004). Pink-footed Goose *Anser brachyrhynchus* (Greenland/Iceland population) in Britain 1960/61 – 1999/2000. Waterbird Review Series, The Wildfowl & Wetlands Trust/Joint Nature Conservation Committee, Slimbridge.

Natural Research Projects (2009a). *Black Law Extension Report on bird surveys in 2008*. Unpublished report to ScottishPower Renewables. NRP, Banchory.

Natural Research Projects (2009b). *Black Law Extension Report on bird surveys in 2009*. Unpublished report to ScottishPower Renewables. NRP, Banchory.

Newton, I. & Mearns, R. (1988). Population ecology of peregrines in south Scotland. Pages 651-665 in T.J. Care, J.H. Enderson, C.G. Thelander and C.M. White lEDS.], Peregrine Falcon populations: their management and recovery. The Peregrine Fund, Boise, ID U.S.A.

Ottvall, R., Larsson, K. & Smith, H.G. (2005) Nesting success in Redshank Tringa totanus breeding on coastal meadows and the importance of habitat features used as perches by avian predators. Bird Study, 52: 289-296.

Parr, S.J. (1991). Occupation of new conifer plantations by merlins in Wales. Bird Study 38, 103-111.

Pearce-Higgins, J.W., Stephen, L., Langston, R.H.W., Bainbridge, I.P. & Bullman, R. (2009). The distribution of breeding birds around upland wind farms. Journal of Applied Ecology 46, 1323-1331.

Pearce-Higgins, J.W, Stephen, L., Douse, A. & Langston, R.H.W. (2012) Greater impacts of wind farms on bird populations during construction than subsequent operation: results of a multi-site and multi-species analysis. Journal of Applied Ecology, 49: 386-394.

Rebecca, G.W., Cosnette, B.L., Duncan, A., Picozzi, N. & D.C. Catt, D.C. (1990). Hunting distance of breeding merlins in Grampian indicated by ringed wader chicks taken as prey. Scottish Birds 16, 38-39.

Regini, K., (2000). Guidelines for ecological evaluation and impact assessment. Ecology and Environmental Management. In Practice, 29 (September), pp. 1, 3-7. Winchester, Institute of Ecology and Environmental Management.

Rubolini, D., Gustin, M., Bogliani, G. & Garavaglia, R. (2005). Birds and powerlines in Italy: an assessment. Bird Conservation International, 15: 131-145.

ScottishPower,Renewables (2010). *Black Law Windfarm: Bird Monitoring 2001 – 2009*. ScottishPower Renewables, Glasgow.

SERAD (Scottish Executive Rural Affairs Department) (2000). Habitats and Birds Directives, Nature Conservation: Implementation in Scotland of EC Directives on the Conservation of Natural Habitats and of Wild Flora and Fauna and the Conservation of Wild Birds ('The Habitats and Birds Directives'). Revised Guidance Updating Scottish Office Circular No 6/1995.

Seymour, A.S., Harris, S, Ralston, C & White, P.L.C. (2003) Factors influencing the nesting success of Lapwings *Vanellus vanellus* and behaviour of Red Fox *Vulpes vulpes* in Lapwing nesting sites. Bird Study, 50:39-46.

Shaw, J.M., Jenkins, A.R., Ryan, P.G. & Smallie, J.J (2010). A preliminary survey of avian mortality on power lines in the Overberg, South Africa. Ostrich, 89: 109-113.

Sim, I.M.W., Gregory, R.D., Hancock, M.H. & Brown, A.F. (2005) Recent changes in the abundance of upland breeding birds. Bird Study 52, 261-275.

SNH (2012a). Assessing the cumulative impact of onshore wind energy Development – March 2012. SNH, Battleby.

SNH (2012b). Guidance. Regional population estimates of selected Scottish breeding birds – April 2012. SNH, Battleby.

SNH (2010). Guidance. Survey methods for use in assessing the impacts of onshore windfarms on bird communities – November 2005 (revised December 2010). SNH, Battleby.

SNH (2006). Guidance. Assessing Significance of Impacts from Onshore Windfarms on Birds outwith Designated Areas. SNH, Battleby.

SNH (2002). Natural Heritage Futures – West Central Belt. SNH, Battleby.

Snow, D.W. & Perrins, C.M. (1998). The Birds of the Western Palaearctic – Concise Edition. Oxford University Press.

Sodhi, N.S. (1993). Correlates of hunting range size in breeding merlins. Condor 95, 316-321.

Sodhi, N.S. & Oliphant, L.W. (1992). Hunting ranges and habitat use and selection of urban-breeding merlins. Condor 94, 743-749.

Trinder, M., Rowcliffe, M., Pettifor, R., Rees, E., Griffin, L., Ogilvie, M. & Percival, S. (2005). Status and population viability analyses of geese in Scotland. Scottish Natural Heritage Commissioned Report F03 AC 302.

Wallander, J., Isaksson, D & Lenberg, D. (2006) Wader nest distribution and predation in relation to man-made structures on coastal pastures. Biological Conservation, 132: 343-350.

Whitfield, D.P., Ruddock, M. and Bullman, R., (2008). Expert opinion as a tool for quantifying bird tolerance to human disturbance. Biological Conservation 141, 2708-2717.

10 Cultural Heritage

Introduction

10.1 This chapter considers the potential impacts of the Black Law Windfarm Extension Grid Connection (hereinafter referred to as the 'proposed grid connection') on cultural heritage assets. Cultural heritage assets include sites, features and areas with statutory and non-statutory designations as set out in Scottish Historic Environment Policy (SHEP)[i] and Scottish Planning Policy (SPP)[ii]. Those relevant to this assessment are Scheduled Monuments, Listed Buildings, Gardens and Designed Landscapes (GDL) and other cultural heritage assets. The cultural heritage assessment was undertaken by CFA Archaeology (CFA), informed by comments and information provided by Historic Scotland (HS); West of Scotland Archaeology Service (WoSAS) on behalf of South Lanarkshire Council and West Lothian Council; and Rathmell Archaeology on behalf of North Lanarkshire Council.

Study Area Description

10.2 The cultural heritage study area was divided into two zones: a Core Study Area and an Outer Study Area, as illustrated on **Figure 10.1.**

10.3 **The Core Study Area** consists of a corridor centred along the route of the proposed grid connection, (including the proposed extension to Linnmill substation). It is generally 500m wide but expanded where necessary to include temporary access tracks which extend a greater distance (i.e. further than 500m) from the proposed grid connection route. Following consultation with HS and the local authority archaeological advisors, a 500m wide corridor (expanded around the access tracks), was considered sufficient to identify cultural heritage assets close to, or within, the proposed grid connection footprint, and to provide additional background information on the archaeological potential of the proposed grid connection route. Field survey was carried out for a corridor (generally 100m wide but expanded as necessary to include indicative infrastructure locations (e.g. for pulling areas)) centred on the proposed grid connection route (see **Paragraph 10.9** for full details). **Figures 10.2a-c** depict the proposed grid connection route, together with the locations of cultural heritage assets identified by the cultural heritage study within the Core Study Area. A gazetteer of cultural heritage assets located within the Core Study Area, detailing the current baseline condition and an assessment of each asset, is provided in **Appendix 10.1**.

10.4 **The Outer Study Area** consists of an area extending 2km from either side of the proposed overhead line (OHL) section of the grid connection route, and is an area within which the potential impacts of the proposals on the setting of cultural heritage assets have been assessed. This study area was defined taking into account the conclusions of the landscape and visual impact assessment (LVIA) (see **Chapter 6: Landscape and Visual Amenity**) which states that there is unlikely to be any significant impact at distances of more than 2km from the proposed grid connection route. The proposed underground cable section of the proposed grid connection, once constructed, will have no above-ground visibility except on the northern bank of the River Clyde, where a cable tray will be used to carry the cables over the rock face adjacent to Stonebyres Hydroelectric Power Station, Weir and footbridge. The underground cable section of the grid connection is therefore not considered when assessing the potential impacts of the proposed grid connection on the setting of cultural heritage assets, other than the potential indirect impact of the cable tray upon the setting of Category A Listed Building, Stonebyres Hydroelectric Power Station, Weir and Footbridge. **Figure 10.3** shows the Outer Study Area boundary, together with the Zone of Theoretical Visibility (ZTV) and the locations of key cultural heritage assets. A list of assets within the Outer Study Area, and an assessment of the indirect impacts upon them, is presented in **Appendix 10.2**.

Impacts Assessed in Full

10.5 The following potential impacts have been assessed in full:

- direct impacts on recorded cultural heritage assets, both designated and non-designated, and on as yet undiscovered assets within the Core Study Area;
- indirect impacts on the setting of designated cultural heritage assets present within the Outer Study Area;
- cumulative impacts on cultural heritage assets of the proposed grid connection in combination with other proposed developments.

Impacts Scoped Out

10.6 On the basis of the desk based and field survey work undertaken, the professional judgement of the Environmental Impact Assessment (EIA) team, experience from other relevant projects and policy guidance or standards, the following topic area has been 'scoped out', as proposed in the Scoping Report:

- indirect impacts on sites or features of national, regional or local cultural heritage value as a consequence of vibration, dewatering or changes in hydrology.

Assessment Methodology

Data Sources and Guidance

10.7 This assessment was conducted in accordance with the Institute for Archaeologists Code of Conduct[iii] and Standard and Guidance for Archaeological Desk-based Assessment[iv] and with reference to the guidelines provided by WoSAS in their contribution to the Scoping Opinion. The assessment also took into account relevant planning policy and legislation, including the SHEP, SPP, and Planning Advice Note 2/2011 – Planning and Archaeology[v].

10.8 Several information sources were consulted as part of the desk-based assessment. A list of all sources consulted is provided at the end of this chapter. The information gathered includes the following:

- Details of the locations and extents of Scheduled Monuments, Listed Buildings, Conservation Areas, GDLs and Historic Battlefields within the Core Study Area and Outer Study Area were downloaded from the Historic Scotland Spatial Data Warehouse[vi].
- Additional information on known archaeological assets was received as a GIS download from the West of Scotland Sites and Monuments Record (SMR) (received on 21st July 2011).
- Data on known archaeological assets within North Lanarkshire was obtained from the National Monuments Record of Scotland (NMRS) [vii] in accordance with advice received from Rathmell Archaeology.
- Further information on the character and condition of known archaeological assets within the Core Study Area was obtained from the NMRS.
- Ordnance Survey maps (principally 1st and 2nd Edition), and other early maps held by the National Library of Scotland were examined, to provide information on sites of potential archaeological significance and on historic land-use within the Core Study Area.
- The National Archives of Scotland Map Collection catalogue was consulted to determine if there were any further early maps which might provide useful information on the Core Study Area.
- An assessment was made of the most relevant vertical aerial photograph collections held by The Royal Commission on the Ancient and Historic Monuments of Scotland (RCAHMS); sorties dating from 1946-1975 were examined. In addition, available online modern aerial photographic images (Google ™2011) were examined.
- Bibliographic references were consulted to provide background and historical information.
- The online Historic Land-use Assessment Data for Scotland (HLA Map)[viii], maintained by the Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS), was consulted for information on the historic land-use character of the Core Study Area.
- The Scottish Palaeoecological Archive Database (SPAD)[ix] which records the distribution of known palaeoenvironmental sites across Scotland was consulted for information on palaeoenvironmental data or sites within the Core Study Area.

Field Survey

10.9 Reconnaissance field survey was undertaken on 15th and 17th August 2011, 30th September 2011, 3rd October 2011, 11th, 14th and 18th May 2012. The field survey was undertaken within corridors centred on the proposed grid connection route and selected access routes. The survey corridor was generally 100m wide, but was expanded as necessary to include indicative infrastructure locations (e.g. for pulling areas) that extend more than 50m from the proposed grid connection route. Field survey was carried out only for those access routes which cross unimproved land and which do not follow existing trackways (e.g. access to poles 82, 87, 120/121 and 124-128), and for those access routes for which identified cultural heritage assets are located in their immediate vicinity (e.g. access to pole 90).

10.10 The aims of the field survey were to:

- locate all visible cultural heritage assets, both those identified during the desk-based assessment and those previously unrecorded, and to record their character, extent and current condition;
- identify areas with the potential to contain currently unrecorded, buried archaeological remains;
- inform the assessment of the possible impacts of the proposed grid connection on the identified assets.

10.11 Two areas were not surveyed due to landowner access restrictions; a short length of the proposed OHL located to the west of Westermains Farm (between poles 67 and 71), and the section of the field survey corridor which runs through the Lee Castle GDL. It was also not possible to access the Stonebyres Hydroelectric Power Station, Weir and Footbridge (**65**) due to building works being carried out in the area.

10.12 Identified cultural heritage assets were recorded on pro-forma monument recording forms and by digital photography. Their positions (and where appropriate their extents) were logged using a Global Positioning System (GPS) accurate to +/- 1-2m.

Consultation

10.13 Scoping responses raising cultural heritage issues were provided by Historic Scotland, WoSAS (acting for South Lanarkshire Council and West Lothian Council) and Forestry Commission Scotland (FCS). CFA carried out further consultation (letters sent 5th August 2011) with Historic Scotland, WoSAS and Rathmell Archaeology (acting for North Lanarkshire Council) to confirm that the proposed cultural heritage baseline study and impact assessment methodology for the EIA was acceptable. The results of all of these consultations are provided in **Table 10.1** below.

10.14 The content of the Scottish Government's Formal Scoping Opinion is provided in **Chapter 2: Approach to the EIA**.

Table 10.1: Consultation Responses

Consultee	Scoping / Other Consultation	Issue Raised	Response/Action Taken
Historic Scotland	Scoping Opinion	Confirmed that there are no Scheduled Monuments, Category A Listed Buildings or Gardens, or Designed Landscapes within the proposed OHL route. Noted the presence of the following cultural heritage assets within the vicinity of the route: <u>Scheduled Monuments</u> • Collielaw Wood, Roman road SSE of Collielaw (Index no. 11528) • Castle Qua, fort 345m WSW of Mouse Bridge (Index no. 2604) <u>Category A Listed Buildings</u>	No response required. The potential for indirect impacts upon these sites is considered in this chapter. The Falls of Clyde GDL lies outwith the outer study area and is not considered in this assessment.
		• Jerviswood (HB no. 13053) • Baronald (HB no. 12967) • Stonebyres Power Station Weir and Bridge (HB no. 51720) <u>Gardens and Designed Landscapes (GDL)</u> • Lee Castle • The Falls of Clyde Stated the ES should consider impacts upon these assets and any others in the wider area which may experience significant impacts. Stated that it would be helpful for the ES to contain appropriate visualisations such as photomontages and wireframe views of the proposed grid connection in relation to the sites and their settings illustrating views both towards and from the proposed grid connection.	
Historic Scotland	Consulted by CFA regarding the proposed methodology for the EIA.	HS offered no further comments on the methodology.	No action required
WoSAS	Scoping Opinion	Provided details of the range of sources which they would expect to be consulted during the desk-based assessment, guidance on the scope of the walkover survey, and information on the format of the final report. Noted that the assessment should take into account the indirect impact of the line on the setting of monuments outside the route corridor. Required that the assessment should consider the potential for previously unrecorded buried deposits to be found within the area traversed by the route.	The adopted methodology takes into account these guidelines (see 'Assessment Methodology'). Indirect impacts of the proposed grid connection are considered in this chapter. The archaeological potential of the area is considered in paragraphs 10.65-10.70.
WoSAS	Additional response to scoping (email issued to LUC 7th September 2011)	Confirmed that they were happy with the proposed cultural heritage methodology and likely mitigation measures outlined in the scoping report.	The proposed methodology has been used and is set out under 'Assessment Methodology'.
Rathmell Archaeology and WoSAS	Consulted by CFA regarding the proposed	No response received.	

Consultee	Scoping / Other Consultation	Issue Raised	Response/Action Taken
	methodology for the EIA.		
Forestry Commission Scotland (FCS)	Scoping Opinion	Noted that as well as the legacy of the past to be found within woodlands, the cultural heritage of ancient woodlands and veteran trees are particularly important, as is recognised in the UK Forestry Standard, the Scottish Forestry Strategy (SFS) and FCS Policy Statement 'Scotland's Woodlands and the Historic Environment'. Stated that reference should be made to the FC 'Forests & Archaeology Guidelines'.	Issues regarding ancient woodlands are discussed in **Chapter 8: Ecology.** These guidelines are referred to within the proposed mitigation (see **Paragraph 10.89**)
South Lanarkshire Council	Consulted by CFA regarding the potential requirement for Listed Building Consent for the proposed works at Stonebyres Hydroelectric Power Station, Weir and Footbridge (Category A Listed Building, Index No. 51720)	Confirmed that as the cabling will utilise existing ducts at Stonebyres Weir, no Listed Building Consent would be required.	No action required.
Historic Scotland	Consulted by CFA regarding the potential requirement for Listed Building Consent for the proposed works at Stonebyres Hydroelectric Power Station, Weir and Footbridge (Category A Listed Building, Index No. 51720)	Stated that the decision about whether or not Listed Building Consent is required for the proposed works at Stonebyres Weir lies with South Lanarkshire Council.	No action required

Assessing Significance

10.15 The impacts of the proposed grid connection on cultural heritage assets are assessed on the basis of their type (direct, secondary, indirect, cumulative), nature (beneficial, neutral or adverse), and longevity (reversible, short-term or long-term; irreversible, permanent). The assessment takes into account the sensitivity of the receptor and the magnitude of impact. Mitigation measures designed to prevent, reduce or offset adverse impacts have been proposed (where required) and residual impacts are assessed taking into account the likely effectiveness of the proposed mitigation.

10.16 The assessment of sensitivity of archaeological and heritage assets reflects the relative weight which statute and policy attach to them, principally as published in SPP and SHEP. **Table 10.2** summarises the relative sensitivity of key cultural heritage resources.

Table 10.2: Sensitivity of Cultural Heritage Assets

Sensitivity	Definition / Criteria
High	Sites of national or international importance, including: • World Heritage Sites • Scheduled Monuments and sites proposed for scheduling • Undesignated archaeological sites and areas of likely national importance identified in SMRs • Category A Listed Buildings • Gardens and Designed Landscapes (Inventory Sites) • Historic Battlefields • Designated Wreck Sites
Medium	Sites of regional importance, including: • Archaeological sites and area of distinctive regional importance • Category B Listed Buildings • Conservation Areas
Low	Sites of local importance, including: • Archaeological sites of local importance • Category C(S) Listed Buildings • Unlisted historic buildings and townscapes with local (vernacular) characteristics
Negligible	Sites of little or no importance, including: • Sites of former archaeological features • Unlisted buildings of minor historic or architectural interest • Poorly preserved examples of particular types of feature

10.17 Criteria for assessing magnitude of direct impacts, which measures the degree of change to the baseline condition of a heritage asset that could result from the construction of one or more elements of the proposed grid connection, are classified in **Table 10.3**.

Table 10.3: Magnitude of Direct Impacts

Level of Magnitude	Definition
High	A fundamental change to the baseline condition of the asset, leading to total or major alteration of character.
Medium	A material, partial alteration of character.
Low	Slight, detectable alteration of the baseline condition of the asset.
Imperceptible	A barely distinguishable change from baseline conditions.

10.18 The sensitivity of the asset, defined in **Table 10.2**, and the magnitude of the predicted impact, defined in **Table 10.3**, are used to inform the professional judgement of the likely significance of the direct impact. **Table 10.4** summarises the criteria for assigning significance of a direct impact.

10.19 Major and moderate impacts are considered significant in the context of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 (as amended).

Table 10.4: Significance of Direct Impacts

Magnitude of Impact ▼	Value / Sensitivity of Asset ►			
	High	**Medium**	**Low**	**Negligible**
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Imperceptible	Minor	Negligible	Negligible	Negligible

Assessment of Indirect Impacts on Setting of Heritage Assets

10.20 The assessment of potential impacts of the proposed grid connection on the setting of a cultural heritage asset followed a four-stage approach:

- identification and characterisation of its settings;
- assessment of the sensitivity of its setting;
- identification of how the presence of the proposed grid connection would likely affect that setting (magnitude of impact);
- assessment of significance of impact.

Identification of Cultural Heritage Assets with the Potential to be Indirectly Impacted

10.21 Details were obtained for previously recorded cultural heritage assets, monuments and landscape features with statutory and non-statutory designations present within the Outer Study Area. A ZTV map, generated for the proposed OHL part of the proposed grid connection, was used to identify those cultural heritage assets from where there is theoretical intervisibility with one or more elements of the proposed grid connection.

10.22 It was determined that there was the potential for an operational (indirect) impact upon Category A Listed Stonebyres Hydroelectric Power Station, Weir and Bridge (which lies outwith the Outer Study Area) due to the proposed use of a cable tray to carry the cables over the rock face adjacent to the weir. The potential indirect impact upon this site has, therefore also been assessed below.

Characterisation of their Settings

10.23 Guidance issued by HS notes that the setting of an asset could be affected by the introduction of new development into its surroundings, even if that new development will not be directly visible from the receptor. Such cases may arise, for example, when both development and a highly sensitive asset will be caught in important views, vistas or prospects from somewhere other than the receptor's location. Further appraisal of the dataset was undertaken to establish if there were any such instances, but none were identified.

10.24 The baseline setting of each relevant asset or related group of assets was characterised on a case-by-case basis. Characterisation of setting of an asset was based upon its properties and location, and took into account the factors identified in the guidance issued by HS. The baseline setting of each asset was characterised principally in terms of the:

- archaeological / historical context of the asset;
- current landscape and visual surroundings of the asset;
- aesthetic and experiential properties of the asset within its surrounding;
- social value (actual or potential) of the asset as a recreational / leisure or education resource.

10.25 The settings of the assets were assessed from desk-based resources (for example, NMRS/SMR site details; Statutory List descriptions, Ordnance Survey maps, modern aerial photographs (Google Earth™) and Street View (Google Earth™)

10.26 The outcome of the work was an understanding, involving the application of professional judgment, of the key characteristics that define the setting of each asset.

Criteria for Assessing Sensitivity of Setting

10.27 The sensitivity of a setting is assessed by considering two factors:

- the relative weight which statute and policy attach to the asset and its setting;
- the degree to which the baseline setting contributes to the understanding and / or appreciation, and hence value, of the asset.

10.28 The relative weight that statute and policy attach to the asset and its setting was determined using the sensitivity of archaeological and heritage resources as set out in **Table 10.2**. Where individual designated assets are present within larger designated areas (e.g. Listed Buildings within a GDL), the sensitivity is stated as the higher of the two designations.

10.29 The degree to which the baseline setting contributes to the understanding and / or appreciation of the asset is assessed according to the criteria set out in **Table 10.5**.

Table 10.5: Contribution of Setting to Understanding and Appreciation of a Cultural Heritage Asset

Contribution	Definition
High	A setting which makes a strong positive contribution to the understanding and/or appreciation of the siting and/or historical/archaeological/architectural context of an asset. E.g. a prominent topographic location; surroundings that include related monuments in close association; surroundings that are believed to be little changed from those when the asset was created.
Moderate	A setting which makes some positive contribution to the understanding and/or appreciation of the siting and/or historical/archaeological/architectural context of an asset. E.g. surroundings that complement the siting and appearance of an asset, such as the presence of a feature of the rural past within a more recent farming landscape containing little or no urban or industrial development.
Low	A setting which makes little positive contribution to the understanding and/or appreciation of the siting and/or historical/archaeological/architectural context of an asset. E.g. where surroundings only partially complement the siting and appearance of an asset, such as the presence of a feature of the rural past within a partly urbanised or industrialised landscape.
Negligible	A setting which does not contribute positively to the understanding and/or appreciation of the siting and/or historical/archaeological/architectural context of an asset. E.g. immediate surroundings of a commercial coniferous single species woodland or industrial development that are not relevant to understanding the context of the asset.

10.30 The two criteria (sensitivity of asset and contribution of setting to understanding and appreciation of an asset) were combined to assess the overall sensitivity of a setting, as set out in **Table 10.6**.

Table 10.6: Sensitivity of Setting of an Asset

Sensitivity of Asset▼	Contribution►			
	High	**Moderate**	**Low**	**Negligible**
High	High	High	Medium	Low
Medium	High	Medium	Low	Low
Low	Medium	Low	Low	Low

Identification of Magnitude of Impact on Setting

10.31 Magnitude of impact on setting was assessed according to the thresholds set out in **Table 10.7**.

Table 10.7: Magnitude of Impacts on Setting

Level of magnitude	Definition
High	Fundamental impacts obviously changing the surroundings of an asset, such that its baseline setting is substantially or totally altered.
Medium	Impacts discernibly changing the surroundings of an asset, such that its baseline setting is partly altered.
Low	Slight, but detectable impacts that do not alter the baseline setting of the asset materially.
Imperceptible	A very slight and barely distinguishable change from baseline conditions.

10.32 The significance of impact on setting depends on both the magnitude of impact and the sensitivity of the setting of the asset. **Table 10.8** presents the matrix used to inform the process.

Table 10.8: Significance of Impacts on Setting

Magnitude▼	Sensitivity►		
	High	**Medium**	**Low**
High	Major	Major	Moderate
Medium	Major	Moderate	Minor
Low	Minor[1]	Minor	Negligible
Imperceptible	Negligible	Negligible	Negligible

10.33 Significance of impact is classified as Major, Moderate, Minor or Negligible, as defined in **Table 10.9**. Major and moderate impacts are considered to be significant in the context of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 (as amended). Where no impact has been predicted, the terms 'Negligible (No Impact)' are used to indicate this.

Table 10.9: Significance Criteria for Impacts on Setting

Significance of Impact	Definition
Major	A change to a setting that leads to a substantial impact on the character, quality or context of an asset.
Moderate	Changes to a setting that leads to a material impact on the character, quality or context of an asset.
Minor	Changes to a setting that lead to a detectable but non material change impact on the character, quality or context of an asset.
Negligible	Changes to a setting that lead to, at most, a negligible impact on the character, quality or context of an asset.

[1] A non-material change to baseline conditions cannot by its nature lead to a significant impact. A significant impact arises from a material change to baseline conditions. This distinction explains why this particular significance assessment finding is not 'moderate'.

Planning Policy

10.34 Planning policies of relevance to this assessment are outlined in **Chapter 5**: **Planning Policy Context**.

Existing Conditions

10.35 This section presents:

- a summary of the type and quantity of cultural heritage assets identified through desk-based resources and field survey within the Core Study Area;
- the current baseline condition of designated and non-designated cultural heritage assets identified within the Core Study Area;
- an assessment of the archaeological potential of the Core Study Area as a whole;
- a summary of the cultural heritage assets that may be affected within the Outer Study Area.

10.36 Numbers in brackets in the following sections, refer to site numbers described in detail in **Appendix 10.1** and depicted on **Figures 10.2a-10.2c**.

Cultural Heritage Assets within the Core Study Area

10.37 Seventy cultural heritage assets were identified within the Core Study Area. Thirty-one of these were visited during the field survey[2].

10.38 The assets recorded within the Core Study Area span a considerable period from prehistory, through the medieval period and into 20th century. They are discussed thematically below.

Prehistoric Sites

10.39 There is limited evidence for prehistoric activity within the Core Study Area. Towards the northern end of the route, a circular enclosure (**10**) which was identified by field survey in the 1990s by GUARD was subject to archaeological evaluation, followed by full excavation, and was found to contain a Mesolithic lithic scatter and several pits and stakeholes. The enclosure itself is thought to be of later date.

10.40 A possible ring ditch (**34**) has been identified as a cropmark visible on aerial photography. This feature may be of prehistoric date, but given its location in an area which was used extensively for limestone quarrying, the cropmark may indicate a backfilled former area of quarrying.

Roman Sites

10.41 The route of the Castledykes to Bothwellhaugh to Balmuildy Roman road (**26**) intersects the Core Study Area. Where intersected by the proposed grid connection, the line of the Roman road is believed to follow a modern road.

Medieval or Later Settlement, Industry and Agriculture

Medieval or Later Settlements

10.42 The medieval burgh of Cartland (**38**) received a charter of erection, but it is not clear whether it ever operated as a Royal Burgh. The burgh was at its most extensive during the mid to late 18th century, and according to the depiction on Roy's Military Survey of 1747-55[x] extended along the road which runs from

[2] Cultural heritage assets beyond the 100m wide survey corridor were not visited as they will not be impacted by the proposed grid connection, and information on these assets was gathered only to help inform assessment of the archaeological potential of the area.

the modern A73 to the modern village of Cartland. Only one modern farm is now located on this road, and it has been suggested that the establishment of this farm during the improvement period led to the contraction of the population of the medieval burgh settlement. Although no upstanding remains were visible within the field survey corridor, it is possible that some buried remains of the medieval burgh are present. A smithy (**39**) is depicted on the First Edition Ordnance Survey map within the area of the burgh. No upstanding remains of that building were identified by the field survey.

10.43 The settlements of East Town of Nemphlar (**60**) and Halltown of Nemphlar (**61**) are also both depicted on Roy's Military Survey of 1747-55. Both settlements have undergone considerable change since their inclusion on Roy's map. It is however unlikely that any buried remains of the settlements extend into the area proposed for development.

10.44 The settlements of Welldale (**58**) and Linnville (**69**) are first depicted on Forrest's Map of 1816. Welldale is depicted until the 1940s, after which date all the buildings appear to have been replaced. The current arrangement of buildings within the settlement of Linnville appears to correspond with the buildings which are depicted on the First Edition Ordnance Survey map.

10.45 Lee Castle lies outside the Core Study Area, but it lies within a larger Inventory Status GDL (**47**) which extends into the Core Study Area. Lee Castle South Lodge (**48**) which stands at the southern end of the GDL, is still occupied and is Category B Listed. The First Edition Ordnance Survey map depicts three buildings which are annotated as Tintochland (**46**). These are located at what is now the south-eastern end of the GDL. This site was not visited during the field survey as it was not possible to arrange land access.

10.46 The large house of Sunnyside Lodge (**57**) is first depicted on Forrest's Map of 1816, and the buildings continue to be occupied today. A lodge (**52**) is located at the northern end of a driveway which leads to Sunnyside Lodge, and is assumed to be a lodge associated with the grounds of Sunnyside Lodge. The building continues to be occupied today.

10.47 Several other dwellings or cottages were identified within the Core Study Area. Collielaw Cottage (**27**) and Craigenhill Cottage (**32**) both survive in an unroofed, ruined condition. No upstanding remains of Loch Knowes (**35**) survive. The building of Linnmill (**71**) which was first depicted on the First Edition Ordnance Survey map remains in use today. A building at Linnbank (**62**) and a building at Linnhead (**66**) are no longer depicted on modern maps; they were not visited during the field survey, as they are located outside the field survey area, and it is therefore unknown whether any upstanding remains of the buildings survive.

Industrial Remains

10.48 A number of remains related to mining activity have been recorded at the northern end of the Core Study Area. These remains include several shafts (**1, 3, 8** and **11**), some coal pits (**9**) and tramways (**2** & **9**) connected to the mining activity (further details about previous mining activity are also contained in **Chapter 13: Land Use**). These remains form part of a wider landscape of mining activity which extends beyond the study area. Spoil heap (**1**) is visible within the forestry plantation as a large mound approximately 100m by 90m in extent and up to 4m high. Shaft (**1**) is visible as an irregular depression approximately 4m by 2m in extent and is surrounded by a fence bearing warning notices. No remains of shaft (**11**) survive as it lies within an area of recently reinstated opencast mining.

10.49 Five sites related to limeworking have been recorded within the Core Study Area. These remains include two areas of lime clamps and quarries (**13** and **14**), a group of limekilns (**28**) and a limestone quarry (**29**). A large lime works (**33**) is recorded at Craigenhill; remains at this location extend beyond the Core Study Area but include the remains of lime kilns, clamp kilns and lime quarries. A mineral railway ran through the site, its course remaining visible as a cutting running across the lime works, as shown on **Figure 10.2c**.

10.50 Five other stone quarries (**6, 7, 40, 44** and **45**) have been recorded within the Core Study Area.

10.51 Three mills were recorded within Core Study Area. One building of Candy Mill (**21**) survives in a partially roofed state, and the mill lade remains visible on modern aerial photography. The site of Cairnie Castle (**67**) is recorded in documentary sources but no remains of it have been located. It is thought that the documentary references may in fact be referring to the remains of the mill of Linn Mill, which are depicted on the river bank on Roy's Military Survey[xi].

10.52 Mousemill (**53**) is Category B Listed, and was the first and main mill to serve Lanark Burgh from 1795 onwards. The Statutory List notes that the Category B Listed building of Orchard Dell (now known as Sorisdale) (**54**) forms a strong grouping with Mousemill, both buildings being of a similar style and featuring similar pointed arched fenestration. Further to the east, a building and sluice (**55**) are depicted on the First Edition Ordnance Survey map, although modern mapping shows the building to be unroofed.

Agricultural Settlement and Land Use

10.53 Five farmsteads were recorded within the Core Study Area; three of these, Birniehall (**15**), Hole (**25**) and Fulwood (**31**) continue to be occupied today. To the north of the modern farmstead of Birniehall, the robbed remains of a former farmstead (**13**) survive as turf-covered walls. The farmstead of Corbinshaw (**24**) survives as an unroofed structure.

10.54 Three areas of rig and furrow cultivation (**12**, **13** and **18**) are recorded within the Core Study Area. One (**12**) lies in an area which is now in use as a commercial forestry plantation, and it is considered unlikely that any coherent remains would have survived pre-afforestation ploughing. An area of rig and furrow surrounding the remains of a farmstead (**13**) was previously recorded. The current field survey could not identify any coherent remains of the rig and furrow cultivation. The southern part of the area is now occupied by a recently planted area of commercial forestry, and pre-afforestation ploughing for this is likely to have caused disturbance to any rig and furrow remains which may formerly have been present in this area. Field survey identified a further area of rig and furrow cultivation (**18**) of 4m span, which survived in fair condition to a maximum height of 0.2m.

10.55 Four sheepfolds (**5, 16, 22** and **42**) were recorded from cartographic sources. The first of these was of dry-stone construction, but no remains of the other two sheepfolds within the field survey corridor (**22** and **42**) were identified.

10.56 Five enclosures (**19, 23, 30, 43** and **63**) were identified within the Core Study Area by the desk-based study. These enclosures provide further evidence of the continuing agrarian use of the landscape. The most southerly of the recorded enclosures (63) appears to have been utilised to enclose an area of woodland rather than being for stock management purposes.

10.57 A bifurcating trackway (**20**) is depicted on the 1st Edition Ordnance Survey map. Its southern half remains in use and has been upgraded with modern rubble and brick. No trace of the northern branch of the trackway remains. Three wells (**36**, **59** and **70**) were identified from historic map and confirmed by field surveys.

Historic Transport related Sites

10.58 Cartland Bridge (**50**) was constructed in 1822 to a design by Thomas Telford. The bridge is Category B Listed. The turnpike, a small square building (**51**), was located to the west of the bridge; the building which appears to have been extended continues to be occupied today.

10.59 A milestone (**37**) is depicted on 1st Edition Ordnance Survey mapping, but could not be located by the field survey. It is assumed to have been removed when the Brooklinn Bridge was constructed.

10.60 A trough (**41**) depicted on the 1913 edition of the Ordnance Survey map was not identified by the field survey.

Modern / 20th Century Features

10.61 Stonebyres Hydroelectric Power Station, Weir and Bridge (**65**) is designated as a Category A Listed Building (Index No. 51720). Stonebyres forms part of the Falls of Clyde hydro-electric scheme, which was the first large scale hydroelectric scheme for public power supply in Britain. A waterfall (**68**) which lies further to the west is noted by the SMR as it forms part of the Falls of Clyde hydro-electric scheme. All elements of the scheme are designed in a neo-classical style. The power station building is of painted render construction. In this hydro-electric scheme, the unusual combined weir and footbridge take the place of a dam. The weir and footbridge consist of a flat-arched white rendered, reinforced concrete bridge and tilting weir with steel sluice gates. It was not possible to visit these sites during the field survey as construction works were being carried out on the weir.

Miscellaneous Features

10.62 A chapel (**4**), St Diarmad's Chapel, or Darrmade Kirk is recorded to have been located at Darmead Linn. Other sources state that the area was used by Covenanters to hold their services. No remains of a chapel were identified by the field survey, and its precise location remains unknown.

10.63 A cave (**49**) located within the ravine of Cartland Crags is traditionally said to have been used as a refuge by Sir William Wallace, and is thus known by the name of 'Wallace's Cave'. The Ordnance Survey conducted a field visit in the 1950s and found the site to comprise a natural inaccessible rock cleft.

10.64 Three footbridges (**17a –c**) are depicted on the 1st Edition Ordnance Survey map, but no remains of these features were identified by the field survey.

10.65 A tank (**56**) was also depicted on the 1913 edition of the Ordnance Survey map.

Assessment of Archaeological Potential of the Core Study Area

10.66 The current land use of the Core Study Area is predominantly farmland, with some areas of forestry plantation at the northern end of the proposed grid connection, and in the area to the north of Birniehall. The northern part of the Core Study Area currently forms part of the Black Law Windfarm.

10.67 Evidence for prehistoric activity is limited to two sites within the Core Study Area. The site of a Mesolithic lithic scatter and associated postholes and pits (**10**) indicate early human activity in the area. A possible ring ditch is visible on aerial photographs and may provide further evidence of prehistoric activity, although without intrusive investigations it is not possible to confirm this possibility. There are few other prehistoric remains recorded by the SMR/ NMRS within the wider area, although this may relate more to the lack of detailed investigation which has occurred, rather than the absence of prehistoric activity in the landscape.

10.68 Settlement in the area is first depicted in detail on Roy's Military Survey (1747-55). Many of the farmsteads which remain today bear the same names, indicating the recurrent use of the area for agricultural activity both in the pre-improvement period, and following the landscape reorganisation of the improvement period, through to the present day.

10.69 The northern part of the proposed grid connection which now primarily forms part of the Black Law Windfarm has been reinstated following its use for mining and more recently opencast mining. The most northerly section of the proposed grid connection is now in use as a commercial forestry plantation. The use of the area for opencast mining activity will have caused substantial disturbance and potentially have destroyed buried archaeological remains in those areas which were mined. There are however known to have been buried archaeological remains found in this area, and there is the potential for remains related to the mining activity to survive in this area. This section of the proposed grid connection, as far south as Hare Hill is considered to have a moderate potential for previously unrecorded archaeological remains, but with a low potential in those areas which were mined, or which have been used for commercial forestry.

10.70 The rest of the OHL part of the proposed grid connection runs primarily through improved agricultural land which has been exploited as agricultural land since at least the 18th century, as shown on Roy's Military Survey. The lack of recorded remains may be a reflection of this long period of agricultural use of the land, and the resulting decreased probability of surviving upstanding archaeological remains, rather than that no archaeological remains are present. The land is considered to have a moderate potential for the discovery of previously unrecorded archaeological remains. Those areas which have been subject to commercial forestry will have suffered considerable disturbance due to pre-afforestation ploughing and as such are considered to have a reduced potential for the discovery of previously unrecorded archaeological remains.

10.71 The underground section of the proposed route will primarily follow the course of modern roads, and this length of the route can therefore be considered to have a low potential for previously unrecorded archaeological remains. Those parts of the underground route which do not run along existing roads, pass through areas of improved pasture land, and are considered to have moderate potential for containing previously unrecorded archaeological remains.

Cultural Heritage Assets within the Outer Study Area

10.72 There are eleven assets within 2km of the proposed OHL (**Figure 10.3**). Of these sites, there are only nine from which one or more element of the proposed OHL will theoretically be visible (**Figure 10.3**). The assets comprise

- The Lee (Category B Listed, Index No. 13056);
- The Lee, Dovecot (Category B Listed, Index No. 13057);
- Lee Castle GDL;
- Auchenglen cairn (Scheduled Monument Index No. 11235);
- Baronald, a large Scottish Baronial mansion (Category A Listed Index No. 12967);
- Jerviswood, a late 16th or early 17th century Laird's house (Category A Listed Index No. 13053);
- Castle Qua, a fort of presumed medieval date (Scheduled Monument Index No. 2604),
- a length of Roman road at Collielaw Wood (Scheduled Monument Index No. 11235); and
- Auchterhead Muir, Covenanters Monument (Category B Listed Index No. 671).

10.73 A list and further details of these assets are provided in **Appendix 10.2**.

The 'Do Nothing' Scenario

10.74 If the proposed grid connection does not proceed, it is likely that the current land uses would remain broadly unchanged. The majority of the route crosses areas of rough pasture or semi-improved or improved pasture land. Within these areas, this land use would limit disturbance to the surviving cultural heritage assets, and only natural decay or erosion would affect the upstanding remains. Some parts of the route are currently in use as commercial forestry plantations. Forestry ploughing is likely to have caused damage to any archaeological remains in these areas, and the continuing use of these areas for commercial forestry may cause progressive damage to any unprotected archaeological remains which currently remain in situ. Archaeological sites within arable land would most probably continue to erode very gradually as a result of attrition from ploughing. Historic buildings could be altered through a wide range of potential causes, including natural decay, extension / alteration and demolition (subject where necessary to appropriate consenting requirements).

Routeing and Design Considerations

10.75 The results of the desk-based study and walk-over field survey were provided by CFA to LUC as Geographic Information System (GIS) data showing the locations (and, where relevant, the extents) of cultural heritage assets.

10.76 The layout of the grid connection, including the positioning of the wooden poles, the routeing of access tracks, and the siting of other infrastructure elements has been designed through a series of iterative stages to develop the best layout within the context of all the environmental and technical constraints. The final proposed layout as shown on **Figure 10.1** therefore embeds design based mitigation to avoid archaeological assets wherever possible in line with planning policy requirements:

- the grid connection was designed to avoid the spoil heap and shaft (1), sheepfold (5) and Corbinshaw farmstead (24);
- a buffer of 10m was applied to either side of the possible Roman road (26) within which no construction works will occur;
- Category B Listed Buildings (48, 50, 53 and 54) and Lee Castle GDL (47) were all avoided by the proposed grid connection and by the associated access routes.

10.77 As the Category A Listed Stonebyres Hydroelectric Power Station, Weir and Bridge (**65**) currently forms a bridge over the River Clyde which carries other services infrastructure, this was identified by SPEN as being a technically and environmentally viable location to cross the river. The possibility that Listed Building Consent might be required for this part of the proposed grid connection was recognised during the design process, and consultation with Historic Scotland and South Lanarkshire council was carried out (see **Table 10.1**).

Impact Assessment

10.78 The assessment of impacts is based upon the proposed grid connection description outlined in **Chapter 4**: **Development Description** and is structured as follows:

- construction impacts;
- operational impacts;

- cumulative impacts.

10.79 The assessments are made taking into account certain assumptions. Assumptions relating to the construction of the proposed grid connection are outlined below:

- Along the line of the proposed OHL route (excluding access routes), physical impacts on cultural heritage assets may potentially occur within 15m of each pole location (the area of a temporary working area, see paragraph 4.34).
- Along the line of the underground cable route (excluding access routes), physical impacts on cultural heritage assets may potentially occur within 10m of the route (the maximum required wayleave distance; see paragraph 4.47)
- Proposed details of indicative access routes are provided in **Figure 4.5**. Although vehicular access to each pole location will be required, it is assumed that there will be no construction impact on a cultural heritage asset, except where that feature is intersected by the proposed access track alignment.
- Proposed areas of felling are shown on **Figure 13.3**. Physical impacts on cultural heritage assets as a result of felling may potentially occur within 25m of the route (the minimum required wayleave corridor , see paragraph 4.46).
- Known cultural heritage assets which lie in close proximity to access tracks will be fenced off to ensure that accidental damage due to construction activities and vehicle movements is avoided. This will apply to sites **1, 5, 33a, 33b** and the majority of site **14** (excluding the extreme eastern portion of the site). These features will be visibly marked out to signal their presence to avoid accidental damage from vehicle movement during the construction period. The markers will be placed, where possible, at an appropriate distance from the recorded extents of the features, along the edges facing the proposed grid connection corridor.
- It is assumed that all occupied standing buildings (with the exception of Stonebyres Hydroelectric Power Station Weir and Bridge (**65**)) will be avoided by the proposed grid connection and will not be impacted directly.

Construction Impacts

Predicted Impacts

10.80 Using the criteria detailed in **Tables 10.3** and **10.4**, **Appendix 10.1** summarises the predicted (direct) construction impacts of the proposed grid connection on the cultural heritage assets identified within the Core Study Area. All construction impacts are considered to be permanent, irreversible and adverse, unless otherwise stated.

10.81 Direct impacts are predicted on the following sites as a result of the construction of the proposed grid connection: a quarry (**6**); an area of rig and furrow cultivation (**13**); an area of limestone quarrying and lime clamps (**14**); a trackway (**20**); Candy Mill, mill lade (**21**), Craigenhill limeworks (**33**); and Category A Listed Stonebyres hydroelectric power station, weir and bridge (**65**).

10.82 A potential impact is predicted at the possible location of St Diarmad's chapel (**4**). The precise location of the chapel cannot be accurately determined as it was not shown on any maps from the Ordnance Survey 1st Edition onwards. However, based on the earlier cartographic sources which depict the chapel, it is thought likely that chapel may have been located further to the west, outside of the Core Study Area. The nature of the potential impact upon this site is unknown as it is unclear whether any remains of the chapel survive within the Core Study Area.

10.83 A potential impact is also predicted for Roman road (**26**). The assumed alignment of the Roman road, which is believed to correspond with the modern road at the location where the proposed grid connection traverses it, has not had its course at this location established through excavation. It is possible that the alignment of the modern road may deviate from the course of the Roman road which may lie just to the north-east or south-west of the modern road. Although a buffer of 10m, in which no construction works will be carried out, has been applied either side of the presumed course of the Roman road, the possibility that the course of the road lies outside this buffer zone cannot be excluded entirely.

10.84 No impacts are anticipated on the following cultural heritage assets, although they lie on the route of the proposed grid connection: former mine shaft (**11**); footbridge (**17c**); sheepfold (**22**); enclosure (**23**); milestone (**37**); and trough (**41**). These sites no longer survive for various reasons, as outlined in **Appendix 10.1**, and therefore no significant impacts upon them are predicted.

10.85 No impacts are anticipated for Halltown of Nemphlar, trackway (**61**) or Linnbank, Building (**62**), although they lie on the proposed temporary access route. The temporary access route utilises the existing Halltown of Nemphlar, trackway (**61**), and crosses the former location of the building of Linnbank (**62**) of which no upstanding remains are visible on modern aerial photography. No ground breaking work will be required for the temporary access route, and therefore no significant impacts upon these cultural heritage assets are predicted.

Significance of Predicted Construction Impacts

10.86 A direct impact is predicted for one cultural heritage asset with statutory protection.

- Stonebyres hydroelectric power station, weir and bridge (**65**) which is designated as a Category A Listed Building, is considered to be of high cultural heritage sensitivity, and will be impacted directly by the proposed grid connection. It is proposed that the cable will cross the weir in pre-existing ducts which are located on the underside of the recently refurbished weir. There will therefore be no construction works carried out on the weir. The construction impact upon the weir will be of imperceptible magnitude and negligible significance.

10.87 The remaining likely direct impacts, predicted for cultural heritage assets with no statutory protection, are considered to be of no more than minor significance.

- Quarry (6) is considered to be of negligible cultural heritage sensitivity. It lies within the area which will be subject to felling, and within 15m of wooden pole 118. The felling and the working area for pole 118 will have a likely direct impact of no more than medium magnitude and negligible significance.
- An area of poorly preserved rig and furrow remains, located to the south and west of the remains of a farmstead (13), are considered to be of low cultural heritage sensitivity. Within this area of rig and furrow remains, the construction of a wooden pole (90) and temporary access tracks are proposed. The south-eastern part of this area of rig and furrow cultivation remains now lies within a forestry plantation, and it is considered unlikely that any coherent remains of the rig and furrow cultivation survive in this area. In the event that the rig and furrow cultivation remains do survive in this area, the proposed grid connection will have a likely direct impact of no more than low magnitude and negligible significance.
- The eastern part of limestone quarry and lime clamps (14) (i.e. the part which has not been fenced off) lie in an area where forestry felling, the construction of a wooden pole (89) and temporary access tracks are proposed. The site is considered to be of low sensitivity. The proposed grid connection will have a direct impact on the spoil heap and some of the more easterly lime clamps, of medium magnitude and minor significance.
- A trackway (20) will be crossed by proposed access routes. Trackway (20) is considered to be of negligible cultural heritage sensitivity, and the predicted impact is considered to be of no more than low magnitude and negligible significance.
- Candy Mill mill lade (21) will be traversed by the temporary access route for the construction of wooden poles (70 and 71) to the south-east and north-west of the mill lade. The mill lade, which has not yet been subject to field survey, is assumed to be of low cultural heritage sensitivity and will have a probable direct impact of low magnitude and negligible significance.
- A small area of Craigenhill Limeworks (33) will be crossed by the proposed grid connection (Sites 33a and 33b will be fenced off, see Paragraph 10.78). The remains of the mineral railway will be crossed by the proposed access tracks. Three wooden poles (14-16) are proposed within the area of Craigenhill Limeworks, a site which is considered to be of low sensitivity. The proposed grid connection will have an impact of medium magnitude and minor significance upon the limeworks.

10.88 Three potential impacts of uncertain significance are predicted, prior to mitigation:

- The possible location of the remains of St Diarmad's Chapel (**4**) is considered to be of unknown, but no more than low sensitivity. The possible location of this former chapel (as noted by the SMR / NMRS) lies in close proximity to the proposed grid connection route, but examination of cartographic sources suggests that the chapel was located further to the west. Taking into account the limited ground-breaking that will be involved in construction of the proposed grid connection, and the low

probability of remains of the church being located in this vicinity, it is considered that it is highly improbable that the remains of St Diarmad's Chapel will be impacted by the proposed grid connection.

- The assumed alignment of Roman road (**26**) is crossed by the proposed grid connection. The assumed alignment of the Roman road is suggested to correspond with the modern road at the location where it will be crossed by the proposed grid connection but this has not been proven by archaeological excavations. A buffer of 10m has been applied during the design process, on either side of the modern road, in which no construction activity will occur. However, should the course of the Roman road, be located more than 10m from the course of the modern road, it could potentially be impacted directly by the proposed grid connection, and from the construction of wooden pole 37 which is proposed in close vicinity to the east of the assumed course of the Roman road. Without mitigation, this potential, albeit unlikely, direct impact will be of uncertain, but potentially low magnitude and minor significance.
- Any ground-disturbing construction activities required by the proposed grid connection could have a direct impact on any hitherto undiscovered, buried archaeological remains present in affected areas. The potential of the area for the discovery of previously unknown, buried archaeological remains is considered to be moderate, but low in those areas which have been subject to open-cast mining, beneath modern roads, and within areas of commercial forestry. Taking into account the limited extent of the proposed ground disturbance resulting from the proposed grid connection, the likelihood of construction works encountering remains of archaeological significance at any specific location (pole location or any particular part of the underground cable route) is considered to be low. The ground disturbing construction activities will have a potential direct impact of no more than minor significance on buried archaeological remains.

Proposed Mitigation

10.89 The emphasis in the Scottish Government's Planning Advice Note (PAN) 2/2011: Planning and Archaeology is the preservation of important remains in situ where practicable and by recording, excavating and analysing where preservation is not possible. The mitigation measures presented below take account of this planning guidance and offer various commitments for recording and ensuring that, where practical, upstanding sites and features are preserved intact to retain the present historic elements of the landscape.

10.90 All mitigation works presented in the following paragraphs will take place prior to, or during, the construction of the proposed grid connection. All work will be conducted by a professional archaeological organisation, and the scope of works will be detailed in Written Scheme of Investigation(s) (WSI). The WSI(s) will make provision for appropriate investigation, post-excavation analysis, and dissemination of the results of the mitigation works, as well as for archiving of the project materials and records. The WSI(s) will be subject to the approval of the local authority archaeology service(s).

10.91 Guidelines on the protection of archaeological sites within forestry areas are set out in the Forestry Commission's UK Forestry Standard[xii] and the Forests and Historic Environment. UK Forestry Standard Guidelines[xiii]. These guidelines include measures to protect archaeological sites and monuments during felling operations, which will be observed during the proposed felling works.

Listed Building Consent

10.92 Historic Scotland and South Lanarkshire Council Conservation Officer were consulted about the potential requirement for Listed Building Consent for the proposed works at Category A Listed Building, Stonebyres Hydroelectric Powerstation, Weir and Footbridge (**65**). Historic Scotland stated that they would discuss the case with the local council, who would make the decision on this matter. South Lanarkshire Council Planning department confirmed (email dated 03/10/2012) that, as the proposed cabling would use existing ducts at Stonebyres Weir, Listed Building Consent would not be required for the proposed works.

Archaeological Monitoring and Recording

10.93 Requirements for the archaeological monitoring of construction works through watching briefs will be agreed in consultation with the local authorities' archaeological advisors. Where there is a possibility that construction activities may encounter buried remains of former sites, a watching brief will be carried out to a scope and strategy agreed with the relevant local authorities and set out in WSI(s). The locations for archaeological monitoring and recording will include, but need not be restricted to:

- the location where the proposed grid connection crosses the eastern most part of an area of limestone quarrying and limestone clamps (14);
- in the vicinity of the Roman road alignment (26) and St Diarmad's Chapel (4);
- the location where the proposed grid connection crosses Craigenhill Limeworks (33).

10.94 If discoveries are made during archaeological monitoring, and preservation in situ of any sites or features is not possible, provision will be made for the further investigation and recording, where necessary, of any archaeological remains. This provision will include the consequent production of written reports on the findings, with post-excavation analyses and publication of the results of the work, where appropriate.

10.95 No archaeological monitoring and recording is considered necessary for quarry (**6**), area of rig and furrow remains (**13**), and former trackway (**20**). These sites are all considered to be of no more than negligible sensitivity, and the predicted direct impacts on all sites are considered to be of no more than negligible significance.

Other Mitigation

10.96 The condition of Candy Mill mill lade (**21**) is unknown as it was not possible to access this area to carry out reconnaissance field survey. Reconnaissance field survey will be carried out prior to any construction work being carried out in this area. Construction works will be designed wherever possible to preserve the mill-lade in situ through micrositing of the poles and temporary access tracks in this area, and if necessary the fencing off of the mill lade. In the event that this is not possible, an appropriate scheme of mitigation will be drawn up in consultation with the local authority's archaeological advisors.

Construction Guidelines

10.97 Written guidelines will be issued for use by all construction contractors (i.e. a toolbox talk will be included in the Construction Environmental Management Plan), outlining the need to avoid causing unnecessary damage to known sites. That document will contain arrangements for calling upon retained professional support in the event that buried archaeological remains of potential archaeological interest (such as building remains, human remains, artefacts, etc.) are discovered in areas not subject to archaeological monitoring. The guidance will make clear the legal responsibilities placed upon those who disturb artefacts or human remains.

Residual Impacts

10.98 The completion of a programme of archaeological mitigation works as set out above will minimise the loss of the archaeological resource that will occur as a result of the construction of the proposed grid connection.

10.99 Residual impacts of negligible significance are predicted for Stonebyres Hydroelectric Power Station, Weir and Footbridge (**65**), a Category A Listed Building.

10.100 For those areas where archaeological monitoring and recording has been proposed (Sites **26, 33** and the eastern part of site **14**), the archaeological monitoring and recording will offset but not reduce the impacts predicted prior to mitigation, resulting in a residual impact of minor significance. If no archaeological remains are discovered, the impact will be negligible (no impact).

10.101 Negligible residual impacts are predicted for three sites (**6**, **13** and **20**), which are features of negligible sensitivity for which no mitigation has been proposed.

10.102 Once reconnaissance field survey has been carried out, Candy Mill mill lade (**21**) will be preserved in situ, resulting in a residual impact of negligible (no impact) significance. If this is not possible, a scheme of mitigation will be agreed with the local council's archaeological advisors, once this is in place, a residual impact on mill lade (**21**) of no more than low magnitude and negligible significance is predicted.

10.103 There may be residual impacts on previously undiscovered sites and features, or sites and unlocated features such as St Diarmad's Chapel (**4**), which may be revealed during construction works. In line with the requirements of PAN 2/2011, any archaeological remains that are identified will be either preserved in situ or excavated and recorded to a standard agreed with the local authorities' archaeological advisors, leading to the accrual of archaeological information and preservation by record. Taking into account the known baseline, the archaeological potential of the area, and the archaeological mitigation set out above, the residual impact on the undiscovered archaeological resource will likely be of low magnitude and minor significance.

Operational Impacts

Predicted Impacts

10.104 Using the methodology described above, **Appendix 10.2** details the findings of the assessment of operational impacts of the proposed grid connection.

10.105 Eleven receptors were identified within the outer study area, of which nine are predicted by the ZTV to have theoretical visibility of one or more component of the proposed grid connection. An additional receptor, the Category A Listed Building, Stonebyres Power Station, Weir and Bridge, which lies outside the outer study area was also included in the assessment.

10.106 The assessment identified no significant impacts upon the setting of these receptors. Three minor adverse, but not significant, impacts are predicted resulting from the construction of the proposed OHL, on Lee Castle GDL, and Baronald and Jerviswood (Category A Listed Buildings).

10.107 The ZTV indicates that from the majority of the Lee Castle GDL at least one element of the proposed OHL will be visible, and for a limited area at the western side of the GDL, up to twenty-one poles will theoretically be visible. Modern aerial photography indicates that wooded areas are located within the GDL between this area of theoretical higher visibility and the proposed OHL, and it can therefore be assumed that these trees will at least partially screen views of the proposed OHL. In addition, it is anticipated that trees or woodland will screen views of the proposed OHL from a number of other locations within the GDL. The proposed OHL will have no impacts upon the key views, as mentioned in the Inventory of Gardens and Designed Landscapes in Scotland[xiv], from the north of the GDL towards Lanark, nor on views from the South Lodge towards The Lee. It is considered that the proposed OHL will have slight but detectable impacts of low magnitude, which will not have a material impact upon the baseline setting of the GDL, resulting in an operational impact of minor significance.

10.108 Baronald (Category A Listed Building, Index No. 12967) is considered to be of high cultural heritage sensitivity. It is a large Scottish Baronial mansion which is composed of an asymmetrical arrangement of linked tower house –like blocks of differing heights. The building is now in use as a hotel. Although a maximum of eight wooden poles of the proposed OHL will theoretically be visible from Baronald, the building is largely surrounded by trees and these will help to screen views of the proposed OHL. It is therefore considered that the proposed grid connection will have an operational impact of low magnitude and minor significance upon the setting of Baronald.

10.109 Jerviswood (Category A Listed Building, Index No. 13053) is considered to be of high cultural heritage sensitivity. It is a late 16th or early 17th century Laird's house. The house has since been extended and a number of more recent buildings lie in the immediate vicinity, detracting from its original setting. Although a maximum of nine wooden poles of the proposed OHL will theoretically be visible from Jerviswood, the building is surrounded by mature woodland on its northern and eastern sides and these trees will help to screen views of the proposed OHL. It is therefore considered that the proposed grid connection will have an operational impact of low magnitude and minor significance upon the setting of Jerviswood.

10.110 Negligible adverse, but not significant, impacts are predicted for six sites, Castle Qua, fort 345m WSW of Mouse Bridge (Scheduled Monument Index No. 2604); Auchenglen, cairn 450m SSE of (Scheduled Monument Index No. 11235); Collielaw Wood, Roman road SSE of Collielaw (Scheduled Monument Index No. 11528); Auchterhead Muir, Covenanters Monument (Listed Building Index No. 671); The Lee (Listed Building Index No. 13056); and the Lee, Dovecote (Listed Building Index No. 13057). Characterisation of the setting of these receptors and the reasoning behind the assessment of these impacts is contained within **Appendix 10.2**.

10.111 To the north of Stonebyres Hydroelectric Power Station, weir and footbridge, a cable tray will be used to carry the cables up and over the rock face adjacent to Stonebyres Weir. It was decided that this cable tray would be used to enable the cable to pass through this area without the need for felling. The cable tray is designed to be unobtrusive, and will be partially screened by the woodland which is located on the northern side of the river. It is considered that the use of the cable tray will have an indirect impact of imperceptible magnitude and negligible significance upon the setting of Stonebyres Power Station, Weir and Footbridge (**65**).

Proposed Mitigation

10.112 No mitigation measures are proposed in relation to the operational impacts.

Residual Impacts

10.113 No mitigation is proposed, and therefore the predicted residual impacts remain as predicted above. Of the nine receptors within 2km of the proposed OHL which have theoretical views of one or more element of the proposed grid connection, minor adverse (not significant) impacts have been predicted for three receptors, and negligible adverse (not significant) impacts have been predicted for six receptors.

10.114 The proposed grid connection will have no significant adverse operational impacts on any identified cultural heritage assets.

Cumulative Impact Assessment

10.115 The identification of likely cumulative impacts focuses upon the residual operational impacts of the proposed OHL on the setting of cultural heritage assets, in addition to the likely operational impacts of other operational, consented and proposed energy developments present within 4km of the proposed OHL (in accordance with the approach taken in the LVIA assessment, as detailed on **Figure 6.16**).

10.116 The assessment of likely operational cumulative impacts has taken into account only those assets considered in the 'Operational Impacts' section (**Paragraphs 10.103-10.110**) and **Appendix 10.2** where minor adverse residual impacts on setting have been identified. Where the operational impact of the proposed grid connection has been assessed as either 'none' or 'negligible' it is considered that the additional impact resulting from the presence of the proposed grid connection will not change the impact on the setting of an asset theoretically caused by the presence of other cumulative development(s).

10.117 Minor residual impacts have been predicted for three cultural heritage assets: Lee Castle GDL, Baronald and Jerviswood. However, since no other proposed developments are located in the vicinity of Baronald (Listed Building Index No. 12967), cumulative impact assessment has been required only for Lee Castle GDL and Jerviswood

10.118 Two consented single turbine schemes are located within the immediate vicinity of the Lee Castle GDL. The Nellifield House single turbine (24.5m to tip) is located to the north of the GDL, and the Hillcroft single turbine (19.36m to tip) is located to the west of the GDL. It is likely that views of these two turbines from the GDL are substantially screened from view by woodland located within the GDL. Each of these two turbines will be visible only in different arcs of view from the proposed grid connection, and none will be of major prominence in views; both turbines being of a similar scale to the proposed wooden poles. It is therefore considered that they will have a cumulative impact of negligible significance.

10.119 Two consented single turbines are located approximately 1.6km to the north-east of Jerviswood (Category A Listed Building, Index No. 13053); the Terracotta Nurseries single turbine (24.8m to tip) and the Cleghorn Mains single turbine (12.5m to tip). The short height of each of these turbines means that they will not be of major prominence in views to or from Jerviswood, and views of them are likely to be screened by the trees which surround Jerviswood. It is therefore considered that the addition of the proposed grid connection will have a cumulative impact of no more than negligible (no impact) significance upon the setting of Jerviswood, Category A Listed Building.

Proposed Mitigation

10.120 No mitigation measures are proposed in relation to the potential cumulative impacts.

Residual Cumulative Impacts

10.121 No significant adverse cumulative impacts are predicted on any identified cultural heritage receptors.

Further Survey Requirements and Monitoring

10.122 No monitoring is proposed beyond the archaeological watching briefs identified as mitigation for construction impacts.

Summary of Impacts

10.123 **Table 10.10** below summarises the predicted impacts of the proposed grid connection on Cultural Heritage.

Table 10.10: Summary of Impacts

Predicted Impact	Significance	Mitigation	Significance of Residual Impact
Construction Impacts			
Construction impacts on quarry (**6**); area of rig and furrow cultivation remains (**13**); trackway (**20**)	Negligible	None	Negligible
Construction impact on area of limestone quarrying and lime clamps (**14**) and on Craigenhill limeworks (**33)**	Minor	Site avoidance and marking out. Archaeological watching brief during ground breaking works in this area.	Minor / Negligible
Construction impact on Candy Mill, mill lade (**21**)	Negligible	Field survey. Site avoidance and marking out, or other mitigation to be agreed in consultation with local council archaeological advisors.	Negligible
Construction impact on Category A Listed Stonebyres hydroelectric power station, weir and bridge (**65**)	Negligible	None	Negligible
Potential construction impact on Roman road (**26**)	Unknown but no more than minor significance	Archaeological watching brief during ground breaking construction works in this area.	Unknown but no more than minor significance
Potential construction impact on St Diarmad's chapel (**4**)	Unknown	Archaeological watching brief during ground breaking works in this area.	Unknown
Potential construction impact on previously unrecorded buried archaeology	Unknown but no more than minor significance	Archaeological watching brief to a strategy to be agreed with local authorities	Unknown but no more than minor significance
Operational Impacts			
Operational impact upon Lee Castle GDL, Jerviswood (Category A Listed Building, Index No. 13053) and Baronald (Category A Listed Building, Index No. 12967)	Minor	None	Minor
Operational impact on Category A Listed Stonebyres hydroelectric power station, weir and bridge (**65**)	Negligible	None	Negligible
Operational impact upon: Castle Qua, fort 345m WSW of Mouse Bridge (Scheduled Monument Index No. 2604); Auchenglen, cairn 450m SSE of (Scheduled Monument Index No. 11235); Collielaw Wood, Roman road SSE of Collielaw (Scheduled Monument Index No. 11528); Auchterhead Muir, Covenanters Monument, Darmead Linn (Category B Listed Building, Index No. 671); The Lee (Category B Listed Building, Index No. 13056); and The Lee, Dovecot (Category B Listed Building, Index No. 13057)	Negligible	None	Negligible
Cumulative Impacts			
Cumulative impact on Lee Castle GDL, Baronald (Category A Listed Building, Index No. 12967) and Jerviswood (Category A Listed Building, Index No. 13053).	Negligible	None	Negligible

References

Brown, P. (1859) *Historical sketches of the parish of Cambusnethan*. Wishaw.

Butt, J. (1967) *The Industrial Archaeology of Scotland*. The industrial archaeology of the British Isles Series, Newton Abbot

CFA Archaeology (2007) *Black Law Extension Environmental Statement. Cultural Heritage*.

Coles, G.M., Gittings, B.M., Milburn, P. and Newton, A.J. (1998) *Scottish Palaeoecological Archive Database* [online], available from http://www.geo.ed.ac.uk/spad (accessed December 2010)

Duncan, JS, (1997) 'Hare Hill/Climpy (Carnwath; Carstairs parishes), Mesolithic chert scatter, later enclosure' *Discovery and Excavation in Scotland* p.75.

Forestry Commission (1995) *Forests and Archaeology Guidelines*.

Forestry Commission (2011) *The UK Forestry Standard. The government's approach to sustainable forest management.*

Forrest, W. (1816) *The County of Lanark from actual survey*.

Historic Scotland (2010) *GIS downloader*, available at: http://hsewsf.sedsh.gov.uk/gisdl.html (accessed December 2010)

Historic Scotland (2011) *Scottish Historic Environment Policy* [online] Available from http://www.historic-scotland .gov.uk/shep-dec2011.pdf

Historic Scotland (2012) *Gardens and Designed Landscapes Inventory* [online] Available from http://data.historic-scotland.gov.uk/pls/htmldb/f?p=2400:10:0

Historic Scotland (2012) *Listed Building Inventory* [online] Available from http://data.historic-scotland.gov.uk/pls/htmldb/f?p=2200:10:0

Hume, J.R. (1976) *The industrial archaeology of Scotland, 1, Lowlands and Borders*. London.

Institute for Archaeologists (2009) *Standard and Guidance for archaeological desk-based assessment*. Institute for Archaeologists.

Institute for Archaeologists (2010) *By-Laws: Code of Conduct*. Institute for Archaeologists

Ordnance Survey First Edition (1853) *Edinburghshire* Sheet XV six inches to one mile.

Ordnance Survey (1859) *Lanarkshire* Sheet XIII six inches to one mile.

Ordnance Survey First Edition (1859) *Lanarkshire* Sheet XX six inches to one mile

Ordnance Survey (1864) *Lanarkshire* Sheet XIX six inches to one mile.

Ordnance Survey First Edition (1864) *Lanarkshire*, Sheet XXV six inches to one mile.

Ordnance Survey, Second Edition (1893) *Edinburghshire* Sheet XVI.NW six inches to one mile.

Ordnance Survey, Second Edition (1893) *Lanarkshire* Sheet XVI six inches to one mile.

Ordnance Survey Second Edition (1893) *Lanarkshire* Sheet XII six inches to one mile.

Ordnance Survey Second Edition (1897) *Lanarkshire* Sheet XIX six inches to one mile

Ordnance Survey (1898) *Lanarkshire*, Sheet XIX six inches to one mile.

Ordnance Survey Second Edition (1898) *Lanarkshire*, Sheet XXV.NE six inches to one mile.

Ordnance Survey Second Edition (1898) *Lanarkshire*, Sheet XXV.NW six inches to one mile.

Ordnance Survey Second Edition(1899) *Edinburghshire* parts of Sheets X and XVI six inches to one mile

Ordnance Survey Second Edition (1899) *Lanarkshire* Sheet XIII six inches to one mile.

Ordnance Survey, Second Edition (1899) *Lanarkshire* Sheet XIII SE six inches to one mile

Ordnance Survey (1910) *Lanarkshire* Sheet XIX six inches to one mile.

Ordnance Survey (1913) *Lanarkshire* Sheet XIX, NE six inches to one mile.

Ordnance Survey (1913) *Lanarkshire*, Sheet XXV.SW six inches to one mile.

Ordnance Survey (1940-41) *Lanarkshire*, Sheet XXV six inches to 1 mile.

Ordnance Survey (1941) *Lanarkshire* Sheets XIX.4, XIV.13 & XII.16 six inches to one mile.

Pryde, G S, (1965) *The burghs of Scotland: a critical list*. London.

RCAHMS (2010), *Historic Land-use Assessment for Scotland* (HLAMAP) [online], available from http://rcahms.gov.uk (accessed December 2010)

RCAHMS (2010) *Pastmap* [online], available from http://jura.rcahms.gov.uk/PASTMAP/start.jsp (accessed December 2010)

Ross, C. (1773) *A map of the Shire of Lanark*

Roy, W. (1747-55) *Military Survey of Scotland*.

Scott, H et al. (Eds.) (1915) *Fasti ecclesiae Scoticanae: the succession of ministers in the Church of Scotland from the Reformation*. Edinburgh

Scottish Government (2010) *Scottish Planning Policy* [online] Available from http://www.scotland.gov.uk/Resource/Doc/300760/0093908.pdf [Accessed April 2012]

Scottish Government (2011) *National Performance Framework* [online] Available from http://www.scotland.gov.uk/Resource/Doc/300760/0093908.pdf [Accessed April 2012]

Scottish Government (2011) *Planning Advice Note (PAN) 2/2011: Planning and Archaeology* [online] Available from http://www.scotland.gov.uk/Resource/Doc/355385/0120020.pdf [Accessed April 2012]

Sinclair, J. (1791) *The statistical account of Scotland, drawn up from the communications of the ministers of the different parishes*. OSA, Edinburgh

Thomson, J. (1832) 'Northern Part of Lanarkshire, Southern Part' In: *Thomson's Atlas of Scotland*.

Table 10.11: Aerial Photographs

Sortie	Frames	Date	Scale
540/1292	0102-0106; 0180-0182; 0225-0257; 0310-0312	20/04/1954	1:10,000
106G/UK/0081	3079- 3083; 4119-4120	10/05/1946	1:10,000
58/3262	0170-0180	15/10/1959	1:10,000
106G/UK/0084	3178-3188; 4178-4188	10/05/1946	1:10,000
541/A/0468	3061-3063; 3148-3153; 3180-3182; 4060-4062; 4148-4150;	26/04/1949	1:10,000
OS/75/135	375-377; 378-380; 420-429; 421-425; 459	21/05/1975	1:6,000
OS/65/105	080-085	10/06/1965	1:5,000
540/1420	0110-0114	28/09/1954	1:10,000

[i] Historic Scotland (2011) Scottish Historic Environment Policy [online] Available from http://www.historic-scotland .gov.uk/shep-dec2011.pdf

[ii] Scottish Government (2010) Scottish Planning Policy [online] Available from http://www.scotland.gov.uk/Resource/Doc/300760/0093908.pdf [Accessed April 2012]

[iii] Institute for Archaeologists (2010) 'By-Laws: Code of Conduct'. Institute for Archaeologists

[iv] Institute for Archaeologists (2011) 'Standard and Guidance for archaeological desk-based assessment'. Institute for Archaeologists.

[v] Scottish Government (2011) Planning Advice Note (PAN) 2/2011: Planning and Archaeology [online] Available from http://www.scotland.gov.uk/Resource/Doc/355385/0120020.pdf [Accessed April 2012]

[vi] Historic Scotland (2010) GIS downloader, available at: http://hsewsf.sedsh.gov.uk/gisdl.html (accessed December 2010)

[vii] RCHAMS (2010) Pastmap [online], available from http://jura.rcahms.gov.uk/PASTMAP/start.jsp (accessed December 2010)

[viii] RCAHMS (2010) Historic Land-use Assessment for Scotland (HLAMAP) [online], available from http://rcahms.gov.uk (accessed December 2010)

[ix] Coles, G.M., Gittings, B.M., Milburn, P. and Newton, A.J. (1998) Scottish Palaeoecological Archive Database [online], available from http://www.geo.ed.ac.uk/spad (accessed December 2010)

[x] Roy, W. (1747-55) *Military Survey of Scotland.*

[xi] Roy, W. (1747-55) *Military Survey of Scotland*

[xii] The Forestry Commission (2011) *The UK Forestry Standard. The government's approach to sustainable forest management.* The Forestry Commission, Edinburgh.

[xiii] The Forestry Commission (2011) *Forests and Historic Environment. UK Forestry Standard Guidelines.* The Forestry Commission, Edinburgh.

[xiv] Historic Scotland (2012) Inventory of Gardens and Designed Landscapes in Scotland. [online] available from http://data.historic-scotland.gov.uk/pls/htmldb/f?p=2400:10:0

11 Noise

Introduction

11.1 This chapter considers the potential noise impacts arising from the construction and operation of the Black Law Windfarm Extension Grid Connection (hereinafter referred to as the 'proposed grid connection'). The construction noise assessment was undertaken by Arup and the operational noise assessment was undertaken by ScottishPower Energy Networks (SPEN).

11.2 This chapter presents the findings of the assessment of the temporary noise impacts arising from construction of the proposed grid connection, including noise generated by construction traffic, and the associated potentially significant changes in the noise climate.

11.3 The chapter also presents the findings of the assessment of operational noise arising from the overhead line (OHL) component of the proposed grid connection.

11.4 Vibration has not been assessed in detail, as neither the construction methods nor the operation of the proposed grid connection includes processes which generate substantial levels of vibration.

Study Area Description

11.5 The assessment has considered construction noise from the works, based on preliminary calculations, at unscreened receptors up to approximately 300m from the centreline of the proposed grid connection. Given the size, scale and temporary nature of the works, it is considered that receptors beyond this distance would not be subject to significant impacts.

11.6 The assessment also considered the operational noise impact of the OHL at unscreened receptors up to approximately 250m from the centreline of the proposed grid connection, on the basis that in SPEN's experience, it is unlikely that properties outside this corridor would be affected by increases in noise.

11.7 It should be noted that although the scheme lies predominantly within South Lanarkshire, the northernmost section also crosses into North Lanarkshire and West Lothian. For these sections of the route, there are no residential properties or other noise sensitive receptors within the 300m study area, and as such these areas will not be impacted.

Impacts Assessed in Full

11.8 The following impacts have been assessed in full:

- the impact of construction noise on receptors in the area surrounding the proposed grid connection, taking account of the construction works and construction traffic routes to, from and along the route;
- the impact of operational noise on receptors in the area surrounding the OHL;
- cumulative noise impacts during construction.

Impacts Scoped Out

11.9 On the basis of the desk-based work undertaken, the professional judgement of the EIA team, experience from other relevant projects and policy guidance or standards, the following topic areas have been 'scoped out', as proposed in the Scoping Report[i]:

- construction and operational impacts from vibration;
- operational noise impacts from the cable route, maintenance traffic and Linnmill substation extension.

11.10 The methods of constructing the proposed grid connection do not include any process likely to generate appreciable levels of vibration and, as such, vibration impacts have not been assessed in detail. As there is minimal vibration associated with the operation of the proposed grid connection, further consideration has not been given to this during operation.

11.11 Due to the infrequency, short duration and small numbers of plant which would be involved in maintenance (see **Chapter 4: Development Description**), operational noise is unlikely to result in a significant impact and has not been considered further. In addition, there is no audible noise emitted by the underground cable or Linnmill substation extension.

Construction Noise Assessment Methodology

Assessment Structure

11.12 The assessment is structured around the consideration of potential construction noise impacts on the residential properties within the study area as these have been identified as sensitive receptors.

11.13 The assessment has considered noise from the following two sources:

- activities associated with site-based construction activity;
- traffic movements associated with the construction activities.

Data Sources and Guidance

11.14 Noise significance threshold and evaluative criteria have been applied, consistent with guidelines, local policies, standards and current best practice appropriate to the noise source and potential receptors being considered, and include the following:

- British Standard (BS) 5228: Part 1: Code of practice for noise and vibration control on construction and open Sites[ii];
- Design Manual for Roads and Bridges (DMRB), Volume 11, Highways Agency, Department for Transport[iii];
- Planning Advice Note (PAN) 1/2011: Planning and Noise[iv];
- BS 4142: Method for rating industrial noise affecting mixed residential and industrial areas[v].

11.15 Data relating to the construction noise assessment have been sourced from the following:

- **Chapter 4** and accompanying figures;
- *BS 5228: Part 1:* Code of practice for noise and vibration control on construction and open sites (BSI, 2009) (typical plant noise data).

Field Survey

11.16 The majority of the route of the proposed grid connection is through very rural farmland and open areas where background noise levels will be very low e.g. typically below the category A threshold levels set in BS 5228:2009 'Table for assessing significance'. As a result, the most sensitive criteria for construction noise have been applied and no field surveys were deemed necessary. Further details of the methodology used for assessing potential impacts from construction noise are provided below.

Consultation

11.17 Consultation with the following consultees has been undertaken and where a response has been received the action taken in response is recorded in **Table 11.1.**

Table 11.1: Consultation Responses

Consultee	Scoping/Other Consultation	Issue Raised	Response/Action Taken
Scottish Government Energy Consents and Deployment Unit	Formal Scoping Consultation by the Scottish Government	There is the potential for noise to be an issue during the construction of the new OHL. Noise predictions should be carried out to evaluate the likely impact of noise from construction activities.	This chapter considers potential impacts on noise sensitive receptors from construction noise.

Consultee	Scoping/Other Consultation	Issue Raised	Response/Action Taken
South Lanarkshire Council	Other Consultation with Environmental Health Officer.	No comments received	No further action taken

Assessing Significance: Construction Noise

11.18 Significance has been determined taking account of noise change as outlined in BS5228-1: 2009. This guidance is specifically relevant to construction site noise. The method reflects conventional EIA methodologies for noise. The 'ABC' method (as described in the BS5228 methodology) has been used in this assessment to establish the noise threshold of significant impact at dwellings. The ambient noise level at the receptor (L_{Aeq}) is determined and rounded to the nearest 5dB to establish the appropriate threshold category (i.e. A, B or C). This is then compared to the total noise level, including construction noise. If the total noise level exceeds the appropriate ABC category value, then a significant impact is deemed to occur.

11.19 Owing to the predominantly rural location of the proposed grid connection, it has been assumed that all properties will lie within the most sensitive category following this methodology (i.e. Category A). The threshold values at various times of the day are set out in **Table 11.2**. These values are applied to the residential receptors identified.

Table 11.2: Table for Determining Significance Threshold for Category A (BS5228)

Threshold Value Period	Category A Threshold Value in Decibels (dB(A))*
Night (23:00 – 07:00)	45
Weekday Evening (19:00 – 23:00) / Saturdays (13:00 – 23:00) / Sundays (07:00 – 23:00)	55
Day (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65

*Category A as per BS5288:2009

11.20 The proposed standard hours of work for construction are 07:00 to 19:00 Monday to Friday between April and September; 07:30 to 17:00 between October to March and 07:00 to 13:00 Saturday, which is within the daytime threshold value period in accordance with **Table 11.2**.

11.21 As construction works at this site would occur only during the daytime, the impact has been identified as potentially significant only where the noise levels from on-site construction activities exceed 65dB(A). The assessment also considers the duration that these residential receptors are exposed to the exceedance.

Assessing Significance: Construction Traffic (Offsite)

11.22 The Design Manual for Roads and Bridges Environmental Assessment, Volume 11, Section 3, Part 7 (2011) provides the clearest guidance to date on significance criteria for the assessment of traffic, where clause 4.2 of HD 213/11 notes that:

"*In terms of permanent impacts, a change of 1 dB(A) in the short-term (e.g. when a project is opened) is the smallest that is considered perceptible. In the long-term, a 3dB(A) change is considered perceptible. Such increases in noise should be mitigated if possible.*"

11.23 For reference, other guidance citing the 3dB(A) threshold for perceptible noise change in the long term includes:

- Department for Transport, A New Deal for Trunk Roads in England: Guidance on the New Approach to Appraisal[vi].
- Department of the Environment, Report of the Noise Review Working Party[vii].
- Institute of Environmental Assessment, Guidelines for the Environmental Assessment of Road Traffic[viii]. .
- Department of the Environment , Planning Policy Guidance 24, Planning & Noise[ix]

11.24 Consequently, the initial indicator for mitigation will be a change of 3dB(A) or more On this basis, Arup has, using professional judgement, determined significance criteria to define the scale of the impact for construction traffic considering sensitivity and magnitude of change, which is presented in **Table 11.3**.

Table 11.3: Significance of Road Traffic Noise Impacts

Predicted Noise Change	Impact Scale	Rating of Likely Significant Impact
Increase of more than 10dB	Substantial increase	Potentially significant (Major / Moderate)
Increase of 6-10dB	Moderate increase	
Increase of 3-5dB	Slight increase	
Increase of less than 3dB	Negligible change	Not significant (Minor / Negligible)

11.25 Major and moderate impacts are considered significant in the context of the EIA Regulations.

Operational Noise Assessment Methodology

11.26 High voltage OHLs can generate audible noise, the level of which depends upon the operating voltage and the choice of conductor system. Noise from energised OHLs is produced by the phenomenon of 'corona discharge', a very limited electrical breakdown of the air at points around the surface of the conductor.

11.27 Whilst conductor systems are designed and constructed to minimise corona discharge, inevitable surface irregularities caused by surface damage or by deposition of surface contaminants such as insects, organic material such as seeds and dust, raindrops or pollution may locally enhance the electric field strength sufficiently for corona discharges to occur. This discharge can be audible in certain circumstances where it would be heard as a crackling sound sometimes accompanied by a low frequency hum.

11.28 Noise levels generated by an OHL increase during periods of rainfall. However, OHLs are generally quiet in dry weather, except after long dry spells when airborne debris adhering to the conductors accumulates. After there has been sufficient rainfall to wash any debris away, noise would return to normal levels.

Data Sources and Guidance

11.29 BS 4142:1997[x] Method for rating industrial noise affecting mixed residential and industrial areas provides an acceptable method for assessing potential noise impacts from OHLs.

11.30 The World Health Organisation (WHO) recommended limit of 50-55dB(A) for outdoor living spaces is also of relevance to this assessment.

Planning Policy

11.31 Planning policies of relevance to this assessment are outlined in **Chapter 5**: **Planning Policy Context**.

Existing Conditions

11.32 The area surrounding the proposed grid connection is a mixture of rural and urban locations, with scattered farmhouse properties in the north and a larger number of residential dwellings located in villages towards the southern end of the proposed grid connection, near Linnmill substation. The existing noise conditions are typical of rural areas.

Do Nothing Scenario

11.33 In the absence of the proposed grid connection, the existing noise climate would be likely to either remain at present levels, or possibly to increase slightly because of other projects (predominantly wind turbines) within the area.

Routeing and Design Considerations

11.34 The design of the proposed grid connection has taken into consideration the distance to the nearest residences, and where practicable, the route lies more than 100m from the nearest residents. Additionally, the temporary access points have been located to avoid or minimise noise impacts to residences.

Impact Assessment

11.35 The assessment of impacts is based upon the proposed grid connection description outlined in **Chapter 4** and is structured as follows:

- construction impacts;
- operational impacts;
- cumulative construction impacts

Construction Impacts

Predicted Impacts

11.36 Construction noise levels have been predicted for the following activities:

- timber felling/clearance;
- OHL construction;
- underground cabling – trench technique;
- cable installation;
- Linnmill substation extension.

11.37 Plant assumptions are given in **Table 11.4**.

11.38 All noise levels have been assessed during the daytime only, as there is no proposal for working outside of the hours indicated in **Chapter 4.**

Table 11.4: Plant Information

Plant Item	Reference table from BS5228	No of items	%on-time	Sound Power (dB)
Timber felling				
Tracked excavator	Table C2-38	1	25	106
Lorry	Table C10-13	1	10	106
Petrol driven chainsaw	Table D2-14	2	20	112
OHL installation				
Lorry with lifting boom	Table C4-53	1	50	105
Tracked excavator (distribution of materials)	Table C2-3	1	60	106
Tracked excavator	Table C2-38	1	50	106
Small compactor (mini planer)	Table C5-9	1	50	96
Timber felling				
Tracked excavator	Table C2-38	1	25	106
Lorry	Table C10-13	1	10	106
Petrol driven chainsaw	Table D2-14	2	20	112
Underground cabling (trench technique)				
Tracked excavator	Table C2-38	2	80	106
Dumper	Table C2-30	1	80	107
Lorry	Table C10-13	1	50	106
Cable installation				
Lorry	Table C10-13	1	25	106
Lorry with lifting boom	Table C4-53	1	30	105
Tracked mobile crane	Table C3-28	1	30	95
Handheld welder	Table C3-31	1	20	101
Small compactor (mini planer)	Table C5-9	1	30	96
Linnmill substation extension				
Lorry	Table C10-13	1	20	106
Dumper	Table C2-30	1	20	107
Handheld welder	Table C3-31	1	20	101

11.39 For each of the above methods, the distance has been calculated beyond which the noise level falls below the threshold of a significant impact. **Table 11.5** outlines the construction method and the limiting distance for impacts.

Table 11.5: Site-based Construction Noise Impacts

Construction Activity	Threshold level above which noise is potentially significant (dB)	Distance at which noise level falls below potential significance threshold level (m)	Average activity monthly noise level at that distance (dB)	Number of properties within this distance of route
Timber felling	65	50	64	0
OHL	65	50	64	0
Underground cabling (trench technique)	65	60	64	29
Cable installation	65	25	65	0
Linnmill substation extension	65	35	65	0

11.40 For the OHL, timber felling and Linnmill substation extension, no residences have been identified within the distances as identified above, therefore no significant impacts have been identified.

11.41 Where the cable will be below ground, 29 properties lie within the distance for a potentially significant impact i.e. within 60m of the works. These are:

- Hawthorne Cottage;
- The Lodge, Mousemill Road;
- 19-71 Lesmahagow Road (odd numbers only).

11.42 However, the period during which the noise level will not exceed the potential significance is expected to be considerably less than one month. This is based on a rate of progress of approximately 30m a day for the underground cabling works (from the construction programme detailed in **Chapter 4**). BS5228-1: 2009 notes that a minimum period of a month can be used as a criterion for assessing duration of exposure in relation to the significance of construction noise. Given the short duration of these works as they pass the receptors, it is assessed that a significant noise impact will not occur.

11.43 During the construction period, the number of vehicle movements per day is estimated as 14 (rounded up to nearest whole vehicle) Approximately half of these vehicles will be heavy goods vehicles (HGV), which equates to 7 ordinary vehicle movements (typically 4x4s) and 7 HGV movements.

11.44 The existing traffic flows on the nearest roads are low enough that the prediction methodologies in CRTN are not applicable for this scheme. The number of vehicle movements equates to less than two movements per hour.

11.45 Given the small number of vehicle movements and that any one access point will only be used for two to three months, a significant impact has not been identified at residential properties on the local roads.

Proposed Mitigation

11.46 As no significant noise impacts have been identified, no mitigation measures are proposed.

Residual Impacts

11.47 There are no residual significant impacts associated with construction noise.

Operational Impacts

11.48 Although the voltage of the proposed OHL is at the lower end of the transmission voltages, 132kilovolt (kV) as opposed to 275kV or 400kV, the surface electric stress for this line design is fairly high because the chosen conductor has a relatively small diameter and there is only one conductor per phase bundle.

11.49 In wet weather, the estimated noise level directly under the line will be up to 34.8dB(A) for 2.0m phase spacing and 32.7dB(A) for 2.5m phase spacing. These noise levels will not be perceptible to an observer standing directly beneath the line, although it should be noted that ambient background noise levels increase during wet weather periods (due to rainfall) and may mask the noise level. At a distance of 50m from the OHL, the corresponding noise levels will be 26.0dB(A) and 23.9dB(A) and will be imperceptible relative to the background noise levels.

11.50 As the nearest residence is 150m from the proposed OHL, it is considered unlikely that noise complaints will be received as it has been judged that the operation of the OHL complies with BS4142 and noise levels will be below the WHO recommended limit of 50-55dB(A).

Proposed Mitigation

11.51 No mitigation is proposed for operational noise as levels would be within recognised standards.

Residual Impacts

11.52 No residual operational noise impacts are predicted.

Cumulative Impact Assessment

11.53 This section considers the cumulative impacts of the construction of the proposed grid connection in respect of other developments within the area.

Predicted Cumulative Impacts

11.54 The Black Law Windfarm Extension Phase 1 (23 turbines) and the Tormywheel Windfarm (15 turbines) (both consented); and the Black Law Windfarm Extension Phase 2 (11 turbines) (currently at planning) are the only proposals in the vicinity of the proposed grid connection which it is considered could give rise to cumulative impacts on the residential receptors identified in the study area as a result of construction activity. No other consented proposals or proposals in planning are considered to be of relevance to the cumulative assessment.

11.55 As a result of the relatively short duration of the impact from construction activities from the proposed grid connection, cumulative construction noise impacts are not anticipated.

11.56 Construction vehicles will largely only use a particular access point, and therefore route, and for a duration of a couple of months only. Therefore, significant cumulative impacts have not been identified for noise from construction traffic.

Proposed Mitigation

11.57 As cumulative construction noise impacts have not been identified, mitigation is not proposed.

Residual Cumulative Impacts

11.58 As cumulative construction noise impacts have not been identified, no residual impacts are identified.

Further Survey Requirements and Monitoring

11.59 Further surveys are not considered necessary, as by assuming that all properties fall within the most sensitive assessment category, the assessment has assumed a maximum case during the construction period.

11.60 Given the relatively short distances at which noise is not considered to impact residences, and that the works will be carried out for short periods at each location, noise monitoring will not be required during the construction period.

Summary of Impacts

11.61 **Table 11.6** below summarises the predicted impacts of the proposed grid connection on noise.

Table 11.6: Summary of Impacts11

Predicted Impact	Significance	Mitigation	Significance of Residual Impact
Noise from construction activity	Not significant	None required	Not significant
Noise from construction traffic	Not significant	None required	Not significant
Operational noise	Not significant	None required	Not significant

References

[i] LUC, (2011), Black Law Windfarm Extension Grid Connection: Scoping Report.

[ii] British Standards Institution, (2009),' (BS) 5228 Part 1: Code of practice for noise and vibration control on construction and open Sites'

[iii] Department for Transport (DPT), (2011), "Design Manual for Roads and Bridges (DMRB), Volume 11', Available [online] at: http://www.dft.gov.uk/ha/standards/dmrb/vol11/index.htm, Last accessed on: 26/10/2012

[iv] The Scottish Government, (2011), *'Planning Advice Note 11/2011: Planning and Noise', Available [online] at: http://www.scotland.gov.uk/Publications/2011/02/28153945/0*

[v] British Standards Institution, (2007), BS 4142: Method for rating industrial noise affecting mixed residential and industrial areas

[vi] Department for Transport, (1998), A New Deal for Trunk Roads in England: Guidance on the New Approach to Appraisal

[vii] Department for Transport, (1990), Report of the Noise Review Working Party

[viii] Institute of Environmental Assessment, (1993), Guidelines for the Environmental Assessment of Road Traffic

[ix] Department for Environment, (1994), Planning Policy Guidance 24, Planning & Noise

[x] British Standards Institution, (1997), Method for rating industrial noise affecting mixed residential and industrial areas

12 Traffic and Transport

Introduction

12.1 This chapter considers the potential traffic and transport impacts associated with the Black Law Windfarm Extension Grid Connection (hereinafter referred to as the 'proposed grid connection'). The chapter identifies access routes for construction vehicles and traffic generation during the construction period. It then assesses the impacts of these on the existing road network and presents potential mitigation strategies to maintain operation of the local road network throughout the construction period.

Study Area

12.2 The study area for traffic and transport is effectively the public road network in the vicinity of the proposed grid connection.

12.3 The proposed grid connection will cross, and be located alongside, a number of roads within South Lanarkshire. These roads are illustrated on **Figure 6.6**[1] and include the:

- A72, which links Lanark to Hamilton (underground cable and Linnmill substation extension);
- A721, which links Carluke and Carstairs (overhead line (OHL));
- A73, which links Lanark to Carluke (underground cable and Linnmill substation extension);
- B7018, which links the A72 to the B7078 at Lesmahagow (underground cable and Linnmill substation extension);
- B7056, which links the A706 to the A721 to the south-east of Carluke (OHL);
- Mousemill Road, which links West Nemphlar Road and Sunnyside Road (underground cable and Linnmill substation extension);
- Sunnyside Road, an uncategorised road where the underground cable deviates from the A73 (underground cable and Linnmill substation extension);
- West Nemphlar Road, which briefly links the A73 and Sunnyside Road (underground cable and Linnmill substation extension).

12.4 The impacts of construction traffic on the A72, A721, A73 B7018, B7056, Sunnyside Road, Mousemill Road and West Nemphlar Road are examined within this chapter.

12.5 The study area also includes the West Coast Main Line (WCML) which will be crossed by the OHL between Carluke and Lanark.

Impacts Assessed in Full

12.6 This chapter considers the following potential impacts based on the *IEMA Guidelines for the Environmental Impact of Road Traffic* (IEMA 2003):

- severance (perceived separation of people from other people and places resulting from high levels of road traffic);
- pedestrian delay;
- delay to road users as a result of temporary traffic management;
- pedestrian and cyclist amenity;
- fear and intimidation of road users as a result of the works;
- accidents and safety.

12.7 In addition this chapter also considers potential cumulative impacts associated with other schemes in the vicinity of the proposed grid connection, including schemes which are the subject of valid planning applications, those which have been approved but not constructed and those under construction.

Impacts Scoped Out

12.8 On the basis of the desk based work undertaken, the professional judgement of the EIA team, experience from other relevant projects and policy guidance or standards, the impact of operational traffic on the local road network has been 'scoped out'. This is in accordance with the Scoping Report and as discussed with the relevant officers of North Lanarkshire Council, South Lanarkshire Council and West Lothian Council given that the proposed grid connection is likely to generate very limited vehicle movements once operational.

12.9 Whilst the operational element of the proposed grid connection will require the OHL to cross the West Coast Mainline (WCML), this is not considered to be a significant issue. The location where the proposed grid connection crosses the WCML, to the north-west of New Greentowers Farm, is situated in a cutting[2]. As a result, construction of the crossing can take place via an overnight possession of the line, with suitable best practice provisions in place for the protection of existing (WCML) and future (proposed grid connection) infrastructure as outlined in **Chapter 4: Development Description**.

Assessment Methodology

Assessment Structure

12.10 The approach used to assess the traffic and transport impacts of the proposed grid connection is outlined below.

Data Sources and Guidance

12.11 Data on the number of predicted construction vehicles was provided by SPT.

12.12 No traffic data was collected on the local road network following scoping discussions with the relevant local authorities. Instead, road capacities as outlined in DMRB Volume 5, TA79/99 were used.

12.13 In addition, consideration has also been given to the following guidance documents:

- Scotland's transport future: The transport white paper – June 2004 (Scottish Executive 2004), which sets out the Government's vision for transport;
- Scotland's National Transport Strategy (Scottish Executive 2006), which sets out the Scottish Government's long term vision for transport together with objectives, priorities and plans;
- PAN 50 Controlling the Environmental Effects of Surface Mineral Workings: Annex C: The Control of Traffic at Surface Mineral Workings (Scottish Executive 1998), which provides guidance on traffic movements from mineral workings, which is relevant to other construction sites;
- PAN 75 Planning for Transport (Scottish Executive 2005a), which offers guidance on sustainable transport planning;
- IEMA Guidelines for the Environmental Impact of Road Traffic (IEMA 2003), which set out guidance for assessing the impact of traffic in EIAs;
- Strathclyde Partnership for Transport's vision for transport (2008);
- Local Transport Strategy 2006-2009 (South Lanarkshire Council 2006) which outlines the council's policies and actions in relation to transport in the South Lanarkshire area.

Field Survey

12.14 No field surveys were undertaken. These were not requested during discussions with the relevant local authorities (see below) and therefore were not deemed necessary.

Consultation

12.15 As part of the scoping exercise, consultation was undertaken with Roads Officers of North Lanarkshire Council, South Lanarkshire Council and West Lothian Council to identify the scope of the traffic and

[1] Mousemill Road, Sunnyside Road and West Nemphlar Road are not illustrated on **Figure 6.6** as these are small sections of road which are not discernible on the 1:50,000 scale Ordnance Survey digital base map which is used in this figure. These roads can, however, be seen on **Figure 4.2g** which uses the 1:10,000 scale Ordnance Survey digital base map.

[2] A 'cutting' is an open excavation for a canal, railway, road or pipeline.

transport assessment. Subsequently, South Lanarkshire Council stated that they did not require any form of Transport Assessment[3] given the minimal number of vehicle movements that are likely to be generated through the construction of the proposed grid connection. West Lothian Council also stated that they were content with the methodology this chapter has followed.

12.16 **Table 12.1** summarises the consultation responses obtained from North Lanarkshire, South Lanarkshire Council and West Lothian Council in relation to traffic and transport.

Table 12.1: Consultation Responses

Consultee	Scoping/Other Consultation	Issue Raised	Response/Action Taken
North Lanarkshire Council	Scoping Consultation	No Issues Raised	N/A
South Lanarkshire Council	Scoping Consultation	No Transport Assessment/ Transportation Statement required. The EIA should outline suitable/appropriate temporary traffic management measures.	Requested information outlined in this chapter.
West Lothian Council	Scoping Consultation	Should any access be required from the West Lothian Council section of the road network, this can be obtained from West Lothian Council Roads Operations in due course.	N/A

12.17 Initial scoping discussions were also held with the Scottish Government as outlined in **Chapter 2: Approach to the EIA**.

Assessing Significance

12.18 This chapter outlines the predicted number of construction vehicles, likely access routes and access points. It also assesses construction impacts against *The Guidelines for the Environmental Assessment of Road Traffic* (IEMA Guidelines 1993). These guidelines are suitable for assessing the short term construction phase of a development such as the proposed grid connection.

12.19 The IEMA Guidelines suggest two broad rules which should be used to identify the assessment area. These are:

- Rule 1 – include road links where traffic flows would increase by more than 30% (or the number of HGVs would increase by more than 30%);
- Rule 2 – include any other specifically sensitive areas where traffic flows would increase by 10% or more (not applicable to roads affected by the proposed grid connection).

12.20 The IEMA Guidelines identify threshold values for traffic flow increases of 10% and 30%. Where the predicted increase in traffic flows is lower than these thresholds, the guidelines suggest that the significance of the impacts can be stated to be low or insignificant and further detailed assessments are not justifiable. However, to ensure the relative assessment of the increase in road traffic in environmental and amenity terms, the criteria outlined in **Table 12.2** and **Table 12.3** are used to determine the magnitude of impact and receptor sensitivity respectively.

Table 12.2: Magnitude of Impact Criteria

Impact	Magnitude of Impact			
	Negligible	Minor	Moderate	Major
Driver Delay	Change in journey time of <30 secs	Change in journey time of 30 secs – 1 min	Change in journey time of 1 min – 2 mins	Change in journey time of >2 mins
Severance **Pedestrian Delay** **Pedestrian and Cyclist Amenity** **Fear and Intimidation** **Accidents and Safety**	Change in total traffic or HGV flows of <30%	Change in total traffic or HGV flows of 30-60%	Change of total traffic or HGV flows of 60-90%	Change in total traffic or HGV flows over 90%

Table 12.3: Receptor Sensitivity

Receptor Sensitivity	Receptor Type
Major	Receptors of greatest sensitivity to traffic flow: schools, colleges, playground, accident blackspots, retirement homes, urban/residential roads without footways that are used by pedestrians. (Para 2.5 IEMA Guidelines, 1993)
Moderate	Traffic flow sensitive receptors including congested junctions, doctors surgeries, hospitals, shopping areas with roadside frontage, roads with narrow footways, un-segregated cycleways, community centres, parks, recreation facilities.
Minor	Receptors with some sensitivity to traffic flow: places of worship, public open space, nature conservation areas, listed buildings, tourist attractions and residential areas with adequate footway provision.
Negligible	Receptors with low sensitivity to traffic flows and those sufficiently distant from affected roads and junctions.

12.21 The magnitude of change and the sensitivity of the receptors are then compared to determine the overall significance of impacts as indicated in **Table 12.4**.

12.22 Potential impacts are considered to be of Major, Moderate, Minor or Negligible significance. Major and Moderate impacts are considered to be significant in the context of the EIA Regulations. Qualitative assessments were undertaken to determine the impacts, and professional judgement used to determine the significance of residual impacts.

Table 12.4: Determination of Significance of Impacts

Sensitivity of Receptor	Magnitude of Impact			
	Major	Moderate	Minor	Negligible
Major	Major	Major	Moderate	Minor
Moderate	Major	Moderate	Minor	Negligible
Minor	Moderate	Minor	Negligible	Negligible
Negligible	Minor	Negligible	Negligible	Negligible

Planning Policy

12.23 Planning policies of relevance to this assessment are outlined in **Chapter 5**: **Planning Policy Context**.

[3] A Transport Assessment is a standalone submission that supports the planning application for significant trip generating development. The Transport Assessment is governed by local and national guidelines and considers whether proposed development is compliant with current planning policies to deliver sustainable and inclusive development

Existing Conditions

Existing Road Network and Capacities

12.24 The local road network in the vicinity of the proposed grid connection is shown on **Figure 6.6** and can be seen in greater detail on the Ordnance Survey mapping in **Figure 4.2a-4.2g**.

12.25 The roads considered in the assessment are the:

- A72 which links Lanark to Hamilton (underground cable and Linnmill substation extension);
- A721 which links Carluke and Carstairs (OHL);
- A73 which links Lanark to Carluke (underground cable and Linnmill substation extension);
- B7018 which links the A72 to the B7078 at Leshmahagow;
- B7056 which links the A706 to the A721 to the south-east of Carluke (OHL);
- Mousemill Road which links West Nemphlar Road and Sunnysider Road;
- Sunnyside Road, an uncategorised road where the underground cable deviates south from the A73;
- West Nemphlar Road, which briefly links the A73 and Sunnyside Road.

12.26 Typical capacities for a variety of road types are provided in the *Design Manual for Roads and Bridges* (DMRB), Volume 15, Part 5, Table 5/3/1. These capacities, which are quoted as two-way flows in vehicles per hour (vph), have been extracted for the roads which will be used by development related traffic and are summarised in **Table 12.5.**

12.27 Traffic flow data has not been sourced for the roads within the study area. Instead, the capacities of each road are presented in **Table 12.5** based on the criteria identified in DMRB, Volume 15, Part 5, Table 5/3/1 and used in the assessment process. For the purposes of a robust assessment, all three route sections are assumed to be Urban Typical Single Carriageways which typically have lower capacities in relation to the characteristics of urban roads.

12.28 If the generated traffic was compared to actual traffic flows, the percentage impact may be higher than the percentages derived from using route capacities. However, given that the proposed grid connection is likely to result in small increases in daily generated traffic, the impact is considered to be so minimal that using road capacities as an indication of use is a rational assumption to make based on professional judgement.

Table 12.5: Route Capacities

Route Section	Description	Speed Limit (miles per hour (mph))	Width	Capacity vph (two-way busiest flow per hour)
A72 (north of Linnmill)	Urban Typical Single Carriageway	60mph typical	6.10m	1800
A721 (east of Kilncadzow)	Urban Typical Single Carriageway	60mph typical	7.30m	3180
A73 (north of Cartland)	Urban Typical Single Carriageway	30mph	6.75m	2040

12.29 The B7056 and B7018 are classified as rural roads; however, the guidance in DMRB, Volume 15, Part 5, sets out theoretical road capacities for urban roads. It is therefore difficult to accurately predict the capacity of minor roads such as the B7018, B7056 and the unclassified roads within the study area. The B7056 is narrow in places but generally 5.5m in width and unrestricted, i.e. the speed limit is 60mph. The B7018 is generally 5.5m in width and restricted to 30mph from the junction of the A72 until Linnmill substation as it passes a residential area to the east of the road. After Linnmill substation, the B7018 is generally 6m in width and the speed limit is unrestricted. Sunnyside Road, Mousemill Road and West Nemphlar Road are likely to be generally around 5m in width or less, with Sunnyside Road and Mousemill Road being unrestricted and West Nemphlar Road being restricted to 30mph for the sections of the road affected by the underground cabling. Based on professional judgement, it is considered reasonable to assume that the capacities of these roads are significantly less than the three roads identified in **Table 12.5**. These five minor roads have been considered collectively for the purpose of this assessment.

Road Traffic Accidents

12.30 No concerns were raised during the consultations regarding local road safety or accident black spots on the roads included within the assessment.

Planned Changes to the Road Network

12.31 No planned changes to the local road network were identified during the consultation process.

Onsite Access

12.32 Access for construction vehicles from the public road network will be provided at a number of points along the proposed grid connection route. For the OHL works, each access point will be used to construct a set number of wood poles to support the OHL and temporary construction compounds will be created. Where ground conditions are unsuitable for low-tracking vehicles, temporary steel matting will be laid.

12.33 **Figure 4.5** illustrates the construction access points along the proposed grid connection route.

12.34 One new construction access point will need to be constructed from the B7018 at the Linnmill substation extension opposite Hillview Road (see **Figure 4.2g**). No other construction access points will be required along the proposed cable route as existing roads and farm tracks will be used.

Construction Vehicle Routes

12.35 Construction vehicles are anticipated to access the site to deliver equipment or site components either via the M74(T) and A72 or via the A73 from the M8(T). The vehicles will then use local roads to reach each construction access point as required and shown on **Figure 4.5**.

Impact Assessment

12.36 The assessment of impacts is based upon the development description outlined in **Chapter 4**.

12.37 The OHL will run from Black Law Windfarm Extension substation in a south-westerly direction to the terminal wood pole point immediately east of the A73, to the north-west of Cartland. From this point, the cable will be contained in an underground trench approximately 1m wide heading in a southerly direction underneath the A73 to West Nemphlar Road, where the cable will turn to head in a westerly direction under Sunnyside Road before heading south, and crossing the A72 and following the B7018 to Linnmill substation extension.

Construction Impacts

Programme

12.38 It is anticipated that the construction period will run for six months. This includes the underground cable connection which will take two months to complete and the construction of the Linnmill substation extension which is likely to last for six months. The construction of the OHL, underground cable and Linnmill substation extension will run in parallel.

Working Hours

12.39 Working hours onsite will be restricted to 07:00-19:00 (April to September) and 07:30-17:00 (October to March). It is expected that the work will take place on weekdays only, however Saturday working may be required. Work will not be carried out on Sundays.

Personnel Numbers

12.40 There will be approximately 10-12 staff employed on the construction of the OHL for the six month period. The staff may work as one team or be split into two working teams (north and south) to work on individual sections of the OHL concurrently.

12.41 The underground cable section will be delivered by a separate working team and will run in parallel to the OHL construction.

12.42 Ten staff members will be employed daily on the construction of Linnmill substation extension over a six month period.

Impacts of Construction

12.43 The assessment has focused on the five key categorised routes in the vicinity of the proposed grid connection namely the A72, A721, A73, B7018 and B7056. The local roads in the vicinity of the grid connection, West Nemphlar Road, Mousemill Road and Sunnyside Road, are considered to have lower levels of traffic than the categorised routes, and therefore the significance of impacts relating to the OHL, underground cable and substation construction works are likely to be limited. This assumption complies with the rules set out in paragraph 12.19.

12.44 The timescale for construction of the OHL and underground cable (including Linnmill substation extension) is short (lasting only six months) and the number of construction vehicles is low in comparison to the capacities of each of the roads included within the assessment. In addition, the vehicles will be spread across the eight public roads within the study area reducing their impact further.

12.45 The main impact associated with construction of the proposed grid connection relates to the underground cable crossing roads en route to Linnmill substation extension as set out in **Chapter 4**. Whilst these roads may be required to be fully closed and diversionary routes implemented, road closures to facilitate cable crossings are likely to be required for less than a day based upon the assumption that an average of 30m of underground cabling can be laid within normal working hours. The roads that will be crossed by the underground cable route are (in route order):

- A73;
- West Nemphlar Road;
- Mousemill Road;
- A72.

12.46 The underground cable will be laid underneath the A73 and Sunnyside Road before crossing the A72 and running underneath the B7018 to Linnmill substation extension. Temporary traffic management will be required on these roads to allow the installation of the cable to take place. This is described further in below and in **Chapter 4**.

12.47 A range of construction vehicles will be used to construct the proposed grid connection and are described in **Table 12.6.**

Table 12.6: Construction Vehicles

Vehicle Type	Purpose	Details	No of (2-way) Vehicles Movements
HGV (Low Loader)	Delivery of OHL wood poles	143 poles for the scheme with a capacity on each low loader of 16 poles.	18
	Delivery of plant for grid connection	Delivery of eight tracked excavators which will be required both for the OHL and underground cable construction.	16
	Delivery of plant for Linnmill substation extension	Delivery of excavator, JCB, mobile work platform.	16
HGV (Articulated / Rigid)	Delivery of equipment for grid connection	top steelwork, stay-wire drums, temporary track (where required) and tree removal equipment will all be required onsite.	
	Delivery of equipment for Linnmill substation extension	Switchgear (circuit breaker, disconnectors, earth switches), busbar, busbar supports and ancillary electrical equipment, marshalling kiosks, control cabinets, cables, security fencing, etc.	100
	Delivery of concrete and aggregate for Linnmill substation extension	Quarried materials will be required to form the platform for the small extension to the HV compound. Concrete will be required for equipment foundations.	
4x4 vehicles	Transportation of grid connection construction staff onsite	Each pole will require four construction staff who will be transported to the pole location in 4x4 vehicles. Two 4x4s will be required each constructing 70 poles.	280
Cars/vans	Transportation of Linnmill substation extension construction staff to site	The Linnmill substation works will require 10 staff onsite for six months. Staff will use their own vehicles to get to the site. Assumption based on 1.5 staff members per vehicle.	2016
Total cars/vans/4x4s			2296 net 15.94 per day
Total HGVs			430 net 2.99 per day

* 40 (two-way) deliveries of forestry equipment over six months, plus five deliveries per week over six months

12.48 **Table 12.6** illustrates that as an average there will be 15.94 cars/vans/4x4s and 2.99 HGVs per day generated by the construction works. It should be noted that the average is calculated by assuming an equal spread of the net predicted construction vehicles over a six month period (six-day working week as a maximum case scenario).

12.49 A comparison between the road capacities shown in **Table 12.5** and the construction vehicles per day shown in **Table 12.6** illustrates that even if all the construction vehicles were to arrive within the peak hour, the total of construction vehicles generated is 1.1% of the capacity of the A72 (which has a capacity value of 1800 vehicles per hour), 0.6% of the capacity of the A721 and 0.9% of the capacity of the A73 (which have a capacity value of 3180 and 2040 vehicles per hour respectively). On this basis, the impact of the construction vehicles generated on the A-roads within the study area is likely to be negligible.

12.50 For the purposes of the assessment, it is assumed that the percentage change in HGVs on the B7018, B7056, West Nemphlar Road, Mousemill Road and Sunnyside Road is 90% or greater to ensure a robust assessment, based on professional judgement. As a result, the magnitude of the impacts associated with the works is expected to be Major in all categories with the exception of driver delay which is expected to be Moderate. The sensitivity of these roads is considered to be negligible given the location and characteristics of these roads. On this basis, the impact on the local roads within the study area will be minor.

12.51 Based on the IEMA *Guidelines for the Environmental Assessment of Road Traffic*, **Table 12.7** illustrates the magnitude, sensitivity and resulting significance of each of the identified impacts on each of the eight roads in the study area.

12.52 The impacts identified include Severance, Driver Delay, Pedestrian Delay, Pedestrian and Cyclist Amenity, Fear and Intimidation and Accidents and Safety. These are summarised as follows:

i) Severance

12.53 Severance results from the creation of new barriers, which completely or partially separate pedestrians and vehicle users from other people and places. A contributing factor to this is the increase in traffic flows, as a result of construction activities, along existing routes. The increase in traffic associated with the proposed grid connection is summarised in **Table 12.6**. The traffic generated as a result of the construction of the proposed grid connection will be minimal and mostly infrequent.

12.54 On the A72, A721 and A73, based on the thresholds set out in **Table 12.2**, the percentage increase in HGVs is expected to be less than 30% resulting in a magnitude value of negligible. For the B7018, B7056, West Nemphlar Road, Mousemill Road and Sunnyside Road, the percentage change in HGVs is assumed to be 90% resulting in a magnitude value of major. The sensitivity of each of the roads is identified based on thresholds identified in **Table 12.3** and combined with the magnitude values, gives an overall significance for each impact. In terms of severance, the significance on each of the roads included in the assessment is expected to be minor (B7018, B7056, West Nemphlar Road, Mousemill Road and Sunnyside Road) or negligible (A72, A721, A73).

ii) Driver Delay

12.55 Driver delay is caused by the impact of the works on the local road network. The impacts of construction traffic combined with partial road closures will cause delays over a minute in length to drivers. The A73 is likely to be most affected by this impact given that the underground cable will run underneath the carriageway for approximately 2km in a southbound direction, which would mean that this section of the A73 may be affected by construction traffic for up to 12 weeks, based on an anticipated programme of 30m of cable laying per day.

12.56 The impact of driver delay on the A73 is considered to be of major magnitude given that delays are likely to extend above two minutes in length. The A72, A721, B7018, B7056, West Nemphlar Road, Mousemill Road and Sunnyside Road are expected to experience delays of between one and two minutes therefore the magnitude value for driver delay on these roads is expected to be moderate. Combined with sensitivity, the significance of this impact is expected to be minor (A72, A73) or negligible (A721, B7018, B7056, West Nemphlar Road, Mousemill Road and Sunnyside Road).

iii) Pedestrian Delay

12.57 Pedestrian delay results from increases in traffic flow, speed or composition along existing routes. Whilst the routes included in this assessment are not heavily trafficked by pedestrians (with the possible exception of the A72 due to the presence of recognised footways), the impacts are predicted to be minimal. The thresholds set out in **Table 12.2** however use the percentage increase of HGVs to measure this impact.

12.58 As the percentage increase in HGVs on the A72, A721 and A73 is expected to be less than 30%, the delay to pedestrians is expected to be negligible. The increase of HGVs on the B7018, B7056, West Nemphlar Road, Mousemill Road and Sunnyside Road is assumed to be above 90% therefore the impact magnitude on pedestrian delay is predicted to be major. Combined with the sensitivity of each of the routes, the overall significance of this impact is expected to be minor (B7018, B7056, West Nemphlar Road, Mousemill Road and Sunnyside Road) or negligible (A72, A721, A73).

iv) Pedestrian/Cycle Amenity

12.59 Pedestrian/cycle amenity relates to the relative pleasantness of a journey and can be affected by increases in traffic.

12.60 The thresholds set out in **Table 12.2** use the percentage increase in HGVs to measure the magnitude of this impact. Similar to pedestrian delay, the percentage increase in HGVs on the A72, A721 and A73 is expected to be less than 30% resulting in a magnitude value of negligible. On the B7018, B7056, West Nemphlar Road, Mousemill Road and Sunnyside Road, the percentage increase in HGVs is assumed to be over 90% resulting in a magnitude value of major. Combined with the sensitivity of each route, the overall significance of this impact is expected to be minor (B7018, B7056, West Nemphlar Road, Mousemill Road and Sunnyside Road) or negligible (A72, A721, A73).

v) Fear and Intimidation

12.61 The pedestrian's level of fear and intimidation is linked to the volume of traffic on the local road network.

12.62 Again, using the thresholds set out in **Table 12.2**, the percentage increase in HGVs is used to measure the magnitude of this impact. The percentage increase in HGVs on the A72, A721 and A73 is expected to be less than 30% resulting in a magnitude value of negligible. On the B7018, B7056, West Nemphlar Road, Mousemill Road and Sunnyside Road, the percentage increase in HGVs is assumed to be over 90% resulting in a magnitude value of major. Combined with the sensitivity of each route, the overall significance of this impact is expected to be minor (B7018, B7056, West Nemphlar Road, Mousemill Road and Sunnyside Road) or negligible (A72, A721, A73).

vi) Accidents and Safety

12.63 The impact of the proposed grid connection works on the number of accidents and relative levels of safety on the links identified as part of the assessment is related to the increase in traffic levels.

12.64 The thresholds set out in **Table 12.2** use the percentage increase in HGVs to measure the magnitude of this impact. The percentage increase in HGVs on the A72, A721 and A73 is expected to be less than 30% resulting in a magnitude value of negligible. On the B7018, B7056, West Nemphlar Road, Mousemill Road and Sunnyside Road, the percentage increase in HGVs is assumed to be over 90% resulting in a magnitude value of major. Combined with the sensitivity of each route, the overall significance of this impact is expected to be minor or negligible.

Summary of Impacts by Route Section

12.65 **Table 12.7** shows that the magnitude of driver delays as a result of temporary traffic management on each of the roads, to allow the proposed grid connection to cross or go underneath, has the most significant impact. However, the sensitivity of each of the roads is either minor or negligible due to their characteristics and location resulting in a significance value of either minor (B7018, B7056, West Nemphlar Road, Mousemill Road and Sunnyside Road) or negligible (A72, A721, A73).

Table 12.7: Significance of Impacts by Route Section

Route Section	Impact	Magnitude	Sensitivity	Significance
A72	Severance	Negligible	Minor	Negligible
	Driver Delay	Moderate		Minor
	Pedestrian Delay	Negligible		Negligible
	Pedestrian and Cyclist Amenity	Negligible		Negligible
	Fear and Intimidation	Negligible		Negligible
	Accidents and Safety	Negligible		Negligible
A721	Severance	Negligible	Negligible	Negligible
	Driver Delay	Moderate		Negligible
	Pedestrian Delay	Negligible		Negligible
	Pedestrian and Cyclist Amenity	Negligible		Negligible
	Fear and Intimidation	Negligible		Negligible
	Accidents and Safety	Negligible		Negligible
A73	Severance	Negligible	Minor	Negligible
	Driver Delay	Major		Minor
	Pedestrian Delay	Negligible		Negligible
	Pedestrian and Cyclist Amenity	Negligible		Negligible
	Fear and Intimidation	Negligible		Negligible

Route Section	Impact	Magnitude	Sensitivity	Significance
	Accidents and Safety	Negligible		Negligible
B7018, B7056, West Nemphlar Road, Mousemill Road and Sunnyside Road	Severance	Major	Negligible	Minor
	Driver Delay	Moderate		Negligible
	Pedestrian Delay	Major		Minor
	Pedestrian and Cyclist Amenity	Major		Minor
	Fear and Intimidation	Major		Minor
	Accidents and Safety	Major		Minor

Mitigation

12.66 Temporary traffic management will be required on all public highway excavations to ensure that the operation of each road is maintained or adequate diversions are provided, whilst the proposed grid connection construction works are ongoing. This traffic management is likely to take the form of single lane operation controlled by temporary traffic signals or the implementation of diversionary routes if single lane operation cannot be safely undertaken. The use of traffic measures will ensure that traffic is effectively managed during the construction period however the residual impacts will remain as detailed above and as summarised in **Table 12.7**.

12.67 South Lanarkshire Council officers have requested that full details of the required temporary traffic management measures, including the duration and exact locations of these measures, are confirmed with the Lanark Area Office within a suitable lead-in time before the construction works are to commence.

12.68 A Traffic Management Plan will be produced for the construction phase of the proposed grid connection. This plan will be prepared by the appointed contractor and will be agreed with Strathclyde Police and South Lanarkshire Council. It is likely to include details such as temporary traffic management requirements, the timing of site deliveries and measures to encourage multi-occupancy of vehicles used by construction workers.

12.69 Designated routes for construction vehicles and guidelines for utilising each route and access point will be included in the Construction Environmental Management Plan.

Cumulative Impact Assessment

Predicted Impacts

12.70 It is assumed for the purpose of this assessment that the Black Law Windfarm Extension Phase 1 and Black Law Windfarm Extension Phase 2 will also be in construction phase during the construction of the proposed grid connection. The construction of the Black Law Windfarm Phase 1 and Phase 2 extensions will largely utilise the M8, A71, B715, B717 and B7057, which are all predominantly to the north of the existing Black Law Windfarm site, and therefore will not affect the public roads identified in this chapter.

12.71 Although there are a number of other windfarm schemes in the vicinity of the site, including those which are the subject of currently undetermined applications, consented or under construction, none are of a scale whereby significant cumulative impacts are predicted to occur.

12.72 No other consented proposals or proposals in planning are considered to be of relevance to the cumulative assessment.

Proposed Mitigation

12.73 No cumulative impacts are predicted therefore no mitigation is required.

Residual Impacts

12.74 No cumulative residual impacts are predicted.

Further Survey Requirements and Monitoring

12.75 No further surveys or monitoring will be required.

Summary of Impacts

12.76 **Table 12.8** below summarises the predicted impacts of the proposed grid connection on Traffic and Transport.

Table 12.8: Summary of Impacts

Predicted Impact	Significance	Mitigation	Significance of Residual Impact
Severance	Negligible (A72, A721, A73) Minor (B7018, B7056, West Nemphlar Road, Mousemill Road and Sunnyside Road)	Traffic Management Plan developed through consultation with Strathclyde Police and South Lanarkshire Council	Negligible (A72, A721, A73) Minor (B7018, B7056, West Nemphlar Road, Mousemill Road and Sunnyside Road)
Driver Delay	Negligible (A721, B7018, B7056, West Nemphlar Road, Mousemill Road and Sunnyside Road) Minor (A72, A73)	Traffic management in the form of temporary traffic signals.	Negligible (A721, B7018, B7056, West Nemphlar Road, Mousemill Road and Sunnyside Road) Minor (A72, A73)
Pedestrian Delay	Negligible (A72, A721, A73) Minor (B7018, B7056, West Nemphlar Road, Mousemill Road and Sunnyside Road)	None	Negligible (A72, A721, A73) Minor (B7018, B7056, West Nemphlar Road, Mousemill Road and Sunnyside Road)
Pedestrian and Cyclist Amenity	Negligible (A72, A721, A73)	None	Negligible (A72, A721, A73)

Predicted Impact	Significance	Mitigation	Significance of Residual Impact
	Minor (B7018, B7056, West Nemphlar Road, Mousemill Road and Sunnyside Road)		Minor (B7018, B7056, West Nemphlar Road, Mousemill Road and Sunnyside Road)
Fear and Intimidation	Negligible (A72, A721, A73) Minor (B7018, B7056, West Nemphlar Road, Mousemill Road and Sunnyside Road)	Traffic management in the form of temporary traffic signals.	Negligible (A72, A721, A73) Minor (B7018, B7056, West Nemphlar Road, Mousemill Road and Sunnyside Road)
Accidents and Safety	Negligible (A72, A721, A73) Minor (B7018, B7056, West Nemphlar Road, Mousemill Road and Sunnyside Road)	Designated routes for construction vehicles identified.	Negligible (A72, A721, A73) Minor (B7018, B7056, West Nemphlar Road, Mousemill Road and Sunnyside Road)
Cumulative Impacts	Negligible (no impacts)	None	Negligible (no impacts)

13 Land Use

Introduction

13.1 This chapter considers how the Black Law Windfarm Extension Grid Connection (hereinafter referred to as the 'proposed grid connection') is likely to interact with the existing land uses, comprising minerals, forestry, agriculture and recreation activities. These topics are given only limited coverage on the basis that no significant impacts are considered likely. The appraisal of existing land use conditions in relation to minerals was prepared by Minerals and Resource Management (with input from the British Geological Society), the information on forestry was prepared by RTS Ltd and LUC was responsible for the sections in relation to agriculture and recreational activity.

Planning Policy

13.2 Planning policies of relevance to land use are outlined in **Chapter 5: Planning Policy Context.**

Minerals Extraction

13.3 In light of the importance of mineral extraction to the Scottish economy, areas of potential future mineral extraction which could potentially be affected by the proposed grid connection through sterilisation of the resource, have been highlighted, and an appraisal of the viability of extraction in these areas prior to construction of the proposed grid connection undertaken.

13.4 This section also identifies areas of historic mining operations in coal and other minerals, presenting information relating to minerals activities in terms of shallow mine workings and mine entries, mine water and mine gas.

13.5 The key issues associated with minerals extraction are considered to be:

- the potential impact on the hydrogeology of the area and accumulations of mine water resulting from the construction and operation of the proposed grid connection;
- the potential for sterilisation of mineral resources due to the presence of the proposed grid connection.

Study Area

13.6 The proposed grid connection runs for a distance of approximately 19km from the Black Law Windfarm Extension substation in the north to the Linnmill substation extension in the south. The appraisal has been carried out on all known minerals, mining activity and rock strata underlying the full length of the proposed grid connection and a distance of 300m on either side. Where information exists beyond this distance, such as mining activity in a specific mineral seam of relevance to the proposed grid connection, this has been included for context.

Data Sources and Guidance

13.7 In establishing the potential impacts associated with mineral extraction, reference has been made to the following sources of data and guidance:

Data Sources

- North and South Lanarkshire and West Lothian Council Planning Departments, planning applications and Scoping Opinions in respect of past and current opencast and deep mine extraction proposals.
- Coal Authority and British Geological Survey Mine Records, data relevant to deep mining, quarrying and opencast extraction.
- Coal Authority Licensing Department, information relating to areas of active extraction licenses, authorisations and areas of responsibility.
- British Geological Survey, borehole records relevant to the study area.
- Relevant Ordnance Survey and Geological Survey maps of the study area.
- North and South Lanarkshire and West Lothian Councils, Structure and Local Plans.
- Institute of Geological Sciences (now British Geological Survey) Report No. 77/8, Sand and Gravel Resources of the Strathclyde Region of Scotland.
- British Geological Survey, Hydrogeological Assessment, Report ID GR 2046501/1.
- Various data from Mining Information and Public Safety and Subsidence departments of the Coal Authority in relation to potential disused mineshafts, mine gas and mine water issues within the study area.

Guidance

- DOE Planning Policy Guidance Note 14, Development on Unstable Land.
- Construction Industry Research and Information Association (CIRIA) Special Publication 32, Construction over Abandoned Mine Workings.

Field Survey

13.8 The appraisal in relation to minerals extraction was informed by collation and evaluation of desk based information sourced from plans, boreholes and other documentary sources as outlined above. A field survey inspection was undertaken on 23rd August 2012 to verify the possible mine entries identified by the desk study. This was carried out only on areas where access to the land was permitted. A field survey from publicly accessible areas was undertaken where access was not permitted for other areas.

13.9 Evidence of a collapsed mine shaft was observed at NS 91390 56650 near the northern end of the proposed grid connection at Black Law Windfarm Extension substation. The ground depression associated with this mine shaft appeared to have been recently secured by double fencing by the Coal Authority. Other than this feature, the inspection did not disclose any other evidence of mine entries.

Consultation

13.10 Consultation was undertaken with the Coal Authority during the routeing stage and at the subsequent EIA Scoping stage on issues relating to mineral extraction. The Coal Authority advised that issues relating to shallow recorded and unrecorded mine workings and mine entries, hydrogeology, mine water and mine gas and the potential for extraction in advance of the proposed grid connection should be addressed in the ES.

Existing Conditions

13.11 To define zones within the study area which may contain minerals of past or future commercial importance, shallow mine workings and mine entries, it is important to understand and define drift and solid geological conditions. Therefore, the existing and previous land use conditions of relevance to the consideration of mineral extraction are set out below.

Surface Geology

13.12 The superficial materials underlying the proposed grid connection consist principally of glacial till (boulder clay). Some areas of peat underlie sections of the proposed grid connection in the north near Black Law Windfarm but decrease in extent towards the south. A large area of backfill is indicated associated with two former opencasts near Climpy to the west of Forth (NS 92000 54000). In the area to the north of Kirkfieldbank (NS 86000 44000), the land is underlain by three small areas containing deposits of sand and gravel associated with a former buried channel of the River Clyde.

Solid Geology

13.13 The solid geology is considered in relation to alterations in the strata groups presented along the proposed grid connection and is described in numbered sections as shown on **Figure 13.1.**

13.14 Section 1-2: The strata below this section are indicated to belong to the Passage Formation and principally consist of sandstones, siltstones and seat earths or fireclays with a few thin ironstones, coal seams and limestones. Records indicate a number of abandoned ironstone, limestone and fireclay deep mine workings and some small former surface mining operations principally in the general area to the north-east of the proposed grid connection. This includes the ongoing Levenseat Silica Sandstone Quarry which is located approximately 2km to the east of the proposed grid connection and extracts a thick seam of silica sandstone. The geological map infers that this seam may underlie the ground below the majority of Section 1-2 of the proposed grid connection from a point approximately 750m to the south-east of the Black Law Windfarm Extension substation.

13.15 Section 2-3: Rocks of the Upper Limestone and Limestone Coal Formations underlie the proposed grid connection in this area. The Limestone Coal Formation in particular contains a number of economic coal seams within a cyclical sequence predominately comprising of sandstones, siltstones, mudstones and seat earths. Former deep mine and opencast operations in this area extracted a number of the coals within this group of rocks and available information indicates that the economic coals underlying this area of the proposed grid connection have now largely been exhausted.

13.16 Section 3-4: The north of this area is underlain by the Lower Limestone Formation with the Lawmuir Series of strata presented below the remainder. The Lower Limestone Formation comprises primarily interbedded sandstones, siltstones, mudstones and limestones with the Hurlet Limestone and Coal noted close to the surface over a relatively limited section. The underlying Lawmuir Formation which is located below the remaining section of the proposed grid connection between Section 3 - 4 is shown to largely consist of sandstones and pebbly sandstones with subordinate siltstones, mudstones and limestones. This group of rocks has not been of commercial interest in the past and is unlikely to contain any minerals of future commercial importance.

13.17 Section 4-5: This section of the proposed grid connection is indicated to be underlain by extrusive igneous rock within the Clyde Plateau Volcanic Formation for a distance around 500m. No past mineral activity has been recorded in the study area within these rocks.

13.18 Section 5-6: Rocks of the Swanshaw Formation underlie this section of the proposed grid connection. This group of rocks are indicated to largely contain feldspathic lithic sandstones with siltstones and rare conglomerate beds. No minerals which may be of future economic value are indicated and no past mining or quarrying is known in this strata.

13.19 Section 6-7: Strata of the Lower Limestone Formation underlie around 300m of the proposed grid connection in this area with rocks of the Lawmuir Series to the north-east and south-west. The Lower Limestone Group contains seams of limestone with some coals which have been extracted in the Kilncadzow area in the past by small opencasts and drift mines.

13.20 Section 7-8: The southern part of the proposed grid connection is underlain by strata of the Swanshaw Formation. This group does not contain any rocks which are indicated as having been extracted in the past and are not likely to be of interest for extraction in the future.

Shallow Mine Workings

13.21 The geological map and other relevant information indicates the presence of former mining activity which could result in the presence of shallow mine workings below two areas of the proposed grid connection as indicated on Figure 13.2. No mine plan or borehole data relating to these former mine workings is available from either the Coal Authority or the British Geological Survey which would provide more detailed information on which to base an accurate appraisal in terms of the area affected by past mining or the depth mining was undertaken at. Accordingly, a number of assumptions need to be made on the basis of the available information. The areas considered to be affected are located between Section 1 - 2 where the available information indicates the Curdly Ironstone may be extracted to outcrop with a lesser possibility of the underlying Castlecary Limestone being exploited. These seams are separated by approximately 20m of strata. The second area is between Section 6 - 7 where it is possible the Hurlet Limestone and Coal has previously been extracted by deep mining over a limited area close to the seam outcrop.

Mine Entries

13.22 A number of disused mine shafts and drift mines which were sunk from the surface and formerly used to access the deep mining operations in the area are indicated in relatively close proximity to the proposed grid connection as shown as mine mouths and mine shafts on **Figure 13.2.** The locations of these features have been assessed from various data including mine plans, geological maps and a register of shaft details maintained by the Coal Authority. No details are available which relate to whether the identified mine entries have been infilled or treated in any way in the past, however any controlled infilling is considered unlikely.

Hydrogeology and Mine Water

13.23 The British Geological Survey (B.G.S.) was commissioned to undertake a hydrogeological desk study in the area of the proposed grid connection. The B.G.S. Report[1] is based on data relevant to the specific area between Forth and Lanark as ascertained from information in the immediate locality and on the basis of general information on the groups of rocks presented below the area.

13.24 The BGS examined groundwater levels, borehole yields and groundwater flows within the various rock units presented below the proposed grid connection and in general terms, found that groundwater levels were likely to lie at depths of between 5m and 15m in the Passage Formation, the Upper, Middle and Lower Limestone Formations and the Lawmuir Formation and between 1m and 10m in the Swanshaw Formation. It is anticipated these groups of rocks would provide yields of up to 10 l/s although where mine workings are encountered this could increase to 40 l/s. The BGS assessed that the Clyde Plateau Volcanic Formation, which is located between Sections 4 - 5 would provide yields of around 0.2 l/s. All the rock units underlying the proposed grid connection were found to be vulnerable to contamination.

13.25 In terms of groundwater quality, BGS records indicate that the Swanshaw Formation is generally very good while qualities in the Carboniferous aquifers which account for the remainder of the rocks is typically relatively hard and mineralised compared to other Scottish ground waters. Where mining has occurred in the Carboniferous strata, it is likely quality will be poor due to rising groundwater following cessation of mining activity.

13.26 Groundwater discharges are recorded around Springfield Reservoir and in the vicinity of Nemphlar to the north of the River Clyde Valley. The BGS also notes that discharges are possible from mine shafts and drift mines in the north of the proposed grid connection but advise that they have no records of locations or qualities of any of these potential discharges.

13.27 The Coal Authority has a number of schemes throughout the country where contaminated groundwater is treated and enquiries were undertaken in relation to any mine water treatment schemes in the vicinity of the proposed grid connection. The closest Coal Authority water treatment schemes in the area lie to the east of Forth at Wilsontown (NS 94900 53100, approximately 2.5km east of the proposed grid connection) and at Pool Farm (NS 98600 54200, approximately 6.5km east of the proposed grid connection). Both of these facilities are mine water treatment schemes fed by surface gravity mine water discharges. Both discharges lie below the surface ground level of the proposed grid connection in this area and collect water from disused mine workings and rock strata over a large area of land. This could potentially include drainage from the land and from the strata and any mine workings underlying the proposed grid connection.

Mine Gas

13.28 The Coal Authority were contacted to determine if records exist of any mine gas incidents in the area and have confirmed that they do not have any records of past occurrences within the study area.

Potential Areas for Mineral Extraction

13.29 Seven areas within the study area have been classified as being underlain by minerals of a type which can be regarded as possibly having potential for economic extraction in the future, and these are indicated on **Figure 13.2.** The initial identification of these areas was based primarily on an appraisal of the mineral type and general area and thickness. Thereafter, a more rigorous examination was carried out on additional aspects such as the total mineral quantity and quality and the possible ratio of mineral to overburden. The likelihood of new operations being initiated within these areas in relation to comparable operating sites has been considered as well as current and anticipated future market conditions. Environmental and planning considerations of these areas have also been examined.

13.30 An area is indicated which may be underlain by silica sandstone between Section 1-2 (Area A) and which is possibly the area which offers the greatest potential for extraction with very limited areas of coal indicated to underlie the ground between Section 3-4 (Area B) and Section 6-7 (Area D). A limited area of igneous rock is shown between Section 4-5 (Area C) whilst at the south of the proposed grid connection between Section 7-8, three small areas of sand and gravel have been identified (Area E).

[1] The British Geological Survey (BGS) Hydrogeology Report is available on request.

13.31 The planning authorities covering the areas of potential interest, in addition to the Coal Authority Licensing Department, have confirmed that are not in receipt of any planning or licence applications or EIA scoping requests for any of these sites.

Routeing and Design Considerations

13.32 Based on the information obtained during the review of mineral extraction, the proposed grid connection has been rerouted to provide a minimum distance of 10m from the mine entry location identified at NS 91390 56650. On the basis of the health and safety measures proposed in **Chapter 4: Development Description** in relation to previous mine workings, no further routeing design alterations were considered necessary as a result of mineral extraction.

Appraisal of Key Issues

13.33 Potential key issues associated with mineral extraction relate to hydrogeology and mine water and the economic impact of sterilisation of areas of potential mineral extraction.

Hydrogeology and Mine Water

13.34 The key issues associated with hydrogeology and mine water largely arise from spillages of oil and diesel and discharges of effluent or untreated water during construction and operation of the proposed grid connection. From the detail supplied by the B.G.S. and the Coal Authority, it is noted that ground water levels in the area of the proposed grid connection should mostly lie well below the proposed construction depths of the proposed grid connection (typically conductors and pilot wires are accommodated in a trench approximately 1.25m deep). Therefore, given this and the proposed good practice measures that will be implemented during construction, pollution of groundwater including any mine water which is being treated by the Coal Authority by their water treatment schemes at Wilsontown and Pool Farm is considered unlikely.

Potential for Mineral Extraction

13.35 Five areas containing minerals of a type which could potentially be extracted at some point in the future have been identified and considered in relation to various economic and environmental factors to seek to ensure that economically viable minerals under, and adjacent to, the proposed grid connection are not sterilised.

13.36 In view of the extraction economics, competing sites, the current market situation and planning and environmental issues in the identified areas, it is not considered that the minerals identified in the appraisal are commercially viable at the present time, or that these minerals are likely to be economically exploited in the foreseeable future. On this basis, it is not considered that any extraction is required by SPT in advance of construction or operation of the proposed grid connection and no sterilisation of mineral resources are expected.

Forestry

13.37 A review of existing forestry in the vicinity of the proposed grid connection was undertaken to identify the woodland required to be felled. The key issues associated with forestry include:

- identification of the extent of felling required;
- consideration of the treatment of felled material;
- consideration of the requirement for woodland management (including re-planting).

Study Area

13.38 The study area for this assessment considers the existing woodland which could be directly affected by the construction and operation of the proposed grid connection. Existing woodland within this area is shown on **Figure 13**. For ease of reference, the study area has been split into sections based on the proposed pole numbers relevant to that section of woodland as detailed below.

Data Sources and Guidance

Data Sources

13.39 The following data sources were utilised in the preparation of the forestry section of this chapter:

- Site 1;10,000 and 1;50,000 OS maps;
- current aerial photographs;
- site inspection notes.

Guidance

13.40 The following guidance was utilised in the preparation of the forestry section of this chapter:

- Forest and Water UK Forestry Standard Guidance (2011), Scottish Government Policy on Control of Woodland Removal (2010).

Field Survey

13.41 Site visits were undertaken in August and September 2012 when each woodland area was walked and a full assessment of the woodland status recorded. This work was then further proofed utilising aerial photographs.

Consultation

13.42 The main comments received during the scoping process with regard to forestry came from Forestry Commission Scotland. Comments received included aspects of wildlife and biodiversity impact which are addressed in **Chapter 8: Ecology**, landscape and visual impacts which are addressed in **Chapter 6: Landscape and Visual Amenity** and archaeology impacts which are addressed in **Chapter 10: Cultural Heritage**. Comments received on the project's impact on the Scottish Government policy on Control of Woodland removal have been addressed in a written response to the Forestry Commission; however, at the time of writing, no response has been received.

Existing Conditions

13.43 The sections below describe the existing woodland cover along the route of the proposed grid connection and detail the volume and type of woodland required to be felled. A summary of the existing conditions with regard to woodlands working from north (Black Law Windfarm Extension substation) to south (Linnmill substation extension) is provided below:

- Section A (Pole numbers 127-125): At the northern end of the route (within the Black Law Windfarm Extension), the overhead line (OHL) passes for a distance of 229m through semi mature Sitka spruce and also small quantities of Lodgepole pine.
- Section B (Pole numbers 125-123): The OHL travels 130m around the north side of an old quarry site through semi mature mixed conifers.
- Section C (Pole numbers 123-113): The OHL passes for a distance of 950m through an area of young mixed conifer woodland being a combination of naturally regenerated mixed conifer and planted Sitka spruce ranging from 1m to 4m in height. The youngest trees are recorded as having been planted in 2010.
- Section D (Pole numbers 100-93): The OHL passes at a minimum 25m distance from the north-western edge of White Cleuch forest.
- Section E (Pole numbers 93-90): The OHL route travels for 195m passing through the gap between two areas of woodland before travelling for a short distance through an area of open ground.
- Section F (Pole numbers 90-86): The OHL passes through a young conifer plantation for a distance of 495m.
- Section G (Pole numbers 85-81) (Birniehall): The OHL passes to the east of a mature conifer woodland.
- Section H (Pole numbers 73-66): The OHL passes through an area where it is understood there is an expired approval for planting woodland west of the existing young woodland planting at Westertown.

- Section I (Pole numbers 66-61): The OHL passes to the west of existing young woodland planting at Westertown.
- Section J (Pole numbers 42-40): The OHL deviates away from the field boundary and thereby avoids a single line of mature broadleaf trees. South of Carnwath Road, the line crosses several field edges, which have scattered mature hedgerow trees. From this point, the OHL route continues in a south-westerly direction through open farm ground.
- Section K (Pole number 25): This is within a gap between two coniferous woodland blocks north of Birkenhead. Here, the gap is approximately 55m in width. Accurate routeing through this gap will ensure that the required 25m clearance is achieved on both sides of the OHL. The OHL route, continuing in a south-westerly direction, then passes along the southern edge of an area of semi mature conifer woodland.
- Section L (Pole numbers 21-20): The OHL crosses a narrow strip of semi mature Lodgepole pine woodland for a distance of 54m.
- Section M (Pole numbers 17-15): The OHL passes through a woodland of mixed species mature conifers (Norway spruce and Lodgepole pine) over a distance of 94m.
- Section N (Pole numbers 10-9): The OHL passes through a line of mature beech trees which is most likely to have been originally planted as a hedgerow.
- Section O (Pole number 3): The OHL passes over a mature hedge row of mixed broadleaf trees.
- Section P (Pole number 1 and underground cable connection point): The OHL passes through mature mixed native woodland, adjacent to the A73 public road, for a distance of 41m.
- Section Q: The underground cable passes through a riparian wooded area on the northern bank of the River Clyde for a distance of 18m.
- Section R: The underground cable passes through an area of open woodland for a distance of 125m between the south bank of the River Clyde and the A72 public road.

13.44 13.53 There is no woodland within the Linnmill substation area and therefore no woodland needs to be removed to accommodate the extension.

Routeing and Design Considerations

13.45 13.53 As stated in **Chapter 4**, for operational reasons, a minimum clearance corridor (wayleave) of 25m either side of the OHL, and 10m directly above the underground cable, needs to be kept free of trees. This wayleave requirement was taken account of during the routeing process, whereby the route was designed to be kept at least 25m from a woodland edge where possible, to negate the need for felling of woodland. However, due to the presence of large blocks or strips of woodland within the area this has not been possible along the entire route and some woodland felling is required to accommodate the OHL and underground cable.

Appraisal of Key Issues

Woodland Felling Requirements

13.46 The areas of woodland which require to be felled to accommodate the proposed grid connection are detailed below and shown on **Figure 13.3**.

Northern Section of OHL Route

13.47 Section A (Pole numbers 127-125): Where the OHL passes through 229m of semi mature Sitka spruce between poles 127-125, clearance of 1.15 hectares (ha) of forest will be required.

13.48 Section B (Pole numbers 125-123): The OHL travels in a south-easterly direction through 130m of mixed species semi mature conifer (predominately Sitka Spruce), where clearance of 0.65ha of trees will be required.

13.49 Section C (Pole numbers 123-113): The OHL passes through an area of young (2m high) conifers for a distance of 950m where 4.70ha of tree clearance will be required.

Central Section of OHL Route

13.50 Section G (Pole numbers 90-86): The OHL requires the clearance of 2.47ha of young conifer woodland as it passes through this woodland for a distance of 495m.

13.51 Section H (Pole numbers 73-66): The OHL passes through an area where it is understood there is an expired approval for planting woodland west of the young woodland planting at Westertown. This project has not proceeded and as such, no woodland will be affected.

Southern Section of OHL Route

13.52 Section L (Pole numbers 21-20): The OHL passes through a narrow shelterbelt strip of semi mature conifer woodland. This area of Lodgepole pine would require a minimum clearance of a 50m wide strip over this distance of 54m equating to 0.27ha. It is anticipated that, due to the age and stability of the retained trees in this area, there will be consequential windblow and an additional further loss of 1.07ha of trees.

13.53 Section M (Pole numbers 17-15): The OHL passes through a woodland where an area of 0.47ha will require to be felled. In addition to this felled corridor, it is anticipated that a further 1.40ha to the south of the line will be lost to windblow. The boundaries of this area are defined by an existing open area to the north and by a change in species to more open woodland to the south.

13.54 Section N (Pole numbers 10-9): The OHL passes through a hedgerow with mature beech trees. Here an area of 0.1ha of trees will need to be felled.

13.55 Section O (Pole number 3): The OHL passes over a mature beech hedgerow with scattered broadleaf trees. It is anticipated that 20 trees will require to be felled within this area (0.1ha).

Underground Cable Route

13.56 Section P (Pole number 1 and underground cable connection point): The underground cable requires the opening of a corridor for a distance of 41m through this area of mature broadleaf woodland. The underground cable will be positioned under an existing track through the woodland and as such, no tree clearance will be required.

13.57 Section Q: The underground cable passes through 18m of riparian woodland where a 10m wide corridor will be created. This will require the felling of 0.02ha of mature broadleaf woodland.

13.58 Section R: The underground cable passes through 125m of open grown scattered woodland trees. It is anticipated that the majority of the underground cable will pass through existing open ground and the net area of trees to be felled will be limited to 0.05ha.

Summary

13.59 In summary, the works proposed for the OHL will include the felling of 9.91ha of trees for the creation of the 50m wide OHL corridor. In addition, a further 2.47ha of trees will be felled as part of the woodland management strategy (see below). For the underground cable, the removal of trees will be limited to an area of 0.07ha of mature mixed species.

Woodland Treatment

13.60 Delivery of the above woodland felling will require the removal of 12.45ha of woodland in total. With the exception of the small group of trees at sections N, O, P, Q and R, the trees to be felled will all be non-native conifers currently growing either as commercial conifer woodland or agricultural shelterbelts. For the areas of tree removal, the method to be used will be a combination of mulching and traditional forestry harvesting. Mulching using a tracked excavator based machine fitted with a mulching head will be undertaken in areas where the current tree size is below that where timber can be economically recovered. This equates to 7.82ha. In addition, there will be 4.63ha of timber harvested where the timber will be extracted and removed offsite to local sawmills and chipboard mills. It is estimated that this timber harvesting operation will generate approximately 720 tonnes of timber which will generate 32 lorry movements off-site. The tree clearance works inclusive of timber haulage would be undertaken over a period of approximately 4 weeks.

Woodland Management

13.61 Proposed works to reduce impacts on woodland management will involve the felling of trees outwith the OHL's 50m wide corridor which would otherwise be lost to windblow. This will be undertaken in two sites

as detailed above (OHL sections L and M) and will result in the felling of 2.47ha of conifer woodland outwith the OHL corridor required for the safe construction and operation of the line.

13.62 The woodland management mitigation principle for this work is to address the risk of future wind damage to these woodlands and, following felling, these areas would be available for replanting by the forest owner, being outwith the required safety zone for the construction and operation of the OHL. In many forest clearance situations, the impact of tree removal on landscape is addressed by the creation of irregular cutting boundaries and the replanting of other species including lower growing trees and shrubs adjacent to the line. In the case of the proposed grid connection, the scale of tree felling is small relative to the remaining forest and it is anticipated that the landscape of the forest will be fully addressed within the next crop rotation by the forest owner following current best forest design practices.

13.63 In relation to the current Forestry Commission policy on woodland removal (ref. The Scottish Government's policy on Control of Woodland Removal, February 2009), it is considered that the scale of tree removal required for the proposed grid connection is not significant. The removal of 9.71ha of commercial conifer forest and 0.27ha of broadleaf woodland over a total of 11 sites is deemed to be within the scale of tree removal anticipated to occur as commercial woodlands are restructured and redesigned. Within the felled areas, the landowner would be able to undertake an element of replanting within the corridor subject to addressing the safety requirements for the operation of the OHL.

Agriculture

13.64 This section considered the issue of the interaction of the construction and operation of the proposed grid connection with existing agricultural activities.

Study Area

13.65 The study area for this assessment considers the existing use of the land for agriculture which could be directly affected by the presence of the proposed grid connection. No agricultural land is located within the Linnmill substation extension area.

Data Sources

13.66 The Macaulay Institute for Soil Research Aberdeen, Upper Clyde Map has been used to inform the appraisal of the proposed grid connection in relation to agriculture.

Field Survey

13.67 No field surveys have been undertaken to inform the review of agricultural issues.

Consultation

13.68 No specific consultation was undertaken in relation to agriculture and this was not raised as an issue by any of the consultees contacted at Scoping.

Existing Conditions

13.69 Use of the land for grazing of sheep and cattle is commonplace throughout the study area to the south of the Black Law Windfarm Extension.

13.70 In relation to agricultural productivity, the Macauley Institute for Soil Research classifies land capability for agriculture on a scale from 1 to 7, where 1 describes land as capable of producing a very wide range of crops and 7 being land of very limited agricultural value.

13.71 The OHL and underground cable pass through agricultural land of varying degrees of capability as the route travels south from the Black Law Windfarm Extension substation to the Linnmill substation extension. The northern section of the route has been described as falling within agricultural classification 5^{i} which is land capable for use as improved grassland only, due to several limitations rendering the land unsuitable to produce arable crops. In particular, from Black Law Windfarm Extension substation to Whaup Knowe, land capability has been classified as 5_3 which means that the land cannot support high densities of this crop without the quality being compromised due to factors such as slope, soil pattern, and wetness.

13.72 The central section of the OHL route, from Whaup Knowe to east of Hill of Kilncadzow, progressively passes through agricultural land of slightly higher capability, with land classified as 4_1 and 4_2 being dominant within this section. Agricultural land classified as 4_1 is capable of being used for a narrow range of crops and 4_2 is agricultural land capable of being used for grassland with some limited potential for other crops.

13.73 The southern section of the proposed grid connection, from east of Hill of Kilncadzow to Linnmill substation extension, again passes through agricultural land of varying degrees of capability. From east of Hill of Kilncadzow to Fullwood in the south-west, the OHL continues to pass through agricultural land of classification 4_1 and 4_2. As the OHL travels from Fullwood to the terminal pole west of Cartland, it enters an area of agricultural land with a higher capability, typically land of classification 3_2. This is described as land capable of producing a moderate range of crops including barley, oats, and grass. The underground cable runs through an area of agricultural land of classification 4 as it travels from west of Cartland to Linnmill substation extension.

Routeing and Design Considerations

13.74 The land within which the proposed grid connection is proposed is currently used for agricultural activities comprising crop production and grazing. This type of land use is common to the wider South Lanarkshire, West Lothian and North Lanarkshire areas. The use of the land for agricultural activities was taken account of during the routeing stages of the proposed grid connection, where areas of land were identified by landowners as being of value for crop production. The identification of the route and subsequent locations of poles within these fields sought to minimise the loss of productive land where possible.

Appraisal of Key Issues

13.75 Due to the relatively limited agricultural value of the majority of the land through which the proposed grid connection passes, the design of the route to minimise loss of productive land, and the overall small amount of land permanently lost to the proposed grid connection, i.e. 5.51 ha, the impact of the proposed grid connection on agricultural land use is not considered to be a key issue.

Recreational Activity

13.76 This section considers the issue of the interaction of construction and operation of the proposed grid connection with existing recreational activity within the area.

Study Area

13.77 The study area for this assessment comprises i) the area within which direct impacts could occur, i.e. the land through which the proposed grid connection passes, and ii) the wider area within which impacts on visual amenity of those undertaking recreational activity could be affected. The wider study area comprises 2km either side of the proposed OHL only, reflecting the maximum extent of potential visual impacts as outlined in **Chapter 6**.

Data Sources

13.78 13.66 The assessment used desk based information sources including local activity/recreational websites and Geographical Information Systems (GIS) data.

Field Survey

13.79 No specific field surveys were undertaken to inform the appraisal of issues associated with recreational activity. However, field work was undertaken as part of the assessment of potential visual impacts as detailed in **Chapter 6**.

Consultation

13.80 The Scoping Opinion received from the Scottish Government advised that the ES should examine the implications of the proposed grid connection on recreation. The Scottish Rights of Way and Access Society (ScotWays) was contacted for information on Rights of Way (RoW) within the study area and the information provided has been used to inform this chapter.

Existing Conditions

13.81 The proposed grid connection spans an area that is sparsely populated with scattered residential and farm properties.

Public Access

13.82 The OHL crosses two public Rights of Way (RoW), SL21 and SL26. RoW SL21 originates from Gladsmuir Hills in the north and travels south-eastwards to Easterseat. There is a short distance (approximately 600m) from this point and the start of RoW SL26, which travels on to the Hill of Kilncadzow.

13.83 The underground cable section crosses 'other route' SL154 which forms part of the Clyde Walkway. This walkway is 65km in total and travels from Glasgow City Centre to New Lanark, providing walkers with the opportunity to experience the scenery and sites of interest within the Clyde Valley.

13.84 There are two RoWs within 25m of the underground cable (SL88 and SL46), at the southern extent, and one approximately 20m south of the underground section which heads south-eastwards through Sunnyside.

13.85 All known public access routes are shown on **Figure 6.6**.

Recreational Activities

13.86 There are no known formal recreation activities, e.g. football pitches, golf courses etc. within the study area. Fishing activity takes place at Springfield Reservoir, located to the west of the OHL, and the wider surrounding area offers a range of informal recreational opportunities such as walking, cycling and horse riding.

13.87 The Clyde Valley caravan and camping site is located in Kirkfieldbank, south of the underground cable section; however, there are no other campsites within the study area.

Visual Amenity

13.88 Landscape and visual impacts during construction and operation are considered in **Chapter 6**. Viewpoints and routes were selected partly on the basis of accessibility and on the type of potential viewers. When predicting the sensitivity of these views to change, consideration was given to the 'type' of viewers that may be affected (i.e. local residents, tourists, walkers etc.).

Routeing and Design Considerations

13.89 The proposed grid connection was routed to minimise the number of crossings of public RoW.

Appraisal of Key Issues

13.90 Predicted impacts for viewpoints and routes of relevance to recreation are shown in **Table 13.1** below, and full details of the assessment of impacts on these viewpoints and routes are provided in the section 'Impacts on Visual Amenity ' in **Chapter 6.**

Table 13.1: Assessment of Impacts for Viewpoints and Routes of Relevance to Recreation

Name and Viewpoint/Route Number	Relevance of Viewpoint/Route to Recreation	Predicted Impact during Construction	Predicted Impact During Operation	Significance of Impact During Construction	Significance of Impact During Operation
Viewpoint 2 – Springfield Reservoir	Springfield Reservoir is used by walkers and anglers.	Construction of the OHL will be perceptible from this viewpoint, with construction vehicles visible along the B7056.	Once operational the OHL will be visible across approximately 120° of the available view from this viewpoint, clockwise from north-east to south	Minor	Minor
The Clyde Walkway	This long distance footpath route follows the River Clyde Valley for 40 miles between Glasgow and New Lanark.	Visibility of construction activity will be possible from a short section of the route (approx. 500m) throughout the construction of the underground cable route.	-	Minor	Negligible
PRoW SL21	Provides access to Springfield Reservoir.	A short section of this PRoW, which provides access to Haininghead Farm and Springfield Reservoir, will be used for construction access.	Once operational, the proposed grid connection will be visible to the west, north-west of this PRoW appearing backclothed against the forestry and topography around Springfield Reservoir.	Minor	Negligible
PRoW SL26	Route used for cycling and walking.	Visibility of construction activity will be possible	The operational OHL will be visible from	Minor	Negligible

Name and Viewpoint/Route Number	Relevance of Viewpoint/Route to Recreation	Predicted Impact during Construction	Predicted Impact During Operation	Significance of Impact During Construction	Significance of Impact During Operation
		from a large proportion of this PRoW which occupies a slightly elevated position around the north-eastern and eastern flanks of Hill Rig.	this PRoW from the entirety of the route; the OHL will appear backclothed against the pastoral farmland and will not break the skyline in views from the route towards the Tinto Hills to the south.		

13.91 Based on the information available, the area in which the proposed grid connection is located is not widely used for recreational activities, and any recreational activities that do take place nearby are unlikely to experience significant impacts as a result of construction or operation of the proposed grid connection.

References

[i] Macauley Institute for Soil Research, Aberdeen, Upper Clyde Valley map

14 Electric and Magnetic Fields

Introduction

14.1 This chapter considers the potential impact of Black Law Windfarm Extension Grid Connection (hereinafter referred to as the 'proposed grid connection') on Electric and Magnetic Field (EMF) exposure to the public. It details the guidance sources used and the method employed to determine the likely exposure levels and the predicted significance of impacts.

14.2 EMFs are present wherever electricity is used, in the home or from the equipment that makes up the UK electricity system. As with many other things encountered in nature, EMFs can be harmful at high-enough levels. However, the fields required to start interfering with the body's nervous system are much greater than those produced by the UK electricity system.

14.3 The term 'EMFs' encompasses two different although related concepts: electric fields and magnetic fields:

- Electric fields are produced by voltage. Voltage is the pressure behind the flow of electricity. It can be likened to the pressure of water in a hose. Electricity in UK homes is at a voltage of 230 volts (V), but outside homes it is distributed at higher voltages, from 11kilovolts (11kV) up to 400kilovolts (400kV). Generally, the higher the voltage, the higher the electric field. Electric fields are measured in volts per metre (Vm^{-1}).
- Magnetic fields are produced by current, which is the flow of electricity. Current, which is measured in amperes or amps, can be likened to the flow of water in a hose when the nozzle is open. Generally, the higher the current, the higher the magnetic field. Magnetic fields are measured in microteslas (μT).

14.4 One difference between EMFs is that electric fields are very easily screened, for example, by buildings, hedges, fences and trees. This means that inside a house, there will be very little electric field from a power line outside. By contrast, magnetic fields pass readily through most buildings.

14.5 All overhead electricity lines produce fields. The fields are usually greatest directly under the lines and fall rapidly with distance to the sides of the line. For smaller, lower voltage lines on wooden poles, the fields generally fall away over a few tens of metres. For larger lines on wood poles, the distance is slightly greater. Fields vary greatly from line to line and over time, and a line typically produces fields much less than the maximum it is capable of.

14.6 High-voltage underground cables can produce higher magnetic fields directly above them than an overhead line (OHL) would produce at ground level, because the physical distance from the underground cable is smaller. However, the field falls more rapidly with distance to the sides, and they produce no external electric field.

Data Sources and Guidance

14.7 The Government sets guidelines for exposure to EMFs in the UK on advice from the Health Protection Agency (HPA). In March 2004, the UK adopted the 1998 guidelines published by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) and this policy was reaffirmed by a Written Ministerial Statement in October 2009. These guidelines also form the basis of a European Union Recommendation on public exposure and a Directive on occupational exposure.

The ICNIRP 'reference levels'

14.8 The ICNIRP reference levels for the public are as follows:

- 5000Vm-1 for electric fields;
- 100μT for magnetic fields.

14.9 Where people spend significant amounts of time, e.g. residential properties, schools, etc, these are the levels above which more investigation is needed; the permitted levels of exposure are somewhat higher, 9000 Vm^{-1} and 360μT and, as stated, apply where the time of exposure is significant. These guidelines are designed to ensure that EMFs do not interfere with nerves, but were set after examining all the evidence, including the evidence on cancer. The occupational limits are five times higher.

14.10 Whilst there are no statutory regulations in the UK that limit the exposure of people to power frequency electric or magnetic fields ,it is the policy of ScottishPower and the UK electricity industry to follow these independent exposure guidelines. A Code of Practice, adopted jointly by industry and Government, sets out all the practical details needed to apply the exposure limits. All exposures in homes already comply with the ICNIRP guidelines. The electricity industry designs all new equipment to comply with the Government guidelines as set out in the Code of Practice.

14.11 In 2010, ICNIRP produced new guidelines. However, these do not automatically take effect in the UK and UK policy remains based on 1998 ICNIRP until the Government decides otherwise.

Assessing Significance

14.12 The predicted significance of the EMF impact of the proposed grid connection was determined through a standard method of assessment based on the ICNIRP reference levels. The impact is either significant or not significant based on the likelihood of exceedance of EMF threshold levels for exposure.

Impact Assessment

Fields Produced by the Proposed Overhead Line

14.13 Calculations[1] are presented here for both electric fields and magnetic fields for the OHL. Calculations have not been undertaken for the underground cable for the reasons given above.

14.14 Electric fields depend on the voltage of the line and the clearance of the conductors above ground, but not on the load. Electric fields for the proposed 132kV OHL have been calculated at 6.7m as this is the minimum ground clearance for a 132kV OHL and hence produces the highest fields, and also for 10.7m which is a more typical ground clearance. Calculations of electric field levels are presented in **Table 14.1**.

Table 14.1: Predicted Electric Field Levels

	Ground clearance of conductors	Lateral distance from route centreline of the OHL		
		Maximum under line	50m	100m
Based on nominal line voltage of 132,000V	6.7m	533Vm-1	10.6Vm-1	1.7Vm-1
	10.7m	148Vm-1	15.7Vm-1	1.7Vm-1

14.15 Magnetic fields depend on the load. In general, loads carried by OHLs, operating as part of an interconnected power system, are much lower than their ratings. Calculations of magnetic field are presented in **Table 14.2** based on a maximum loading.

Table 14.2: Predicted Magnetic Field Levels

	Ground clearance of conductors	Lateral distance from route centreline of the OHL		
		Maximum under line	50m	100m
Based on a maximum loading of 162MVA	6.7m	13.72μT	0.194μT	0.048μT
	10.7m	5.03μT	0.189μT	0.048μT

[1] All calculations presented in this Section were performed on the program "EM2D" using the approximations of infinitely long straight conductors and ignoring zero-sequence currents and voltages, which are appropriate approximations for these circumstances, and are of unperturbed fields.

Compliance of this Project with Exposure Guidelines

14.16 The maximum electric field that could be produced was calculated as 533 Vm^{-1}. This figure is less than the ICNIRP 'reference level', so the OHL also complies with Government policy for electric fields. On this basis, no significant impacts are predicted.

14.17 In the tables above, the maximum magnetic field that could ever be produced by the proposed grid connection was calculated as 13.72μT. As this is less than the ICNIRP 'reference level', the proposed grid connection complies with Government policy for magnetic fields, and no significant impacts are predicted.

14.18 **Table 14.3** summarises the predicted impacts of the proposed grid connection on EMF exposure.

Table 14.3: Summary of Impacts

Predicted Impact	Significance	Mitigation	Significance of Residual Impact
Electric Field Exposure	Not Significant	None Proposed	Not Significant
Magnetic Field Exposure	Not Significant	None Proposed	Not Significant

15 Summary

Introduction

15.1 **Chapters 6 to 14** of the ES report the findings of the assessments of the predicted impacts of the Black Law Windfarm Extension Grid Connection (hereinafter referred to as the 'proposed grid connection') on a topic-by-topic basis. The significance of these impacts has been assessed using criteria defined in the topic chapters. Where appropriate, the significance of impacts has been categorised as major, moderate, minor or negligible. In the context of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000[i] (the 'EIA Regulations'), impacts assessed as being of 'major' or 'moderate' significance are considered to be significant impacts. For some of the assessments, impacts are either considered to be 'significant' or 'not significant' in the context of the EIA Regulations.

15.2 **Table 15.1** summarises the predicted significant impacts of the proposed grid connection prior to, and following, the implementation of committed mitigation measures. Summaries of all significant and non-significant impacts can be found at the end of each assessment chapter.

Summary of Significant Impacts

15.3 Prior to committed mitigation, significant impacts are predicted in relation to:

- Landscape and Visual Amenity;
- Ecology.

15.4 No significant impacts are predicted in relation to:

- Hydrology;
- Ornithology;
- Cultural Heritage;
- Noise;
- Traffic and Transport;
- Land Use;
- Electric and Magnetic Fields.

15.5 Only impacts which are considered to be significant prior to mitigation are presented in the summary of predicted significant impacts table below (**Table 15.1**). All other impacts are considered to be non-significant prior to mitigation and are therefore not presented.

15.6 From the outset, the purpose of the routeing and design strategy for the proposed grid connection was to avoid significant environmental impacts where possible, through careful design of the OHL and underground cable. The most viable route for the proposed grid connection, which complied with SPT's statutory obligations and with the objective of the design strategy, was identified through several design iterations reflecting the Holford Rules, consultation feedback and emerging findings of the environmental surveys. The current use of the land primarily for agriculture and, to a lesser extent, forestry also formed a key influence on the design of the route during the early EIA stages.

15.7 Following avoidance of significant impacts through the design of the proposed grid connection, there is further scope to mitigate most of the predicted significant impacts of the proposed grid connection, and many are therefore not significant following mitigation. This is highlighted in **Table 15.1** below.

15.8 During construction, it is anticipated that there will be temporary residual impacts of moderate significance in relation to two landscape resources, namely the A721 Road to West Coast Mainline Railway, and the West Coast Mainline Railway to the A73 Road. A temporary residual impact of moderate significance is predicted for one of the nine viewpoints; Viewpoint 6: Minor Road, near Collielaw Cottage. There will be no significant residual operational or cumulative landscape and visual amenity impacts. Further mitigation, in addition to that undertaken as part of the design strategy, is not possible due to the inherent nature of OHLs.

15.9 In relation to ecology, it is anticipated that there will be significant impacts prior to mitigation on habitats during construction; however, this will be at a site level. Furthermore, prior to mitigation, significant impacts on mammals are also predicted in terms of physical disturbance at site level. Mitigation measures proposed to minimise these impacts include the appointment of an Ecological Clerk of Works (ECoW), pre-construction surveys to identify sensitive areas, the implementation of exclusion zones, and restricted working hours and lighting. Following the implementation of these measures, it is considered that the residual impacts will not be significant.

Interrelated Impacts

15.10 The EIA Regulations (Schedule 4, Part 1, paragraph 2) require that Environmental Statements consider the interrelationships between aspects of the environment likely to be significantly affected by a development. It is considered that the following impacts are interrelated:

- There is a correlation between recreation and tourism impacts and views of the proposed grid connection from viewpoints within the wider 2km landscape and visual study area. Whilst the assessment of such interrelated impacts is presented within **Chapter 13: Land Use**, the assessment necessarily relates to the assessment in **Chapter 6: Landscape and Visual Amenity**. No significant impacts are predicted on land use as a result of the proposed grid connection.
- There is some correlation between landscape and visual amenity impacts and cultural heritage impacts in relation to the change in views resulting from the proposed grid connection where these are evident from cultural heritage receptors. An assessment of impacts on the setting of cultural heritage features has been undertaken in **Chapter 10: Cultural Heritage**, which is interrelated to the findings of the assessment in **Chapter 6**, whereby changes to views within the wider area are discussed.
- There is some correlation between potential impacts on local residential amenity resulting from visual impacts on residential properties and temporary impacts from construction noise and traffic which have been identified. Impacts on residential receptors are considered in **Chapter 6**, **Chapter 11: Noise** and **Chapter 12: Traffic and Transport**.
- There is some correlation between likely impacts on hydrology and ecology given that changes to hydrology resulting from the proposed grid connection could result in impacts on ecological receptors for example, disruption of the hydrological patterns within groundwater dependent habitats. These impacts are assessed in **Chapter 7: The Water Environment,** and **Chapter 8: Ecology**.

Table 15.1: Summary of Predicted Significant Impacts

Predicted Impact	Significance of Impact	Mitigation	Significance of Residual Impact
Landscape and Visual Amenity			
Construction: Landscape Resources			
A721 Road to West Coast Mainline Railway	Moderate	Measures to reduce landscape impacts were embedded in the design of the proposed grid connection including reinstatement. No further mitigation measures are proposed.	Moderate
Glasgow - Edinburgh Railway Line to the A73 Road	Moderate	As above.	Moderate
Construction: Visual Impacts on Viewpoints			
Minor Road, near Collielaw Cottage	Moderate	Measures to reduce visual impacts were embedded in the design of the proposed grid connection. No further mitigation measures are proposed.	Moderate
Ecology			
Construction			
Physical Disturbance to Habitats	Significant (Site level)	•Management of peat and peat turves; •Tool-box talk and ECoW; •Vehicle movements across sensitive habitats controlled by the ECoW; •Use of ground protection mats and low ground-pressure vehicles; •Standard silt management.	Not Significant
Physical and Noise Disturbance to Mammals	Significant (Site level))	•Tool-box talk and ECoW; •Implementation of exclusion zones; •Standard silt management; •Restricted working hours and lighting;	Not Significant

References

[i] The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000

Non-Technical Summary

Introduction

1.1 SP Transmission Limited (SPT) is applying to the Scottish Ministers for consent to install, and keep installed, a 132kilovolt (kV) single circuit overhead line (OHL). An additional application for an underground cable and extension to the existing Linnmill substation will also be submitted. This is required to connect the consented Black Law Windfarm Extension to the existing electricity network. The Black Law Windfarm Extension Grid Connection (hereinafter referred to as the 'proposed grid connection') is located within the local authority boundaries of North Lanarkshire, South Lanarkshire and West Lothian, and is shown in **Figure 1.1**.

1.2 The application for consent to construct and operate the proposed grid connection is subject to an Environmental Impact Assessment (EIA) and is accompanied by an Environmental Statement (ES) which presents the findings of the EIA. This Non-Technical Summary (NTS) summarises the findings and conclusions of the ES. Furthermore, to obtain consent for the proposed grid connection, it is SPT's duty to consider the possible environmental impacts of the proposals and state what can 'reasonably be done' to mitigate any identified adverse environmental impacts.

1.3 The ES has been compiled by LUC for SPT. Whilst LUC had overall responsibility for the ES; sub-consultants prepared a number of the specialist chapters and provided input to the EIA.

Environmental Impact Assessment

1.4 EIA involves the compilation, evaluation and presentation of any potentially significant environmental impacts resulting from a proposed development, to assist the consenting authority, statutory consultees, and wider public in considering an application. Early identification of potentially adverse environmental impacts also leads to the identification and incorporation of appropriate mitigation measures into the scheme design to avoid, reduce and, if possible, remedy potentially significant adverse environmental impacts. The ES presents information on the identification and assessment of the likely environmental impacts of the proposed grid connection.

Design Strategy and Routeing

1.5 To determine options for connecting Black Law Windfarm Extension to the existing electricity network, SPT carried out a technical and economic study to review the capacity of the existing transmission system in the vicinity of the scheme. There were two possible connection options:

a) construct a single 132kV line to Wishaw substation, similar to the original Black Law Windfarm; or

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

1.6 In examining the two connection options, SPT was obliged to have regard to its obligations to develop and maintain an efficient coordinated and economical system of electricity transmission, and also to preserve the environment.

1.7 On this basis, LUC commenced a strategic routeing study in 2010 to identify a 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 undertake recreational activities within it. SPT policy seeks to find an OHL solution for all connections and only where there are exceptional constraints would underground cables be considered as a design alternative (e.g. in urban areas and in rural areas of the highest scenic and amenity value). Where an OHL solution is not achievable for technical reasons, SPT looks to an underground cable solution as an alternative. However, sections of underground cable identified for inclusion within a scheme must balance the economic, technical and environmental considerations.

1.8 The routeing process sought to avoid or limit impacts on the environment and people by taking account of local conditions, including:

- landscape and visual amenity e.g. views;
- ecology;
- the water environment;
- cultural heritage;
- residential properties (in relation to noise);
- land uses including mineral operations, agriculture and forestry;
- recreational activities e.g. rights of way.

1.9 The findings of the routeing study and the preferred route were presented in the 'Black Law Windfarm Extension Grid Connection Routeing Consultation Report'[i] which was provided to a number of organisations e.g. Councils, Scottish Natural Heritage (SNH), the Scottish Environment Protection Agency (SEPA), the Royal Society for the Protection of Birds (RSPB) and Historic Scotland, as well as local Community Councils. Consultation responses received from consultees and the local Community Councils, in combination with preliminary environmental survey work, was taken into account in making modifications to the preferred route to identify the 'proposed route', which was progressed to the EIA stage.

Scoping

1.10 The purpose of scoping is to help focus the EIA on the likely significant environmental impacts of relevance to the site. A Scoping Report, setting out the proposed EIA scope for the proposed grid connection, was prepared by LUC and submitted to the Scottish Government in June 2011.

1.11 The scope of the EIA was informed by the Scoping Opinion provided by the Scottish Government in September 2011 and the consultation responses received from key consultees including North Lanarkshire Council, South Lanarkshire Council, West Lothian Council, SNH and SEPA.

1.12 In addition to the consultees contacted by the Scottish Government during the formal scoping process, topic area specialists engaged in further consultation and contacted a number of other stakeholders to obtain background information to further inform the EIA, and to allow stakeholders the opportunity to raise any concerns that they might have in relation to the proposed grid connection.

Development Description

1.13 As shown on **Figure 4.2a-4.2g**, the proposed grid connection comprises three elements:

- **A 132kilovolt (kV) OHL** mounted on wood poles running approximately 14.5 km south-west from the proposed Black Law Windfarm Extension substation towards the wood pole termination structure.
- **An underground cable** from the wood pole termination structure as noted above running approximately 4.5km to the existing substation at Linnmill in the Clyde Valley.
- **An extension to the existing Linnmill substation** of approximately 23m x 20m to accommodate additional electrical connection equipment.

1.14 The proposed OHL will be constructed using wood poles, typically 13 – 15m high above ground, with 2.5m below ground.

1.15 Delivery of construction materials to wood pole locations will be achieved by access from public roads and a number of access points from the public road network have been identified. Vehicular access will be required to every pole site along the route during construction and whilst final access arrangements will be agreed with the landowners, indicative access routes from the public road access points to each pole location have been identified.

1.16 At locations along the OHL route, temporary construction compounds will be required for delivery, storage and assembly of materials, dispersal of plant and equipment and temporary welfare facilities.

These locations will be agreed between SPT and the landowners; however, indicative locations are shown on **Figures 2a-2g**. Temporary working areas around each pole location will also be required for foundation excavation and pole erection, with the dimensions of typical working areas being 15m x 15m.

1.17 A total of approximately 12.45 hectares (ha) of forestry will be felled for the proposed grid connection. This is necessary to physically construct the OHL and underground cable, and also to maintain the clearances required for safe operation and maintenance.

1.18 There will be approximately 10 – 12 contracting staff in total working on the construction of the OHL during the 6 month construction programme.

1.19 The underground cable between the wood pole termination structure and the substation at Linnmill will be constructed under the road carriageway of the A72, A73 and Sunnyside Road, in a trench approximately 1250mm deep and 1000mm wide.

1.20 A 23m x 20m extension will be made to the existing high voltage (HV) compound at Linnmill substation.

Landscape and Visual Amenity

1.21 The landscape and visual amenity assessment considered the impact that the proposed grid connection will have on the landscape and on the people who view that landscape. The main objective of the routeing process was to avoid or reduce landscape and visual impacts within the local area through design. Following the routeing study, field surveys were undertaken to inform modifications to the route to further reduce impacts where possible.

1.22 To assess the likely impacts on visual amenity during construction and operation of the proposed grid connection, nine viewpoints were selected for detailed review; these were agreed in consultation with SNH, North Lanarkshire Council, South Lanarkshire Council and West Lothian Council.

1.23 The proposed grid connection will pass through five landscape character types (LCT). There are no nationally designated landscapes located within the 2km study area; however, the Leven Seat locally designated landscape lies within 2km of the OHL. The closest settlements to the proposed grid connection include Climpy, Forth, Kilncadzow, Linnville, Cartland, Lanark and Kirkfieldbank.

1.24 During construction, it is anticipated that there will be impacts on the A721 Road to West Coast Mainline Railway (WCML), the WCML to the A73 Road and on one viewpoint, viewpoint 6, the minor road near Collielaw Cottage. These impacts will be temporary for the duration of the six month construction programme.

1.25 No significant impacts are predicted during the operational phase of the project or cumulatively with other developments likely to be constructed or operated within the study area.

1.26 Mitigation measures for landscape and visual impacts are those embedded into the design of the scheme, and those relating to site restoration after construction.

The Water Environment

1.27 This assessment considered the impacts on surface water hydrology, flood risk, surface water quality, groundwater and water resources during construction and operation of the proposed grid connection.

1.28 The study area included the catchments and streams where the proposed grid connection infrastructure is located. However, the assessment also considered downstream impacts of the proposed grid connection on surface water hydrology, flooding risk, water quality, groundwater and water resources.

1.29 The northern section of the proposed grid connection is located within the catchment of the River Almond but the majority of the proposed grid connection lies within the River Clyde catchment area, and the route will pass over, or close to, streams associated with a number of watercourses; all of which drain to the River Clyde. The OHL will also pass over watercourses that connect to the Springfield Reservoir which is stocked for fishing. The underground cable section will cross the River Clyde over the existing Stonebyres Weir.

1.30 During the design process, stream crossings, watercourses, hydrological features, private water supplies, wells and areas of wet ground were taken into consideration and the route designed to avoid these features where possible. The design process also identified the type of temporary access tracks needed to reflect the ground conditions along the route corridor.

1.31 The assessment identified a potential increased flood risk on the section of the A73 road during construction due to the possible blockage of drainage culverts under the road. A further potential impact was predicted on the Netherton Burn reach, as it is anticipated that there will be a decrease in water quality of the burn as a result of increased sediment levels during construction. A potential impact is also predicted on the water quality of Springfield Reservoir due to potential pollution risk from construction activities.

1.32 Potential impacts on hydrology will be prevented and reduced through the use of standard water run-off and sediment control measures and pollution prevention measures. These will be implemented through the Environmental Management Plan (EMP) for the proposed grid connection and no significant impacts are predicted on the water environment as a result of the proposed grid connection.

Ecology

1.33 The ecology assessment considered the impacts that the proposed grid connection will have on habitats and protected species.

1.34 A number of field surveys were undertaken to inform the assessment. These included an assessment of habitat types and distributions, as well as an otter survey, water vole survey, badger survey, bat habitat survey and great crested newt survey. A total of 30 habitats were identified within the study area including improved and poor semi-improved pasture grasslands, fields containing arable crops, coniferous plantation woodlands and marshy grasslands. The study area was found to support otter, a number of badger setts, and habitat features suitable for bat commuting and foraging. The field studies found no evidence of great crested newt or water voles.

1.35 Routeing of the proposed grid connection sought to avoid areas of blanket bog habitat where possible and to ensure a 30m distance was maintained from all badger setts. In addition, the OHL was routed to avoid felling trees with high potential for bat roosts, and a section of the underground cable route will utilise a cable tray arrangement on the north bank of the River Clyde to minimise the felling of semi-natural broadleaf trees.

1.36 The proposed grid connection will result in construction impacts on non-statutory designated sites as a result of direct habitat loss (two ancient woodland sites and two Sites of Importance for Nature Conservation (SINCs)). There will be no impacts on statutory designated sites for nature conservation. A significant impact is predicted on habitats due to physical disturbance to peatland habitats during construction. A significant impact is also predicted on badger and otter due to physical and noise disturbance associated with construction activity in two locations.

1.37 Mitigation measures are proposed to minimise significant impacts during construction including pre-construction surveys and the appointment of an Ecological Clerk of Works (ECoW). As a result, no residual significant impacts of the proposed grid connection are proposed.

1.38 It should be noted that the proposed construction methodologies and design associated with the proposed grid connection already includes extensive 'built-in' mitigation that will safeguard ecological features.

Ornithology

1.39 The assessment of potential impacts on ornithology (birds) considered impacts relating to indirect habitat loss during construction and operation of the proposed grid connection, and risk of collision with the OHL during operation.

1.40 Bird populations were surveyed from March 2011 to May 2012 and surveys were undertaken for breeding birds, woodland birds, black grouse, and scarce breeding raptors and owls. Flight activity surveys were undertaken from six vantage points following established survey methods. The aim of the surveys was to identify bird species and numbers breeding, wintering and migrating within the study area.

1.41 Four scarce raptor species; hen harrier, goshawk, merlin and peregrine were recorded during the field surveys in addition to barn owl and short-eared owl. Wildfowl records consisted of whooper swan, pink-

footed goose and greylag goose. In relation to wader species; golden plover, curlew, lapwing, snipe and oystercatcher were recorded. A number of other species were also recorded including herring gull, buzzard and kestrel; however, these species were not considered in the assessment due to their being present in low numbers and/or unlikely to be significantly affected by the proposed grid connection.

1.42 No significant impacts on birds are predicted due to indirect habitat loss resulting from disturbance and displacement of birds during construction of the proposed grid connection. A Bird Protection Plan (BPP), to be approved by SNH, will be put in place prior to construction of the proposed grid connection, which will describe survey methods for the identification of sites used by protected and sensitive birds, and detail operational protocols for the prevention or minimisation of disturbance to birds.

1.43 During operation of the proposed grid connection, displacement of birds due to the presence of the OHL is not considered to result in significant impacts on birds.

1.44 Although no significant impacts are predicted during operation, mitigation measures will be employed to reduce the likely risk of birds colliding with the OHL as good practice. To reduce potential collision risk, the OHL will be made more visible to birds by attaching markers to the line which has been shown to reduce collision rates by 60- 90%. In total, 5km of the OHL will be marked in consultation with SNH, including a section of line within 500m of Springfield Reservoir.

1.45 A cumulative assessment found that no significant operational impacts are predicted.

Cultural Heritage

1.46 Cultural heritage assets include sites, features and areas with statutory and non-statutory designations, including Scheduled Monuments; Listed Buildings; Conservation Areas; Gardens and Designed Landscapes; Non Statutory Register sites and other historic environment interests. The assessment considered direct impacts on recorded designated and non-designated cultural heritage assets within the study area, indirect impacts on the setting of designated assets within the wider study area and cumulative impacts on cultural heritage assets. A desk based assessment, consultation and field surveys in 2011 and 2012 were undertaken to inform the assessment.

1.47 Seventy cultural heritage assets were identified within the study area for potential direct impacts, spanning a period from prehistory throughout the medieval period into the 20th century. The underground cable section of the proposed grid connection crosses the River Clyde via the Category A Listed Stonebyres hydroelectric power station, weir and bridge. There are 11 assets within 2km of the proposed grid connection, of which eight could have theoretical visibility with the OHL. These comprise: two Category A Listed Buildings, three Category B Listed Buildings, one Garden and Designed Landscape and three Scheduled Monuments.

1.48 The routeing process sought to avoid routeing through areas designated for cultural heritage importance where possible, e.g. Lee Castle Garden and Designed Landscape, with subsequent modifications made to the design of the OHL and access tracks to avoid direct impacts on known cultural heritage assets.

1.49 Due to the routeing design and subsequent modifications undertaken to avoid cultural heritage assets, whilst there will be unavoidable potential impacts on a number of assets during construction, these are not considered to be significant. Due to the limited length of the OHL with potential visibility and partial screening of views of the grid connection from the eight designated assets within the wider study area, no significant impacts are predicted on the setting of these features. Further, no significant cumulative impacts on cultural heritage assets are considered likely from the proposed grid connection in combination with other developments.

1.50 Whilst no significant impacts are predicted, SPT is committed to avoiding or reducing impacts where possible and is proposing that a Written Scheme of Investigation is prepared in advance of construction which includes measures for pre-construction survey, recording and preserving features on site. Guidance for construction staff on the identification and avoidance of assets will also be issued.

Noise

1.51 The noise assessment considered the potential impacts from construction noise on residential properties within approximately 300m of all construction works and access tracks used by construction traffic. Given the nature and scale of the construction works, it was considered that receptors beyond this distance would not be subject to significant impacts.

1.52 The study area consists of a mixture of rural and residential locations, with mainly scattered farmhouse properties in the north and more residential areas located towards the southern end of the route near the Linnmill substation.

1.53 The routeing design has taken into consideration the distance to the nearest residences, and where practicable, the OHL route lies more than 100m from the nearest residents. Additionally, the temporary access points have been located to avoid or minimise noise impacts to residences.

1.54 No background noise monitoring surveys were required as the assessment was carried out based upon noise threshold values outlined in British Standards Institution (BSI) guidance for construction noise and values defined from other guidance in relation to traffic noise. Sound power output levels for each construction vehicle e.g. excavators, dumper-truck and chainsaw were utilised in combination with the construction programme to assess construction noise impacts.

1.55 No significant impacts have been identified due to the construction of the OHL as no residential properties are located within 50m of the felling and construction works. There are 29 properties located within the 60m threshold for potentially significant impacts of the underground cable route. Due to the duration of construction of the underground cable within 60m of these properties being less than one month, no significant impacts are predicted.

1.56 During the construction period, the number of vehicle movements per day is estimated at 19, with approximately 3 of these vehicles being heavy goods vehicles (HGV) and 16 being 4x4s and construction personnel vehicles. Given the small number of vehicle movements and that any one access point will only be used for two to three months, a significant impact has not been identified at residential properties due to construction traffic noise.

1.57 An assessment of the operational noise produced by the OHL found that the OHL is acceptable in terms of continuous audible noise.

Traffic and Transport

1.58 The traffic and transport assessment considered the impacts of the construction of the proposed grid connection on the road network and other road users. The study area for the traffic and transport assessment has been defined as the public road network in the vicinity of the proposed grid connection that will be used as access routes for construction traffic, namely the A72, A73, A721, B7056, Sunnyside Road, Mousehill Road, West Nemphlar Road and B7018.

1.59 The assessment was informed by a combination of desk-top study and consultation; no field surveys were undertaken.

1.60 Access for construction vehicles will be provided at several points along the proposed grid connection route and will be taken from the local road network. For the OHL works, access points to allow construction of a set number of wood poles to support the cable and temporary construction compounds will be created. Construction vehicles are anticipated to access the site to deliver equipment or site components either via the M74(T) and A72 or via the A73 from the M8. The vehicles will then use local roads to reach each construction access point as required. Due to the number of access points dispersing construction traffic, low construction traffic volumes and existing capacity on the local road network, no significant impacts associated with construction of the OHL are predicted.

1.61 The underground cable section of the proposed grid connection will be constructed under the carriageway of the A73, Sunnyside Road, A72 and B7018 and this has the potential to cause delay to road users during construction.

1.62 Whilst the impact of construction of the proposed grid connection is not considered to be significant, a temporary Traffic Management Plan will be required to ensure that the operation of each road is maintained whilst the works are ongoing. This traffic management is likely to take the form of single lane operation controlled by temporary traffic signals. The A73 is likely to be most affected by this impact as the underground cable will run underneath the carriageway for approximately 2km in a southbound direction. As a result, this section of the A73 may be affected by construction traffic for up to 12 weeks, based on an anticipated programme of 30m of cable-laying per day. No cumulative impacts are predicted.

Land Use

1.63 The land use assessment considered how the proposed grid connection will interact with the existing land use, comprising mineral extraction, forestry, agriculture and recreational activities.

1.64 The key issues relating to minerals were identified as hydrogeology and contamination of mine water and the potential for mineral extraction. Ground water levels in the area of the proposed grid connection mostly lie below the proposed construction depths of the proposed grid connection. Therefore, given this, and the proposed good practice measures that will be implemented during construction, pollution of groundwater, including any mine water, is considered unlikely. Five areas within the study area have been classified as being underlain by minerals of a type which may have potential for extraction in the future. However, these are not considered to be economically viable at the current time, or likely to be economically viable in the near future. A field survey inspection was undertaken in August 2012 and a number of disused mine shafts and drift mines (six in total) were identified in close proximity to the proposed grid connection route. The proposed grid connection has been rerouted to provide a minimum distance of 10m from the mine entry locations.

1.65 The proposed grid connection is located within an area of mainly open ground, interspersed with areas of commercial and broadleaf woodland. The routeing process aimed to avoid routeing through woodland areas where possible. However, due to the presence of large blocks or strips of woodland within the area, this has not been possible along the entire route and some woodland felling is required to accommodate the OHL and underground cable. For technical and safety reasons, a corridor of 25m either side of the OHL and 10m above the underground cable needs to be kept free of trees, therefore approximately 12.45 hectares of woodland is required to be felled. The majority of the felled trees will be removed using a combination of mulching and traditional forestry harvesting, where the timber will be extracted and removed to a local saw mill.

1.66 Some of the land through which the proposed grid connection passes is currently used for agricultural activities comprising crop production and grazing. This was taken into account during the routeing stages of the project; when areas of land were identified by landowners as being of value for crop production, the identification of the route and subsequent locations of poles within these fields sought to minimise loss of productive land where possible. Due to the relatively limited agricultural value of the majority of the land within which the grid connection is proposed, the design of the route to minimise loss of productive land, and the overall small amount of land permanently lost to the development, i.e. 5.51 hectares (ha), the impact of the proposed grid connection on agricultural land use is not considered to be a key issue.

1.67 In relation to recreational activity, the proposed grid connection crosses three public Rights of Way including the Clyde Walkway. There are no formal recreational activities which would be affected by the proposed grid connection; however, recreational fishing takes place on Springfield Reservoir and the Clyde Valley caravan and camping site is located in Kirkfieldbank. Based on the information available, the area through which the proposed grid connection will pass is not widely used for recreational activities and those informal recreational activities that do take place nearby are unlikely to experience significant impacts as a result of construction or operation of the proposed grid connection.

Electric and Magnetic Fields

1.68 The Government sets guidelines for exposure to electric and magnetic fields (EMFs) in the UK on advice from the Health Protection Agency (HPA). Whilst there are no statutory regulations in the UK that limit the exposure of people to power frequency electric or magnetic fields, it is the policy of ScottishPower and the UK electricity industry to follow these independent exposure guidelines.

1.69 Based on these national guidelines, calculations were undertaken for both electric and magnetic field levels for the proposed OHL. The assessment found that the maximum electric field that could be produced directly underneath the proposed OHL during operation will be 533 Vm-1 (volts per metre) and the maximum magnetic field will be 13.72μT (microteslas). These EMFs are less than the Government reference levels of 5000Vm^{-1} for electric fields and 100UT for magnetic fields; therefore, the proposed grid connection therefore complies with Government policy for magnetic fields.

Summary

1.70 The EIA of the proposed grid connection has been carried out in accordance with regulatory requirements and guidance on good practice.

1.71 The overall aim of the design strategy was to create a 'technically feasible and economically viable route' for the proposed grid connection which met the technical requirements of the electricity network and caused the least disturbance to the environment. The proposed grid connection route was selected following a number of routeing and design iterations taking into account technical constraints, consultation feedback and environmental characteristics.

1.72 Overall, the ES shows that, given the iterative design process, and with the committed good practice measures and proposed mitigation in place, most potential environmental impacts associated with the construction and operation of the proposed grid connection can be avoided or minimised. Therefore, in terms of the EIA Regulations, it is considered that the proposed grid connection will not have significant adverse impacts on the environment with the exception of a limited number of landscape and ecological impacts. Mitigation measures have been proposed to avoid any significant ecological impacts. The avoidance and reduction of landscape and visual impacts has been achieved predominantly through the routeing and design of the proposed grid connection and the reinstatement proposals post construction; no significant impacts are predicted once the proposed grid connection is operational.

[i] LUC, (2011), *'Black Law Windfarm Extension Routeing Consultation Report',* Available [online] at: http://www.spenergynetworks.co.uk/serving_our_customers/consulation_black_law.asp?NavID=1&SubNavID=3&SubSubNavID=3, Last accessed on: 25/10/2012