Intended for
SP Energy Networks

On behalf of
SP Transmission Plc

Date
April 2017

Project Number
UK12-23096

ROUTEING STRATEGY CONSULTATION DOCUMENT

DALQUHANDY WIND FARM TO COALBURN SUBSTATION 132KV OVERHEAD LINE

RAMBOLL ENVIRON

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APPENDICES

GLOSSARY

132 kV	132 kilo-volt capacity of an electricity power line
AOD	Above Ordnance Datum
ASA	Archaeologically Sensitive Area
Bing	A refuse heap, especially of metallic ore or of waste from a mine.
EIA	Environmental Impact Assessment
ES	Environmental Statement
GDL	Garden and Designed Landscape
GWDTE	Groundwater Dependent Terrestrial Ecosystem
HER	Historic Environment Records
Holford Rules	A set of seven rules, first developed in 1959 by Sir William Holford, which define the principles of route selection and which continue to inform transmission line routeing in the UK.
IBA	Important Bird Areas are designated by Birdlife as places of international significance for the conservation of birds and other biodiversity[1]. They are a non-statutory, international designation.
LCT	Landscape Character Type
LECU	Local Energy Consents Unit (Scottish Government)
OHL	Overhead line
PAN	Planning Advice Note
Planning application	An application for planning permission under the Town and Country Planning (Scotland) Act 1997, as amended by the Planning etc. (Scotland) Act 2006. It should be noted that consent under section 37 of the Electricity Act 1989 usually carries with it deemed planning permission from the Scottish Ministers under Section 57 of the Town and Country Planning (Scotland) Act 1997.
Preferred route	The route option is considered to represent the optimum balance between the various environmental considerations.
Proposed route	The final route within which alternative OHL route alignments will be defined and appraised.
Ramsar site	Site protected under The Convention on Wetlands, called the 'Ramsar Convention', which provides the framework for the conservation and use of wetlands and their resources.
Route	A linear area of search within the study area, through which a new transmission line could be located.
Route options	A number of possible route alignments within the proposed route, for comparative analysis.
Section 37 (s37) application	An application for development consent under section 37 of the Electricity Act 1989.

[1] www.birdlife.org

SAC	Special Area of Conservation - designated under Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora (known as - The Habitats Directive).
SEPA	Scottish Environment Protection Agency
SNH	Scottish Natural Heritage
SPA	Special Protection Area – designated under Directive 2009/147/EC on the conservation of wild birds (the Birds Directive).
SPEN	Scottish Power Energy Networks
SPP	Scottish Planning Policy
SPT	Scottish Power Transmission
SSSI	Site of Special Scientific Interest – designated by SNH under the Nature Conservation (Scotland) Act 2004.
Study area	The area of land which comprises the area within which route options will be identified and evaluated.
Trident wood pole	A 132 kV overhead line design using wood pole support structures, as set out in the guidance[2]. The nominal height of the wood poles is likely to be approximately 15 m, with a maximum above-ground height of 22 m and a minimum above-ground height of 10 m. The spacing between the poles will vary according to pole type, with span length of 60-75 m for single poles above 200 m AOD, and 130-155 m for H poles above 200 m AOD.
ZTV	Zone of Theoretical Visibility - the theoretical visibility of an object in the landscape.

[2] Energy Networks Association (2003) Technical Specification 43-50, Issue 1: 1984 – 132 kV Single Circuit Overhead Lines on Wood Poles

EXECUTIVE SUMMARY

Scottish Power Energy Networks (SPEN) proposes to construct a new 132 kilovolt (kV) overhead line (OHL) supported by wood poles to connect the proposed Dalquhandy wind farm to the existing Coalburn substation, approximately 2.5 km north east of Coalburn, South Lanarkshire, Scotland. The typical height of the wood poles would be 15 m. As the route is above 200 m AOD, the OHL will likely require construction using H poles, with a span length of 130 – 155 m.

This routeing strategy consultation document outlines the process by which a preferred route for the OHL has been identified. All interested parties are invited to comment on the preferred route identified.

The approach to developing and assessing route options is consistent with SPEN's approach to routeing[3] . The selection of the proposed route will be undertaken by means of a five-stage process, as follows:

- Stage 1: development of route options;
- Stage 2: appraisal of route options and selection of a preferred route
- Stage 3:consultation on a preferred route;
- Stage 4: modification of preferred route following consultation; and
- Stage 5: selection of a proposed route.

Stage 1, 2 and 3 have been completed and a preferred route has been selected to provide an optimum balance of environmental, technical and economic factors. Consultation on the preferred route will now be undertaken. SPEN attaches great importance to the effect the works could have on the environment and local communities and are keen to engage with key stakeholders, with views taken into account through the development of the project.

All comments received will inform further consideration of the preferred route (Stage 4), and the selection of a proposed route (Stage 5). The proposed route will be taken forward for more detailed environmental assessment prior to submission of an application for consent under section 37 of the Electricity Act 1989 (for the OHL).

Comments on this document should be sent to:

Dalquhandy Project Team

Ochil House

10 Technology Avenue

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Blantyre

G72 0HT

Email: DalquhandyConnectionProject@spenergynetworks.co.uk

Copies of this document can be found online at www.spenergynetworks.co.uk/pages/dalquhandy_wind_farm_grid_connection.aspx

Public consultation events detailing the proposals within this document will be held on 3rd and 4th May 2017 from 2pm to 7.30pm at the following location:

[3] SP Energy Networks (May 2015) Major Electrical Infrastructure Projects: Approach to Routeing and Environmental Impact Assessment, available here: http://www.spenergynetworks.co.uk/userfiles/file/SPEN_Approach_to_Routeing_FINAL_20150527.pdf

Coalburn Miners' Welfare Charitable Society One Stop Shop,

42, Coalburn Road,

Coalburn

Lanarkshire

ML11 0LH

SP Energy Networks request that all consultation responses are received by 30th June 2017.

1. INTRODUCTION

1.1 Purpose of Document

Scottish Power Energy Networks (SPEN) proposes to construct a new 132 kilovolt (kV) overhead line (OHL) supported by wood poles to connect the proposed Dalquhandy wind farm to the existing Coalburn substation, approximately 2.5 km north east of Coalburn (Figure 1.1).

This document outlines the process by which a preferred route for the OHL has been identified. It sets out the methodology used and how the relevant guidelines[4] have been applied. This consultation document provides a summary of the findings of the routeing study and invites interested parties to comment on the preferred route that has been identified.

1.2 Background

Scottish Power Transmission Ltd (SPT) is the transmission license holder in the south of Scotland and has the following duties under Section 9 of the Electricity Act 1989:

- to develop and maintain an efficient, coordinated and economical system of electricity transmission; and
- to facilitate competition in the generation and supply of electricity.

SPT also has obligations to offer non-discriminatory terms for connection to the transmission system, both for new generation and for new sources of electricity demand. SPEN is responsible for the delivery of the transmission network on behalf of SPT. As such, SPEN has a legal duty to provide connections for new electricity generators wishing to connect to the transmission system in its licence area under the terms of its statutory and licence obligations. SPEN is obliged to make its transmission system available for these purposes and ensure the system is fit for purpose through appropriate reinforcements to accommodate the contracted capacity.

Under Section 37 of the Electricity Act 1989, SPEN is required to seek consent from the Scottish Ministers for the construction of any non-exempted overhead line operating at a voltage greater than 20 kilovolts (kV).

1.3 Project Need

SPT has received a connection request to connect the proposed Dalquhandy wind farm to the electricity transmission network. As such, SPEN is obliged to provide a connection for the wind farm which lies within the SPT licence area.

1.4 Legislation and Planning Policy Context

Schedule 9 of the Electricity Act 1989, imposes a statutory duty on SPEN to take account of the following factors when formulating proposals for the installation of OHLs: *"to have regard to the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiological features or special interest of protected sites, buildings, objects of architectural, historical or archaeological interest; and to do what it 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 objects."*

Section 37 of the Electricity Act 1989 provides that an application to install or keep installed an above-ground electricity line shall be made to the Scottish Ministers who may direct that planning

[4] SP Energy Networks (May 2015) Major Electrical Infrastructure Projects: Approach to Routeing and Environmental Impact Assessment, available here: http://www.spenergynetworks.co.uk/userfiles/file/SPEN_Approach_to_Routeing_FINAL_20150527.pdf

permission for the development and any ancillary development shall be deemed to be granted under Section 57 (2) of the Town & Country Planning (Scotland) Act 1997.

The UK is legally committed to meeting 15% of its energy demand from renewable sources by 2020, as set out within the Renewable Energy Directive 2009/28/EC. The Scottish Government's Electricity Generation Policy Statement (July 2013) states that Scotland's generation mix should:

- deliver a secure source of electricity supply;
- deliver energy at an affordable cost to consumers;
- be largely decarbonised by 2030; and
- achieve the greatest possible economic benefit and competitive advantage for Scotland including opportunities for community ownership and community benefits.

The proposed development will provide a grid connection to a renewable energy project; therefore, it is a necessary part of energy infrastructure, without which new generation projects are unable to contribute to the achievement of these targets.

Sections 25 and 37 (2) of the Town and Country Planning (Scotland) Act 1997 (as amended by the Planning etc. (Scotland) Act 2006) require that planning decisions are made in accordance with the development plan, unless material considerations indicate otherwise.

The South Lanarkshire Local Development Plan (2015) covers the study area between the proposed Dalquhandy wind farm and the existing Coalburn substation.

Policy within the following are also considered material considerations:

- The Climate Change Scotland Act (2009);
- The Scottish Renewables Action Plan (2009) and 2020 Route Map for Renewables in Scotland;
- The National Planning Framework 3 (NPF3) (2014);
- Scottish Planning Policy (SPP) (2014);
- Planning Advice Notes (PANs); and
- Scottish Government Web-based renewable energy advice[5] .

1.5 Project Scope

In response to the connection application from the developers of the Dalquhandy wind farm and in light of the above legislative context, SPEN proposes to discharge its obligation based on a balance of technical, economic and environmental considerations.

The scope of this study is limited to the routeing of a connection between the Dalquhandy wind farm substation and the existing Coalburn substation. The locations of the different elements of the electrical infrastructure within the routeing study area, including the wind farm locations, are illustrated on Figure 1.1.

1.5.1 Overhead Line Design

The ENA Specification 43-502 overhead line design specification (commonly referred to as a 'trident' OHL design) is a UK Electricity Industry Design Standard and the final designation of pole type is generally dependant on three main factors: altitude, weather and the topography of the route. The size of poles and span lengths will also vary depending on these factors, with poles

[5] [5] http://www.gov.scot/Topics/Built-Environment/planning/Policy/Subject-Policies/Utilities/Delivering-heat-electricity/renewables-advice, accessed 16/06/2016

being closer together at high altitudes to withstand the effects of greater exposure to high winds, ice and other weather events. The OHL route is above 200 m AOD and will therefore be likely to require construction using H poles (rather than single poles), with a span length of 130 -155 m. The pole configuration, height and the distance between poles will therefore only be fully determined after a detailed line survey.

The proposed wood pole will support three conductors (wires) in a horizontal flat formation as shown in Figure 1.2.

Following identification of the proposed route for the new OHL, a detailed topographical survey will be carried out. This is required to identify the proposed positions and heights of each individual tower and wood pole. Site surveys to examine the subsoil conditions will also be carried out at proposed wood pole positions, where required. The results of these surveys will be used to inform the wood pole foundation designs.

1.5.2 Overhead Line Construction and Maintenance

OHL construction typically follows a standard sequence of events as follows:

- prepare access to the pole locations;
- install pole foundations, where necessary;
- erect wood poles;
- string conductors; and
- reinstate pole sites and remove temporary accesses.

For wood pole line construction, the 'poles' are erected using normal agricultural machinery such as an excavator with a lifting arm. A tracked excavator and low ground-pressure vehicles, (e.g. tractor, argocat, quad bikes) are used to deliver, assemble and erect each wood pole structure at each location. The erection of the wood poles requires an excavation to allow the pole brace block and/or steel foundation braces to be positioned in place. A typical pole excavation is 3 m2 x 2 m deep. The excavated material is sorted into appropriate layers and used for backfilling. It would be rare for concrete to be used in the foundations of wood poles. This would normally only be used where ground conditions are particularly unstable. An excavator is typically used to hoist the assembled structure into position and once the structure has been braced in position the trench is backfilled.

Prior to stringing the conductors, roads and railways that are to be crossed by the power line have to be protected by building a scaffold tunnel through which vehicles/trains can pass. Other obstacles such as existing power lines have to be either switched off, deviated or protected using 'live line' scaffolds.

In all cases, every effort is made to cause the least disturbance to landowners and local residents during construction. Following completion all ground disturbance resulting from the construction of the new line is reinstated.

1.6 The Development and Consenting Process

1.6.1 Phase A: Routeing and Consultation

Applying SPEN's approach to routeing, the objective of the route selection process is to identify a technically feasible and economically viable OHL route, between specified points, which causes the least disturbance to people and the environment. This involves the collation and analysis of

existing environmental and technical information in order to identify a 'Preferred Route' for the new OHL.

SPEN is committed to consulting with statutory and non-statutory bodies throughout the development process. Whilst there is no statutory duty to consult on the proposed OHL connection at this stage, SPEN adopts this approach as good practice in order to involve and gain feedback from as broad a range of consultees and stakeholders as possible. This Routeing Strategy Consultation Document sets out the steps taken to identify the 'Preferred Route' for the new OHL and is provided for issue to interested stakeholders, giving them the information required to engage and comment on the project at an early stage.

Following this consultation and the evaluation of the responses received, it is possible that some changes to the route will be suggested as a result of the emergence of new information. The suggested changes will be evaluated and, if necessary, subjected to additional consultation. Consultation on the Preferred Route will inform identification of the 'Proposed Route', which will be taken forward for further assessment and consultation as part of the Environmental Impact Assessment (EIA) and application process.

1.6.2 Phase B: Environmental Impact Assessment

The EIA Process is set out in full within the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 (hereafter 'the EIA Regulations'). EIA is required for developments falling within Schedule 2 to the EIA Regulations that are likely to have significant effects on the environment by virtue of factors such as nature, size or location. In determining whether the proposed development is likely to have significant effects on the environment, regard should be had to the selection criteria detailed in Schedule 3 of the EIA Regulations.

Under the EIA Regulations, any development defined by Section 37 of the Electricity Act that is considered likely to have significant effects on the environment, because of factors such as its nature, size or location, must be subject to EIA and an Environmental Statement (ES) must be submitted with the consent application.

Where EIA is required, environmental information must be provided by the developer in an ES. Schedule 4 specifies the information that must be provided in the ES.

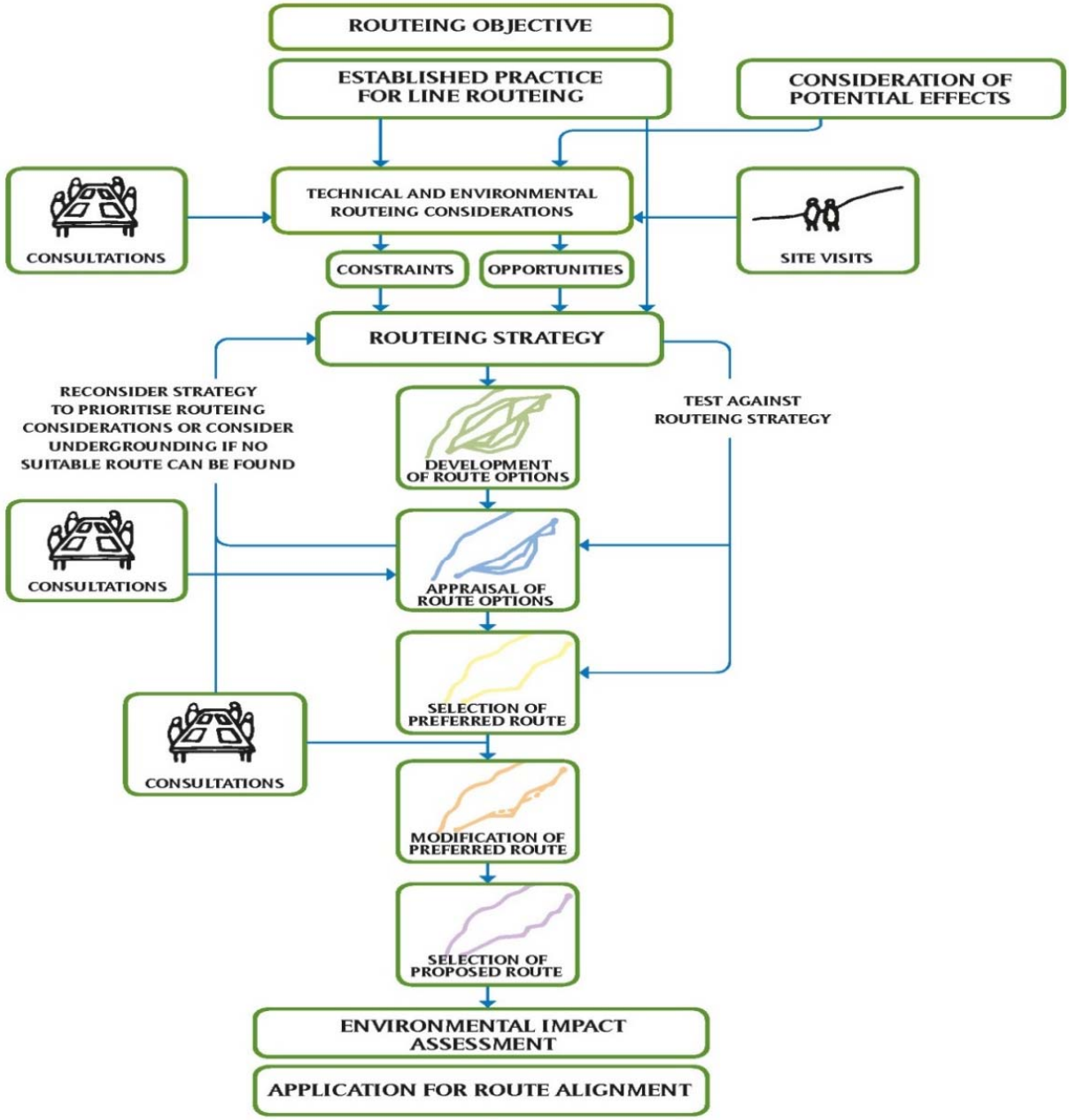
The proposed development is considered to have the potential to give rise to significant effects on the environment due to its nature and size. On this basis, SPEN proposes to submit an ES with the application for consent for the proposed development.

Diagram 1 illustrates the main stages in identifying a Proposed Route and carrying out the EIA, and highlights the stages at which consultation will occur.

1.6.3 Phase C: Application for Consent and deemed Planning Permission

An application for consent will be submitted to the Scottish Ministers under section 37 of the Electricity Act 1989, in which deemed planning permission is sought under section 57 (2) of the Town and Country Planning (Scotland) Act 1997 as amended. An application will be submitted in 2018.

Diagram: 1: The Main Stages in identifying a Proposed Route



1.7 Structure of this Document

This 'Routeing Strategy Consultation Document' is structured as follows:

- Section 2 outlines the methodology adopted for the development of the routeing process;
- Section 3 summarises the environmental features and technical considerations which have informed this study;
- Section 4 presents the route options and the results of the analysis of each route option and provides a description the preferred route that has been identified as a result of the analysis; and

- Section 5 provides an overview of the proposed consultation process, highlighting the timescale and the key questions to consider when responding. It also describes the next steps in the routeing and environmental assessment process.

The document is supported by appendices as follows:

- Appendix 1 presents the figures accompanying this report;
- Appendix 2 provides a list of sources of the environmental data used in this report;
- Appendix 3 provides environmental and technical baseline within the study area and buffer area;
- Appendix 4 provides a list of the environmental features within the study area and details their relative sensitivity;
- Appendix 5 describes the detailed environmental analysis of the route options; and
- Appendix 6: Appendix 1: Holford Rules from SPEN 2015[6].

[6] SPEN 2015 - SP Energy Networks 2015 – Major Electrical Infrastructure Projects – Approach to Routeing and Environmental Impact Assessment

2. ROUTE STRATEGY METHODOLOGY

2.1 Overview

The methodology used for developing and assessing route options is consistent with SPEN's approach to routeing[7] . The guidance recommends that every project should broadly follow the process set out below:

- agreeing the routeing objective;
- recognition of established practice for line routeing;
- consideration of potential effects;
- technical, economic and environmental routeing considerations (constraints and opportunities) based on research, consultations and site visits and collection of background information;
- development of a routeing strategy;
- development of route options;
- appraisal of route options;
- selection of Preferred Route;
- consultation and any subsequent modification of the Preferred Route; and
- selection of the Proposed Route.

The Proposed Route is then carried forward into the Environmental Impact Assessment (EIA) process and used as the basis for an application for consent.

The sections below describe the way in which the routeing assessment has been undertaken.

2.2 Routeing Objective

The routeing objective is to seek a technically feasible and economically viable continuous overhead line route, between specified points, which causes on balance the least disturbance to the environment and people.

2.3 Established Practice for Overhead Line Routeing

The approach adopted in developing and assessing route options is consistent with relevant SPEN approach to routeing guidance (Ibid). This guidance recommends that the identification and comparison of route options should adopt the following overarching principles:

- preference for an option which could involve using or adapting existing infrastructure, rather than building new infrastructure;
- preference for a shorter option over a longer one;
- preference for a financially less expensive option over more expensive options; and
- preference for options which avoid or mitigate environmental and socio-economic impacts.

The SPEN guidance also recommends the application of Forestry Commission guidelines[8] , where a new overhead line may pass through woodland and the appropriate application of the 'Holford Rules'. The Forestry Commission guidelines recommend that overhead lines should be routed to avoid passing through woodland, where possible, by following open space and/or running alongside woodland. The 'Holford Rules' are presented in Box 1 below (Appendix 5 includes the

[7] SP Energy Networks (May 2015) *Major Electrical Infrastructure Projects: Approach to Routeing and Environmental Impact Assessment*, available here: http://www.spenergynetworks.co.uk/userfiles/file/SPEN_Approach_to_Routeing_FINAL_20150527.pdf
[8] Forestry Commission (2014) *Design techniques for forest management planning*

Holford Rules). The Holford Rules[9] were first developed in 1959 by Sir William Holford and continue to inform transmission line routeing in the UK. These rules advocate the application of a hierarchical approach to routeing which first avoids major areas of highest amenity, then smaller areas of high amenity, and finally considers factors such as backdrop, woodland and orientation.

It should be noted that the Holford Rules apply the term 'highest/high amenity' to refer to environmental designations and classifications such as Natura 2000 sites, Sites of Special Scientific Interest (SSSI), Scheduled Monuments and Listed Buildings.

The Holford Rules are reproduced in Box 1 below.

Box 1: The Holford Rules

Rule 1: Avoid altogether, if possible, the major areas of highest amenity value, by so planning the general route of the line in the first place, even if the total mileage is somewhat increased in consequence;

Rule 2: Avoid smaller areas of high amenity value or scientific interest, by deviation; provided that this can be done without using too many angle towers (i.e. the more massive structures which are used when line change direction);

Rule 3: Other things being equal, choose the most direct line, with no sharp changes of direction and thus fewer angle towers;

Rule 4: Choose tree and hill backgrounds in preference to sky background wherever possible and when the line has to cross a ridge, secure this opaque background as long as possible and cross obliquely when a dip in the ridge provides an opportunity. Where it does not, cross directly, preferably between belts of trees.

Rule 5: Prefer moderately open valleys with woods, where the apparent height of the towers will be reduced and the views of the line will be broken by trees.

Rule 6: In country which is flat and sparsely planted, keep the higher voltage lines as far as possible independent of smaller lines, converging routes, distribution lines and other masts, wires and cables so as to avoid a concatenation or 'wirescape'

Rule 7: Approach urban areas through industrial zones where they exist and where pleasant residential and recreational land intervenes between the approach line and substation, go carefully into the costs of undergrounding, for lines other than those of the highest voltage.

SPEN's approach to the routeing of OHLs[10] is based on the premise that the major effect of an OHL is visual and that the degree of visual intrusion can be reduced by careful routeing. A reduction in visual intrusion can be achieved by routeing the OHL to fit the topography, by using topography and trees to provide screening and/or background, and by routeing the OHL at a distance from settlements and roads. In addition, a well-routed OHL takes into account other environmental and technical considerations and will avoid, wherever possible, the most sensitive and valued natural and man-made features.

2.4 Technical and Environmental Considerations and Collection of Background Information

2.4.1 Study Area and Buffer Zone

A study area which is large enough to accommodate all likely route options, and a surrounding buffer zone, was defined for this routeing process, as described below. The purpose of defining the study area and buffer zone is as follows:

[9] The Holford Rules were reviewed circa 1992 by the National Grid Company (NGC) Plc. (now National Grid Transmission (NGT)) as owner and operator of the electricity transmission network in England and Wales, with notes of clarification added to update the Rules. A subsequent review of the Holford Rules (and NGC clarification notes) was undertaken by Scottish Hydro Electric Transmission Limited (SHETL) in 2003 to reflect Scottish circumstances.

[10] As described within section 6.2 of the SPEN guidance (May 2015)

- the study area comprises the area within which various options for locating the proposed development are identified and assessed; and
- the buffer zone comprises a larger area within which potential impacts of the proposed development on the environment may occur. Potential impacts are identified and evaluated, in order to define the overall preferred route option.
- The study area for the proposed development has been defined through:
- Identification of the start and end points for the connection, which represent the fixed geographical elements of the route. In this case, these comprise the proposed Dalquhandy wind farm substation and the existing Coalburn substation;
- Identification of the technical, environmental and economic drivers which exist in the area between these two points. These drivers include topography, landscape character and areas of environmental value and historical interest. This responds to the requirements of the Holford Rules 1 and 2, recognising that there is no requirement to take the most direct route between the start and end points and that routes must respond to the constraints identified.

The buffer zone is defined as a 6 km buffer distance from the study area, on the basis of maximum perceptibility of a wood pole OHL in the landscape[11].

2.4.2 Collection of Background Information

An initial evaluation of environmental and technical constraints is undertaken during this stage. Through a combination of Geographic Information Systems (GIS) analysis, field work, consultation and liaison with the wider technical and environmental project team, those constraints considered key in terms of avoidance, are mapped for the study area and buffer zone. This includes current baseline conditions, as well as known potential future conditions, in relation to the following features:

Environmental

- ecology;
- ornithology;
- landscape (designations & character);
- visual amenity;
- archaeology and cultural heritage;
- recreation and tourism;
- hydrology, hydrogeology and geology;
- residential dwellings and land use; and
- other land use (including transmission lines, mineral operations (planned and consented), wind farms (planned and consented), agriculture, forestry and roads).

Digital data sets describing the nature and extent of each of the environmental features described were obtained from published sources and from SPEN records[12], and were transferred to a project Geographic Information System (GIS) for subsequent analysis, and have been verified during field reconnaissance. Data sources for all of the digital data sets are listed in Appendix 2. The results of the environmental baseline review are presented in Appendix 3.

[11] As set out within D Horn, I McAulay and M Turnbull (May 2010) *High Voltage Wood Pole Transmission and Distribution Main Interconnector Lines in Rural Landscapes: Perceptibility*

[12] Data for existing and proposed transmission lines and substations was provided by SPEN

Technical

Of critical importance during this stage, for many OHLs, is the identification and understanding of the range of technical constraints that may influence the routeing of an OHL. Whereas environmental constraints may be somewhat flexible in the degree of constraint they present, technical constraints commonly are not. An example would be the location of large waterbodies that cannot be crossed by an OHL.

Economic

In compliance with the duties imposed on SPEN in terms of 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.

2.5 Routeing Strategy

The overall routeing strategy has been to identify the most direct route between the substation at Dalquhandy wind farm and Coalburn substation, whilst taking into consideration the environmental, technical and economic constraints. Key considerations that have informed the routeing strategy have been the need to avoid the settlement of Coalburn, Coalburn Special Area for Conservation (SAC) and consented developments (e.g. wind farms, mineral extraction). To help limit landscape and visual effects, the proposed overhead line route will also seek to avoid the highest ground and ridgelines and use natural backclothing to minimise visibility, where possible. To help minimise temporary and permanent cumulative effects, careful consideration has also been given to the relationship of the proposed OHL with other electricity infrastructure within the study area.

The routeing strategy comprises the stages as set out in the following sub-sections below.

2.5.1 Stage 1: Development of Route Options

In response to the identification of the key environmental and technical constraints and strategy, a sensitivity weighting (high, medium or low sensitivity) is defined on an aspect-by-aspect basis, for each environmental feature identified. This is undertaken with reference to Holford Rules 1 and 2 and by using relevant guidance and professional judgement.

A "heat map" is generated which assigns colours (red, amber, green) to features of high, medium and low sensitivity, respectively. The purpose of heat mapping is to provide a graphic indication of overall receptor sensitivity across the study area; it does not ascribe absolute values to any particular area (i.e. the red areas are not considered absolute 'no go' areas and the green areas are not considered to be absolutely constraint-free).

Table 2.1 describes how the sensitivity of features to the type of development proposed is assigned, and outlines the typical response for route selection.

Table 2:1: Sensitivity Analysis rand Route Identification Response

Sensitivity	Justification	Examples	Route Identification Response
High	Holford Rule 1 features (international and national designations) or environmental features considered particularly sensitive to transmission infrastructure Technical constraints of key significance	European designated sites (e.g. Special Protection Areas); National Park; National Scenic Area	Avoid wherever possible and prioritise for mitigation
Medium	Holford Rule 1 features considered less sensitive to transmission infrastructure; Holford Rule 2 features (regional and local designations)	Geological SSSIs; Category B and C Listed Buildings; Local Nature Reserve	Proceed with caution
Low	Holford Rule 2 features considered not to be sensitive to transmission infrastructure	Geological Conservation Review Sites	Some constraints of lesser sensitivity - no issue for route identification

In the case of landscape and visual amenity, it is not the case that particular areas or features can be easily recognised and separated into high, medium and low sensitivity categories. Therefore, landscape sensitivity has been considered with reference to criteria provided by the Landscape Institute and IEMA (2013)[13] and the following parameters:

- the value attributed to landscapes based on clear evidence such as literary reference or formal landscape designation and/or classification;
- landscape quality and condition;
- existing land-use;
- the pattern and scale of the landscape;
- visual enclosure/openness of views and nature and distribution of visual receptors;
- the scope for mitigation that would be in character with the existing landscape; and
- the degree to which the particular element or characteristic contribution to the landscape character and can be replaced or substituted.

It should be noted that the definition of features as being of high, medium and low sensitivity does not necessarily denote that the proposed development would have a significant adverse effect on this feature. The determination of potential effects shall be undertaken as part of a detailed environmental impact assessment on a proposed OHL alignment, and any associated development, carried out as part of a future application for consent under section 37 of the Electricity Act 1989.

Based on the constraints analysis undertaken, a refined study area was identified, within which two route options, with a number of variations, were selected for further appraisal. The preferred route will, notwithstanding the emergence of further constraints information, fall within one of these route options. The aim of identifying route options is to allow an appraisal of the optimal geographic area within which a proposed route can be identified.

[13] Landscape Institute and IEMA (2013) Guidelines for Landscape and Visual Impact Assessment, 3rd Edition

2.5.2 Stage 2: Appraisal of Route Options and Selection of Preferred Route

To allow identification of a Preferred Route, an appraisal of the route options was undertaken and is presented in this report. The purpose of this is to identify the relative potential of each route option to accommodate an OHL, with a focus on potential landscape and visual impacts of the options as directed by Holford Rules 3 to 7.

The conclusion of this appraisal is the emergence of a 'Preferred Route'. Whilst this route will be defined based upon the information available to date, further consultation or technical matters may emerge which render the Preferred Route no longer the best option (for example the emergence of hitherto unknown technical constraints). Where this occurs, a review of the route options would be undertaken to determine the proposed route.

This appraisal is carried out by means of the following principal steps:

Step 1: Field Surveys

In order to ground truth and to supplement the landscape and visual desk work, a site walkover was undertaken by landscape specialists from Ramboll Environ on 21st June 2016.

A Breeding Raptor Survey was undertaken by ornithology specialists from Ramboll Environ on 9th and 30th May 2016 using access from public roads. An Extended Phase 1 survey was undertaken by ecology specialists from Ramboll Environ in May - August 2016.

Land within the study area was surveyed and specified habitat types were mapped onto Ordnance Survey base mapping using standard colour codes following good practise guidelines (JNCC, 2010)[14] . Further information was also noted through the use of dominant species codes within many habitat types and from descriptive 'target notes' providing a brief account of particular features and observations. Land bordering Coalburn Moss SAC was surveyed to NVC level in June 2016.

The extended Phase 1 habitat survey also included identifying habitats of protected species as well as direct field signs. Field signs can include: droppings, footprints, hair, scratch posts, tracks, feeding signs and shelter.

A site visit was also undertaken for the hydrology and hydrogeology constraints.

There are a couple of Listed Buildings in the east of the study area. However, there are no other features of national or regional importance within the study area and therefore no significant issues are foreseen with any external receptors within the 6 km study. Therefore, an archaeological site visit has not been undertaken at this stage.

Step 2: Environmental Analysis

A comparative environmental analysis of identified route options was undertaken, on a topic-by-topic basis, in order to identify a Preferred Route.

The environmental analysis comprised a qualitative appraisal of each route option, which involved professional judgement regarding the sensitivity of individual environmental features. The appraisal considered the potential interaction of transmission infrastructure with key environmental features and sensitivities, focussing on factors which differentiate the route options (as presented in Appendix 5).

[14] JNCC (2010) Handbook for Phase 1 habitat survey – a technique for environmental audit. ISBN 0 86139 636 7

Step 3: Selection of the Preferred Route for Consultation

Based on the analysis described above, an indicative Preferred Route has been identified, which avoids environmentally sensitive features to the greatest extent possible and offers the greatest potential for mitigation. The definition of the Preferred Route is based on professional judgement regarding the overall potential of each route option to accommodate the proposed OHL.

This Preferred Route is then taken forward for formal consultation.

2.5.3 Stage 3: Consultation on the Preferred Route

Consultation on the Preferred Route is a key part of identifying the best on-balance route option i.e. that which is technically feasible and economically viable and which causes on balance the least disturbance to people and the environment. This Routeing Strategy Consultation Document facilitates consultation on the Preferred Route for the proposed Dalquhandy wind farm to Coalburn substation OHL.

2.5.4 Stage 4: Modification of the Preferred Route

Whilst the analysis of route options undertaken up to this point is based upon all available technical and environmental constraints and consultation with statutory bodies, consultation with a broader range of stakeholders can raise further constraints which were hitherto unidentified, but which are important in the local context of the study area. The consultation responses will be evaluated and the preferred route will be considered in relation to the feedback.

2.5.5 Stage 5: Selection of Proposed Route

Following the consultation, and the incorporation of any modifications, the route then forms the Proposed Route which is taken forward for further analysis within the Environmental Impact Assessment. The EIA is a subsequent stage to the current routeing consultation stage.

The Environmental Statement (ES) will report the findings of the EIA, identify and describe in detail the potential environmental impacts of the proposed development during construction and operation, identify any appropriate mitigation measures, and confirm whether any potentially significant environmental effects remain. The ES will be submitted as part of the S37 application for the proposed route.

3. TECHNICAL AND ENVIRONMENTAL ROUTEING CONSIDERATIONS

3.1 Study Area

The key starting point has been to encompass the substation for the proposed Dalquhandy wind farm and the existing Coalburn substation.

The high level constraints that define the boundary of the study area are as follows:

- The northern boundary is defined by the settlements of Auchlochan and Lesmahagow;
- The eastern boundary is defined by the presence of the M74 motorway;
- The southern boundary is broadly defined by the Poniel Water valley and the forested hill slopes beyond, and the presence of an unnamed water body in the south west; and
- The western boundary is defined by the river valleys of Scots Burn and the River Nethan, which is based on the preference to minimise river and road crossings.

The settlement of Coalburn and Coalburn Moss Special Area of Conservation (SAC) occupy the central area between the two substations. Therefore, this has required the study area boundary to be extended to the east and west of this to enable an approach from either of these directions to be considered at the routeing stage.

For the purposes of the environmental appraisal, a buffer zone of up to 6 km from this study area is also defined for landscape, visual amenity and cultural heritage constraints, as described within Section 2.3.1. The definition of this buffer zone allows for consideration of the potential for the proposed development to indirectly impact upon important designated areas, landscapes and views.

The study area and associated high level constraints are shown on Figure 3.1, whilst the additional buffer zone is shown on Figure 3.2.

3.2 Environmental and Technical Baseline

Baseline information was used as a basis for the analysis of environmental constraints and to inform the approach adopted in the identification and appraisal of route options. The details of the environmental and technical baseline information is presented in Appendix 3 and the key issues are summarised as follows and are presented on Figures 3.3-3.9:

- Coalburn Moss SSSI/SAC, designated for its raised bog habitat, is present within the north of the Study Area, occupying approximately 235 ha;
- Two small areas of ancient woodland are identified from the Ancient Woodland Inventory within the Study Area, one at Aultonheights in the north, and the second in the south, near West Toun;
- Presence of Coalburn settlement and individual dwellings;
- Recreational resources such as Hollandbush Golf Club and core paths;
- Listed Buildings at Birkhill and West Toun;
- Presence of watercourses and waterbodies, including Poniel Water, Coal Burn and Longhill Burn;
- Existing infrastructure including a 400 kV overhead line in the north and the consented wind farms in the south (Douglas West and Dalquhandy);

- Consented planning applications for redevelopment e.g. Auchlochan Bing and Bellfield Bing to the east of Coalburn; and
- Potential areas for future minerals extraction e.g. an area of sand and gravel near Poniel and a small area of coal north of Coalburn Moss SAC.

The constraint analysis was undertaken using Geographical Information Systems (GIS) which utilised available digital datasets. This analysis provided for the identification of alternative routes which were then tested in respect of technical priorities.

4. ROUTE SELECTION

4.1 Introduction

Figure 4.1a shows the key environmental features, as described in Section 3, along with the heat mapping (Figure 4.1b) (see Section 2.2.3). The relative sensitivity assigned to the specific environmental features within the study area is set out in Appendix 5.

The mapping of combined constraints and their relative sensitivity have allowed the identification and evaluation of possible routes, as described below.

4.2 Stage 1: Identification of Route Options

The study area was refined in response to the key environmental and socio-economic constraints illustrated in Figure 4.1a. The refined study area is shown on Figure 4.2.

Two main route options have been identified within the refined study area. These were defined through the consideration of constraints within the refined study area as well as topography and proximity to the road network. The two route options are identified as Route Option 1 and Route Option 2 and are shown on Figure 4.3. Route Option 1 includes variations 1a – 1f and Route Option 2 includes variations 2a-2c to allow consideration of how to navigate past environmental constraints in the landscape.

Route Option 1 lies in the western part of the study area, to the west and north west of the Dalquhandy wind farm site. Route Option 2 runs to the south of Coalburn and the east of Coalburn SAC. The two route options and their variations are shown on Figure 4.3.

4.3 Stage 2: Environmental Analysis and Selection of Preferred Route

Table 4.1 below provides a colour coded summary of the detailed analysis based on the key set out below.

	Preferred option: greatest potential to accommodate the required infrastructure within the context of the environmental constraints identified.
	Some potential to accommodate required infrastructure within the context of the environmental constraints identified.
	Least relative potential to accommodate the required infrastructure within the context of the environmental constraints identified.

Note that these colour codings represent relative weightings. A green colour code does not mean that no environmental issues have been identified nor does a red colour code necessary reflect an insurmountable environmental constraint. The codings enable a qualitative analysis to be undertaken, applying professional judgement and experience on an aspect-by-aspect basis for each environmental feature to enable the identify, which route, on balance, is the best option.

Table 4:1: Environmental Appraisal of Route Options

Topic	Route Variations									Descriptive Text
	1a	1b	1c	1d	1e	1f	2a	2b	2c	
Ecology and Ornithology										• Variation 1a, 1b or 1c: There is a marginal preference for section 1a over section 1b and 1c as this variation would require fewer trees to be felled. • Variation 1d or 1e: There is no clear preference between either of these variations. • Variation 2a or 2b: Section 2a crosses less of the wet heath and planted coniferous habitat then it is considered preferable to Section 2b. Route Preference: Both Route Options 1 and 2 cross similar areas of potential GWDTE, broadleaved woodland and blanket bog. Route Option 2 involve less felling of mature conifers as most of the plantation area contains very young trees, <2 years old, compared with 5 to 10 year old trees for Route Option 1. There is a marginal preference for Route 2 with regards to hen harrier travelling across the study area from the SPA to the SAC during the winter. Overall the preference would be for Route Option 2 using Variations 2a and 2c.
Landscape										Route Option 1 is the preferred route as it is considered the least sensitive of the two options. It is the most distant from the majority of designated landscapes, and likely to result in lower adverse effects on the landscape resource. It utilises some areas of disturbed land and takes advantage of a greater degree of tree cover than present within Route Option 2, to achieve filtering and backclothing by vegetation and limitation of cumulative effects on the character of the landscape. Of the variations in Route Option 1, 1a and 1e are subject to the least potential cumulative effect and would be experienced from the least number of receptor locations, including residential properties, both in terms of scattered properties and settlements. 1a would be marginally better than 1b and 1c due to its greater distance from key receptors such as walkers, road users and residents in and around Coalburn, whose perception of the landscape and the setting of Coalburn could be adversely affected by the closest variations. Variation 1a also has the least potential for cumulative effects in relation to other grid infrastructure.

Topic	Route Variations									Descriptive Text
	1a	1b	1c	1d	1e	1f	2a	2b	2c	
										A comparison of variations 1d and 1e suggests that there would be less impact on the main outlook from the Johnshill property with 1e. Johnshill is oriented to the north, with marginally greater potential for mitigation of the effects of 1e due to the screening effect of farm buildings along the eastern side of the farm. Both 1d and 1e would also benefit from their position relative to existing structural vegetation along the side of Coalburn Road, to the west of the proposed OHL. This is of particular relevance to safeguarding the character of the landscape when experienced from properties along the side of Coalburn Road and from the Johnshill steading. Variation 1f is the only option for connecting Option 1 to the substation, but is likely to add to the wirescape and effects on the landscape in the vicinity. However, this section of the Route Option would occur within an area where there is increased tree cover which provides for mitigation of the OHL. Route Option 2 also has potential to accommodate the required infrastructure, but would be liable to greater potential cumulative effects in combination with other grid infrastructure than Route Option 1, due to the relative openness of much of this Route Option.
Visual Amenity										Route Option 1 is preferred because it is considered the least sensitive route, being most distant from the majority of visual receptors, including those at Coalburn, and provides mitigation of potential visual effects arising from wayleave felling of forestry west of Coalburn. Of the variations in Route Option 1, 1a and 1e are considered the best variations as they are the most distant from settlements and properties and/or have the greatest potential for mitigation as they would be partially screened from Coalburn Road properties by intervening vegetation. Variation 1e is marginally preferred to 1d as it avoids the principal outlook from the Johnshill dwelling. These variations also represent the least potential for adverse effects (including cumulative effects) on road users, recreational receptors and residential receptors overall. Variation 1f is the only option for connecting Route Option 1 to the substation, but is likely to add to the wirescape and effects on the landscape in the vicinity. However, this section of the Route Option would occur within an area where there is increased tree cover which provides for mitigation of the OHL.

Topic	Route Variations									Descriptive Text
	1a	1b	1c	1d	1e	1f	2a	2b	2c	
										Route Option 2 also has potential to accommodate the required infrastructure, but the potential for cumulative effects and effects on residential receptors is appreciably greater than those anticipated for Route Option 1.
Archaeology and Cultural Heritage										• Variation 1a, 1b or 1c: There is no clear preference between any of the options. • Variation 1d or 1e: There is no clear preference between either of the options. • Variation 2a or 2b: There is no clear preference between either of the options. Route Preference: There are no material constraints in relation to the heritage sensitivity for either of the two route options. There is consequently no preference between the two routes in terms of potential effects on cultural heritage, either direct effects or effects on the settings of heritage assets.
Geology, Hydrogeology and Hydrology										• Variation 1a, 1b or 1c: There is no clear preference between any of the options. • Variation 1d or 1e: There is no clear preference between either of the options. • Variation 2a or 2b: There is no clear preference between either of the options. Route Preference: Route Option 1 does not cross any watercourses; there are a few drainage ditch crossings (for Sections 1b, 1d and 1e). Route Option 2 requires two watercourse crossings, which both occur within Section 2c. However, it should be possible to span the watercourse without requirement for encroachment within the watercourse buffer. Neither Route Option 1 nor 2 pass through any nationally important carbon-rich soils, deep peat and priority peatland habitat (i.e. Class 1 or 2), as defined by SNH. Therefore, there is no clear preference for Route 1 or Route 2, or any of their variations.
Recreation and Tourism										• Variation 1a, 1b or 1c: There is no clear preference between any of the options. • Variation 1d or 1e: There is no clear preference between either of the options. • Variation 2a or 2b: There is no clear preference between either of the options. Route Preference:

Topic	Route Variations									Descriptive Text
	1a	1b	1c	1d	1e	1f	2a	2b	2c	
										Both Route Option 1 and 2 require a number of core path crossings. Section 1a is less preferable to Sections 1b and 1c as it is closer to a core path for a longer section of its route and is in an area of open moorland. However, overall there is no clear preference between Route Option 1 and 2 or any of their variations.
Land Use and Infrastructure										• Variation 1a, 1b or 1c: There is no clear preference between any of the options. • Variation 1d or 1e: There is no clear preference between either of the options. • Variation 2a or 2b: There is no clear preference between either of the options. Route Preference: Route Option 1 crosses roads, encroaches within the 3 x wind turbine rotor diameter buffer (excluding Section 1c), and is in proximity to properties near Glaikhead. However, it is considered that existing tree cover could mitigate any effects of the OHL at this location. Route Option 2 requires road crossings, encroaches within the 3 x wind turbine rotor diameter buffer and requires crossing of existing 400 kv and 132 kv OHLs (Figure 3.9) which has the potential for cumulative wirescape effects. There is no clear preference for either Route Option 1 or 2 or any of their variations. SPEN have confirmed that the proximity of the route variations to the Dalquhandy wind turbines (i.e. within 3x rotor diameters) is acceptable.
Combined preference										Route preferences have been identified for ecology, ornithology, landscape and visual amenity. No clear preference has been identified for the other environmental topics that were considered in the comparative analysis. For ecology and ornithology there is a marginal preference is for Route Option 2 and for landscape and visual amenity there is a marginal preference for Route Option 1. For the sections that have been selected as amber they are still categorised as having some potential to accommodate required infrastructure within the context of the environmental constraints identified. Therefore, both route options could be accommodated, however Route Option 1 (sections 1a, 1e and 1f) is 5 km in length compared to Route Option 2 (sections 2a and 2c) which covers 7.2 km. All things being equal, Holford Rule 3 recommends choosing the most direct line with the least sharp changes of direction. On this basis, Route Option 1 (section 1a, 1e and 1f) is the preferred route.

4.3.1 Preferred Route and Key Issues

As set out in Table 4.1, based on the comparative analysis, marginal preferences for the route options were identified for ecology, ornithology, landscape and visual amenity. Ecology and ornithology have a preference for 2a and 2c whilst landscape and visual amenity have a preference for 1a, 1e and 1f. Both route options are considered to have the potential to accommodate the proposed OHL, therefore the shortest route out of the preferences is Route Option 1a, 1e and 1f, which is approximately 2 km shorter than Route 2a and 2c. The preferred route is shown on Figure 4.4.

Key issues associated with this Preferred Route are:

- The proximity to a small number of individual dwellings and farmsteads, for example along Coalburn Road and between Coalburn and the River Nethan;
- Proximity to Hollandbush Golf Club and the need to make use of natural screening from existing vegetation;
- Road crossings required of Shoulderigg Road and Coalburn Road;
- Requirements for felling to ensure appropriate safety clearances from the OHL; and
- Potential for areas of GWDTE to exist have been identified.

5. CONSULTATION ON THE PROPOSALS AND NEXT STEPS

SPEN is inviting comments on the development proposals described in this document. You may comment in person, at the forthcoming public exhibition detailed in the preface to this document, by post or by email. When providing comments, SPEN would be grateful for your consideration of the following questions:

- Do you have any comments regarding the rationale for the project, as set out in this route selection consultation document?
- Do you have any comments regarding the approach to the selection of the preferred route as set out in this route selection consultation document?
- Are there any factors you consider may have been overlooked or given either insufficient or too much consideration during the route selection process?
- Do you have any other comments about the preferred route of the overhead line?

The public exhibition will be held in the locations and at the times detailed in the preface to this document.

The exhibition will be advertised in the local press, and in the local community.

Comments forms will be available at the public exhibition. Comments can be posted or emailed to the SPEN Community Liaison Manager, at the address below:

Dalquhandy Projects Team
Ochil House
10 Technology Avenue
Hamilton International Technology Park
Blantyre
G72 0HT

DalquhandyConnectionProject@spenergynetworks.co.uk

Copies of this document can be found online at
www.spenergynetworks.co.uk/pages/dalquhandy_wind_farm_grid_connection.aspx

Public consultation events detailing the proposals within this document will be held on 3rd and 4th May 2017 from 2pm to 7.30pm at the following location:

Coalburn Miners' Welfare Charitable Society One Stop Shop,
42, Coalburn Road,
Coalburn
Lanarkshire
ML11 0LH

SP Energy Networks request that all consultation responses are received by 30th June 2017.

All comments received will inform further consideration of the preferred route alignment and the selection of a proposed route alignment, which will be taken forward for more detailed environmental assessment prior to submission of an application for section 37 consent under the Electricity Act 1989 (for the OHL). These applications will be developed for submission in 2018.

APPENDIX 1
FIGURES

Auchrobert

Jordanshill Turbines

Broken Cross Wind Farm

Birkhill Commercial Park Turbines

JJ's Farm Turbine

Talamh Life Turbine

Middlefield Farm Turbine

Dalquhandy wind farm

Poniel Wind Farm

Douglas West Wind Farm

Nutberry

Cumberhead

Galawhistle Wind Farm

Hagshaw Hill Extension

N

SP ENERGY NETWORKS

Key

- Study Area
- # Connection Point
- (Wind Turbine

Wind Farm Boundary Status

- Application
- Approved
- Installed
- Scoping

Title: Figure 1.1: Connection Points and Wind Farm Boundaries

Project No. UK1223096

Site: Dalquhandy Wind Farm Grid Connection Route Selection Study

Client: SPEN

Date: March 2017

Scale: 1:25,000 @ A3

Issue: 1 Drawn by: RC

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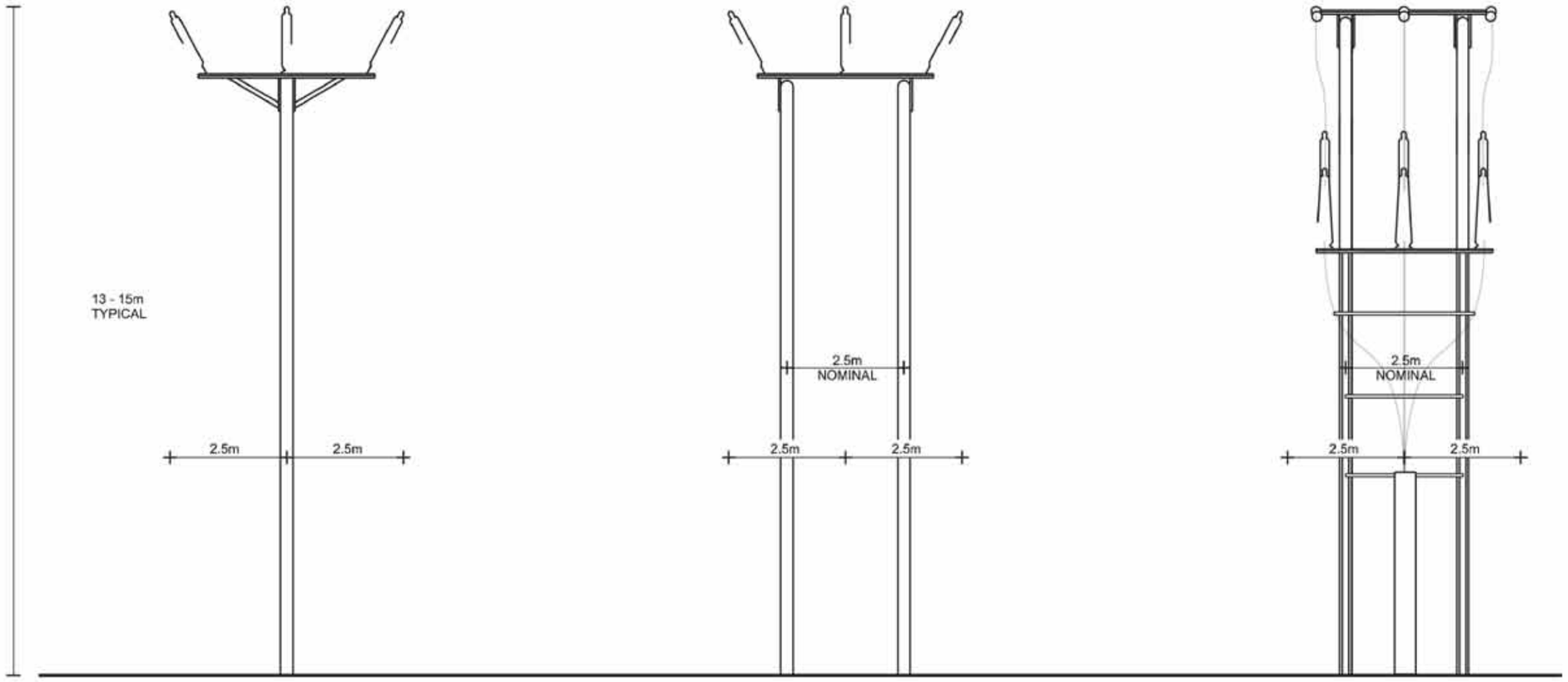

LONG SPAN INTERMEDIATE SINGLE POLE

LONG SPAN INTERMEDIATE 'H' POLE

TERMINAL H-POLE

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SP ENERGY NETWORKS

Based on ENA Specification 43-502. Reproduced with permission from LUC

Title: Figure 1.2: Trident Woodpole Specification

Project No. UK1223096

Site: Dalquhandy Wind Farm Grid Connection Route Selection Study

Client: SP Energy Networks

Date: March 2017

Scale: Figure not to scale.

Issue: 1 | Drawn by: RC

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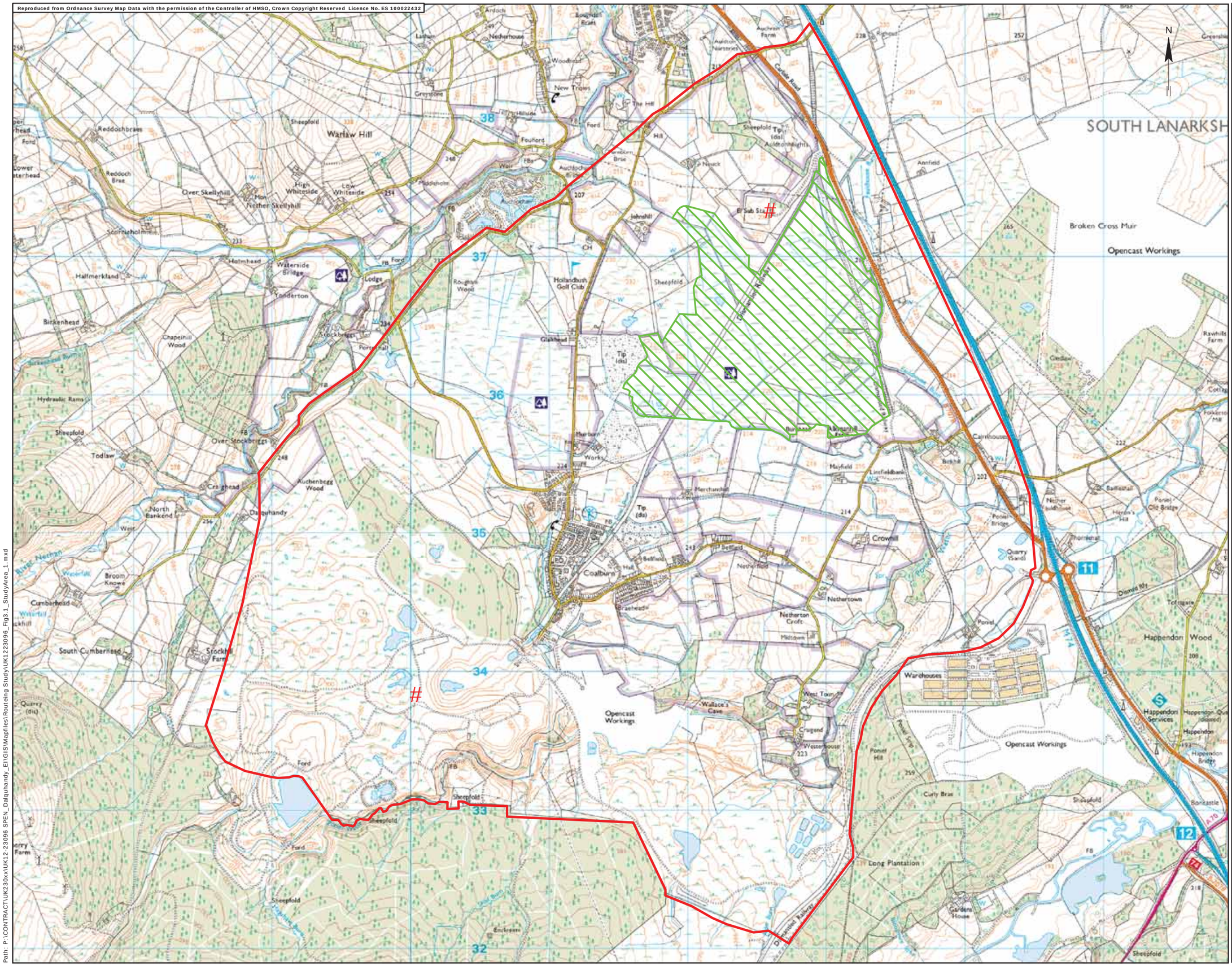

SP ENERGY NETWORKS

Key

- # Connection Point
- Study Area
- Special Area of Conservation

Title: Figure 3.1: Study Area

Project No.	UK1223096
Site	Dalquhandy Wind Farm Grid Connection Route Selection Study
Client	SP Energy Networks
Date	March 2017
Scale	1:25,000 @ A3
Issue	1
Drawn by	RC

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SP ENERGY NETWORKS

Key

- Study Area
- Study Area Buffer (6 km)

Title	Figure 3.2: Study Area with Buffer
Project No.	UK1223096
Site	Dalquhandy Wind Farm Grid Connection Route Selection Study
Client	SP Energy Networks
Date	March 2017
Scale	1:70,000 @ A3
Issue	1
Drawn by	RC

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Clyde Valley Woods

Upper Nethen Valley Woods

Falls of Clyde

Airds Moss and Muirkird Uplands

Birkenhead Burn

Muirkirk and North Lowther Uplands

Coalburn Moss

Shiel Burn

Millers Wood

N

Strathaven

Blackwood

Kirkmuirhill

Lesmahagow

Douglas

LANARK

Kype Muir

Broken Cross Muir Opencast Workings

Douglas Water

Rigside

Forside Hill

Key

- Study Area
- Buffer Zone (6 km)
- Important Bird Area
- Ancient Woodland Inventory
- Special Area of Conservation
- Special Protection Area
- Site of Special Scientific Interest

Title: Figure 3.3: Sites Designated for Nature Conservation

Project No. UK1223096

Site: Dalquhandy Wind Farm Grid Connection Route Selection Study

Client: S P Energy Networks

Date: March 2017

Scale: 1:70,000 @ A3

Issue: 1 Drawn by: RC

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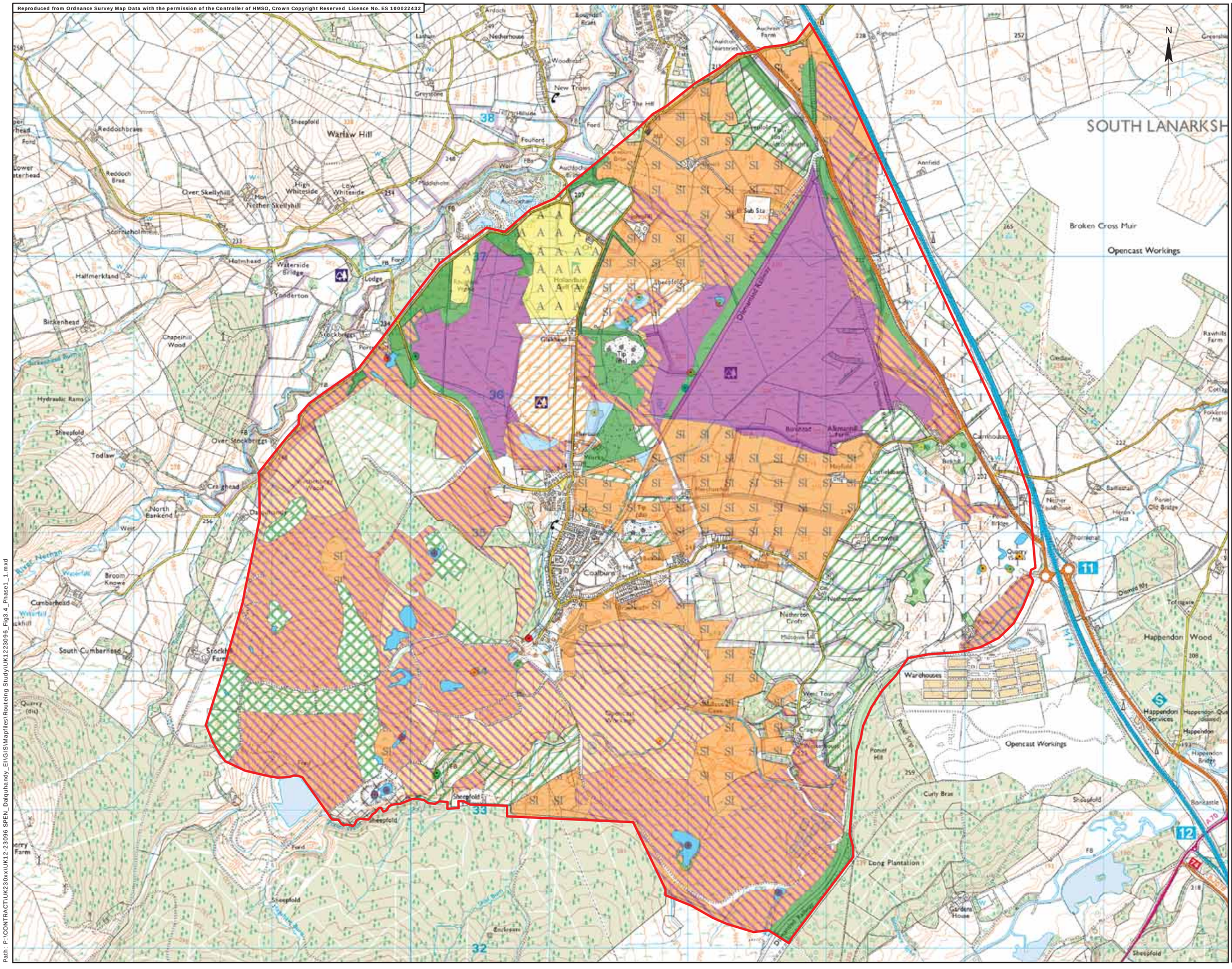

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SP ENERGY NETWORKS

Key

Study Area

Phase 1 Habitat

- A1.1.1 Broadleaved woodland - semi-natural
- A1.1.2 Broadleaved woodland - plantation
- A1.2.1 Coniferous woodland - semi-natural
- A1.2.2 Coniferous woodland - plantation
- A1.3.1 Mixed woodland - semi-natural
- A2.1 Scrub - dense/continuous
- A2.2 Scrub - scattered
- B1.1 Acid grassland - unimproved
- B1.2 Acid grassland - semi-improved
- B2.2 Neutral grassland - semi-improved
- B4 Improved grassland
- B5 Marsh/marshy grassland
- C3.1 Other tall herb and fern - ruderal
- C3.2 Other tall herb and fern - non ruderal
- D1.1 Dry dwarf shrub heath - acid
- D2 Wet dwarf shrub heath
- E1.6.1 Blanket sphagnum bog
- F1 Swamp
- G1 Standing water
- G2 Running water
- A J1.2 Cultivated/disturbed land - amenity grassland
- D J1.3 Cultivated/disturbed land - ephemeral/short perennial
- J3.6 Buildings
- J4 Bare ground
- J5 Other habitat

Target Notes

- ! Common lizard sighting
- ! Considered unsuitable for Great Crested Newt.
- ! Hen Harrier sighting
- ! Large oak tree
- ! Potential Great Crested Newt Ponds
- ! Woodland has black darter and common hawker dragonflies

Title	Figure 3.4: Phase 1 Habitat Survey
Project No.	UK1223096
Site	Dalquhandy Wind Farm Grid Connection Route Selection Study
Client	SP Energy Networks
Date	March 2017
Scale	1:25,000 @ A3
Issue	1
Drawn by	RC

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Incised River Valley
Plateau Farmland Windfarm
Incised River Valley
Incised River Valley
Plateau Farmland
Rolling Farmland
Plateau Farmland
Rolling Farmland
Incised River Valley
Urban
Upland River Valley
Rolling Farmland
Plateau Farmland
Rolling Farmland
Rolling Farmland
Rolling Moorland
Urban
Broad Valley Upland
Rolling Moorland
Plateau Moorland Opencast Mining
Upland River Valley
Plateau Farmland
Rolling Moorland Forestry
Plateau Moorland
Plateau Moorlands
Rolling Moorland
Plateau Farmland Opencast Mining
Plateau Moorlands
Rolling Moorland Forestry
Rolling Moorland
Foothills Forestry
Prominant Isolated Hills
Broad Valley Upland
Plateau Moorlands
Plateau Moorland
Upland River Valley Opencast Mining
Upland River Valley
Plateau Moorlands
Rolling Morrland Windfarm
Rolling Moorland
Prominant Isolated Hills
Plateau Moorlands
Inland Loch
Upland River Valley Incised
Rolling Moorland
Foothills
Upper River Valleys
Plateau Moorlands
Upland River Valley Opencast Mining
Rolling Moorland
Rolling Moorland Forestry
Plateau Moorland
Rolling Moorland
Plateau Moorland
Broad Valley Upland
Plateau Moorlands
Rolling Moorland Forestry
Rolling Moorland
Upland River Valley
Rolling Moorland
Rolling Moorland
Upland River Valley
Southern Uplands

N

Key

- Study Area
- Buffer Zone (6 km)

Landscape Character Areas (Local Dataset)

- Broad Valley Upland
- Foothills
- Foothills Forestry
- Incised River Valley
- Plateau Farmland
- Plateau Farmland Opencast Mining
- Plateau Farmland Windfarm
- Plateau Moorland
- Plateau Moorland Opencast Mining
- Prominant Isolated Hills
- Rolling Farmland
- Rolling Moorland
- Rolling Moorland Forestry
- Rolling Morrland Windfarm
- Southern Uplands
- Upland River Valley
- Upland River Valley Incised
- Upland River Valley Opencast Mining
- Urban

Landscape Character Areas (National Dataset)

- AYS10 - Upper River Valleys
- AYS19 - Plateau Moorland
- LOCH - Inland Loch
- STC12 - Upland River Valleys
- STC18 - Plateau Moorlands

Title: Figure 3.5: Landscape Character Areas

Project No.: UK1223096

Site: Dalquhandy Wind Farm Grid Connection Route Selection Study

Client: SP Energy Networks

Date: March 2017

Scale: 1:75,000 @ A3

Issue: 1 Drawn by: RC

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Middle Clyde Valley

Upper Clyde Valley and Tinto

Douglas Valley

Leadhills and Lowther Hills

SP ENERGY NETWORKS

Key

- Study Area
- Buffer Zone (6 km)
- Gardens and Designed Landscapes
- Special Landscape Areas

Title	Figure 3.6 : Landscape Designations
Project No.	UK1223096
Site	Dalquhandy Wind Farm Grid Connection Route Selection Study
Client	SP Energy Networks
Date	March 2017
Scale	1:75,000 @ A3
Issue	1
Drawn by	RC

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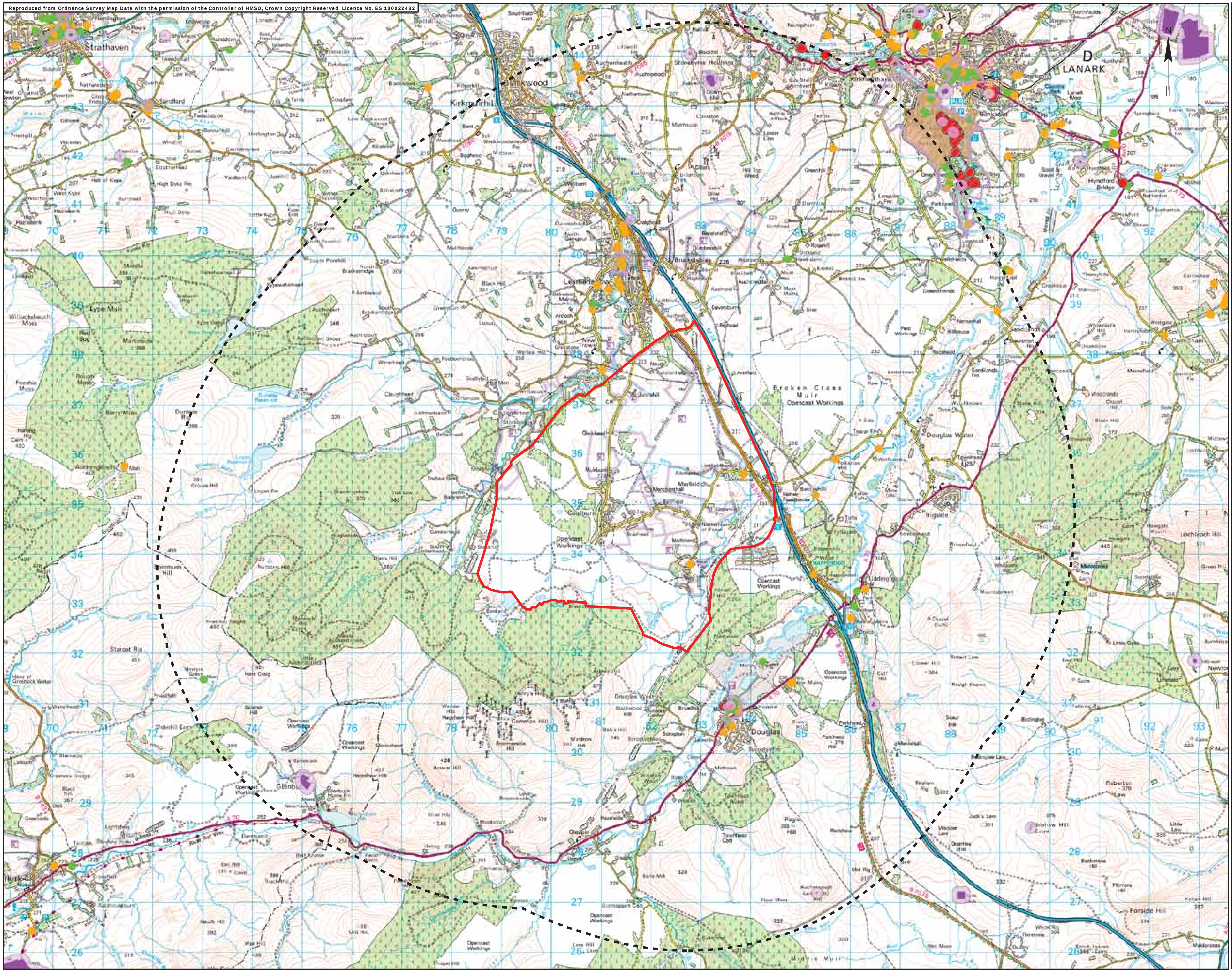

SP ENERGY NETWORKS

Key

- Study Area
- Buffer Zone (6 km)
- Scheduled Monuments
- Scheduled Monument Buffer (100m)
- Conservation Area
- Battlefields

Listed Buildings

- A
- B
- C
- Category A Listed Building Buffer (100m)
- New Lanark World Heritage Site

Title	Figure 3.7 : Cultural Heritage Features
Project No.	UK1223096
Site	Dalquhandy Wind Farm Grid Connection Route Selection Study
Client	SP Energy Networks
Date	March 2017
Scale	1:70,000 @ A3
Issue	1
Drawn by	RC

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N

0 6 Kilometers

SP ENERGY NETWORKS

Legend

- Study Area
- Buffer Zone (6 km)
- Waterbody Buffer (50m)
- Surface Coal
- Peat (BGS)

Carbon rich soil, deep peat, and priority habitats (SNH)

Importance

- 1
- 2
- 3
- 4
- X

Title	Figure 3.8: Hydrological Features
Project No.	UK1222885
Site	Dalquhandy Grid Connection Route Selection Study
Client	SP Energy Networks
Date	March 2017
Scale	1:70,000 @ A3
Issue	1
Drawn by	RC

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Auchrobert

Broken Cross Wind Farm

Dalquhandy wind Farm

Nutberry

Cumberhead

Douglas West Wind Farm

Poniel Wind Farm

Hagshaw Hill Extension

Galawhistle Wind Farm

0 3 Kilometers

N

SP ENERGY NETWORKS

Key

- # Connection Point
- Study Area
- Core Path
- Turbine
- Turbine Buffer (3x Rotor Diameter)
- 400kV OHL
- 132kV OHL
- Residential Property Buffer (100m)
- Bing
- Strategic Economic Investment Area
- Estimated Boundary of Hollandbush Golf Course

Wind Farm Boundary

- Approved
- Installed

Mineral Extraction Zones

Type

- Existing Extraction Site
- Former Extraction Site

Mineral Extraction Potential

Type

- Moderate Potential
- Very Low Potential

Title: Figure 3.9 : Tourism, Recreation and Land Use

Project No.: UK1223096

Site: Dalquhandy Wind Farm Grid Connection Route Selection Study

Client: SPEN

Date: March 2017

Scale: 1:25,000 @ A3

Issue: 1 Drawn by: RC

RAMBOLL ENVIRON

Path: P:\CONTRACT\UK230xx\UK12-23096 SPEN_Dalquhandy_E\GIS\Mapfiles\Routeing Study\UK1223096_Fig3.9_TourismRecLandUse_1.mxd

4.1a Combined Constraints

4.1b: Relative Sensitivity

N

SP ENERGY NETWORKS

Key

- Study Area
- Core Path
- 400kV OHL
- 400kV OHL 70m Buffer
- 132kV OHL
- 132kV OHL 70m Buffer
- Category B Listed Building Buffer (50 m)
- Surface Water Buffer (50 m)
- Ancient Woodland Inventory
- Site of Special Scientific Interest
- Special Area of Conservation
- Residential Property Buffer (100m)
- Turbine Buffer (3x Rotor Diameter)
- Estimated Boundary of Hollandbush Golf Course

Areas with Mineral Extraction Potential

- Moderate Potential
- Very Low Potential

Mineral Extraction Zones

- Existing Extraction Site
- Former Extraction Site
- Strategic Economic Investment Area

Relative Sensitivity

- Low
- Medium
- High

Title: Figure 4.1a and 4.1b: Combined Constraints and Relative Sensitivity

Project No. UK1223096

Site: Dalquhandy Wind Farm Grid Connection Route Selection Study

Client: SPEN

Date: March 2017

Scale: 1:35,000 @ A3

Issue: 1 Drawn by: RC

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SP ENERGY NETWORKS

Key

- Study Area
- # Connection Points
- Refined Study Area

Title	Figure 4.2 : Refined Study Area
Project No.	UK1223096
Site	Dalquhandy Wind Farm Grid Connection Route Selection Study
Client	SP Energy Networks
Date	March 2017
Scale	1:25,000 @ A3
Issue	1
Drawn by	RC

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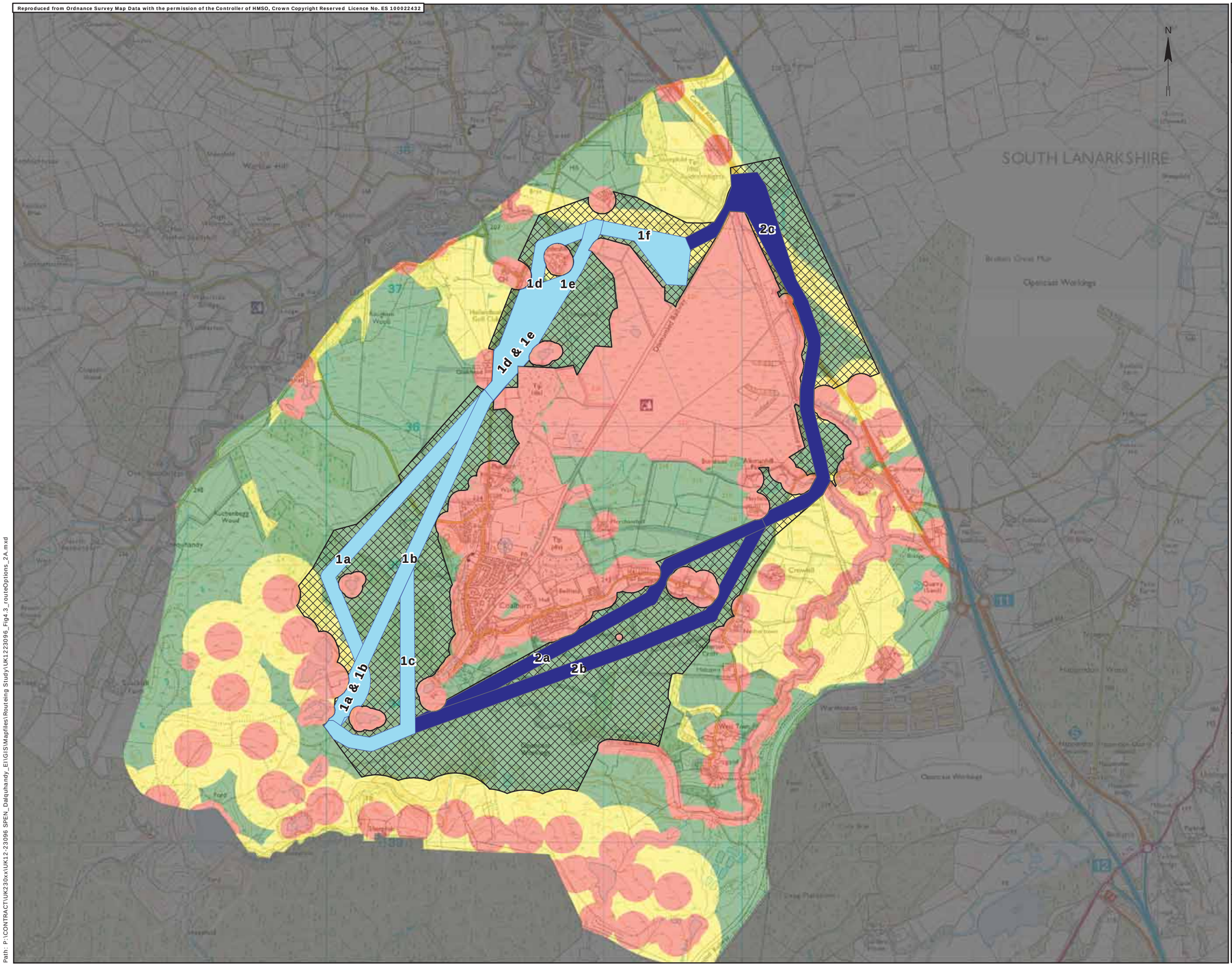

SP ENERGY NETWORKS

Key

- Connection Points
- Refined Study Area

Route Options

- 1
- 2

Relative Sensitivity

- High
- Medium
- Low

Title	Figure 4.3 : Relative Sensitivity, Refined Study Area and Route Options
Project No.	UK1223096
Site	Dalquhandy Wind Farm Grid Connection Route Selection Study
Client	SP Energy Networks
Date	March 2017
Scale	1:25,000 @ A3
Issue	1
Drawn by	RC

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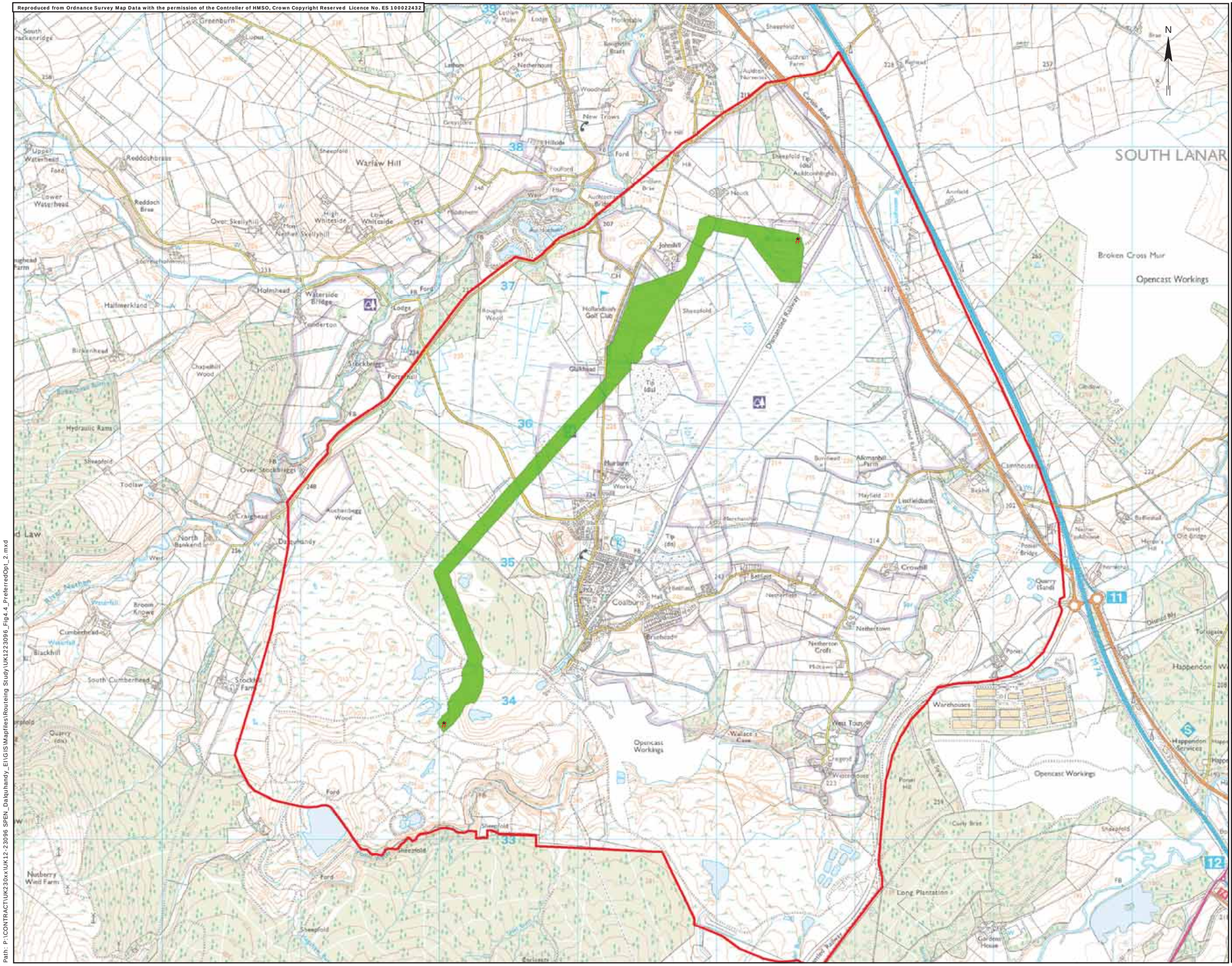

Key

□ Site Boundary

Connection Points

🟩 Preferred Route Option

SP ENERGY NETWORKS

Title
Figure 4.4 :
Preferred Route Option

Project No. UK1223096

Site Dalquhandy Wind Farm
Grid Connection
Route Selection Study

Client SP Energy Networks

Date March 2017

Scale 1:25,000 @ A3

Issue 1 Drawn by RC

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ENVIRON

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APPENDIX 2
ENVIRONMENTAL BASELINE DATA SOURCES

Table A2.1: Environmental Data Sources		
Feature	**Abb**	**Source**
Ancient Woodland Inventory	AW	SNH
Conservation Areas	CA	Historic Environment Scotland
Core Paths	-	South Lanarkshire Council
Cycle Routes	-	SUSTRANS
Existing Transmission Infrastructure	-	SPEN
Flood Risk Zones	FRZ	SEPA online flood mapping
Historic Environment Record	HER	Canmore (canmore.org.uk)
Hydrogeology	-	BGS (online)
Landscape Character Types (Landscape Character Assessment)	LCT (LCA)	SNH
Listed Buildings	LB	Historic Environment Scotland
National Tourist Routes	-	VisitScotland
National Scenic Areas	NSA	Scottish Government
Regional Scenic Areas	RSA	South Lanarkshire Council
OS Maps 1-250k	-	OS Open Data
OS Maps 1-50k	-	Emapsite
Ramsar sites	-	SNH
Residential Settlements and housing allocation areas	-	OS_Address_Layer (downloaded from emapsite)
RSPB Reserves	-	RSPB
Scheduled Monuments	SM	Historic Environment Scotland
SEPA Assessed Watercourses	-	SEPA online river basin management plan mapping
Sites of Special Scientific Interest	SSSI	SNH
Scenic Areas	-	South Lanarkshire Council
Special Area of Conservation	SAC	SNH
Special Protection Areas	SPA	SNH
Wild Land Areas 2014	WLA	SNH
Wind farms	-	SNH

APPENDIX 3
ENVIRONMENTAL & TECHNICAL BASELINE

Table A3:1: Baseline Environment of Study Area and Buffer Zone		
Topic	**Study Area**	**Buffer Zone**
Ecology and Ornithology	The Coalburn Moss SSSI/SAC, designated for its raised bog habitat, is present within the north of the Study Area, occupying approximately 235 ha, as shown in Figure 3.3. National Biodiversity Network (NBN) Gateway identifies the following protected species within the two 10 km grid squares that encompass the Study Area: • Otter *Lutra lutra* • Badger *Meles meles* • Common Frog *Rana temporaria* • Common Pipistrelle *Pipistrellus pipistrellus* • Soprano Pipistrelle *Pipistrellus pygmaeus* • Daubenton's Bat *Myotis daubentonii* • Natterer's Bat *Myotis nattereri* The Ancient Woodland Inventory identifies two small areas of ancient woodland within the Study Area, one at Aultonheights in the north, and the second in the south, near West Toun. A Phase 1 Habitat survey identified the following habitat types within the Study Area: • Broadleaved-semi-natural woodland (3.6%) • Broad-leaved woodland plantation (6.0%) • Coniferous Woodland plantation (11.5%) • Mixed woodland semi-natural (0.5%) • Unimproved acid grassland (2.6%) • Acid grassland semi-improved (14.4%) • Neutral Grassland semi-improved (13.2%) • Improved grassland (10.5%) • Marsh/Marshy grassland (9.4%)	The ecological/ ornithological designated sites located within the 6 km Buffer Zone are shown in Figure 3.3. These are: • Clyde Valley Woods SAC enters the Buffer Zone briefly to the north along the River Nethan, near Burnfoot. This SAC is designated for the protection of mixed woodland on base-rich soils associated with rocky slopes. • Muirkirk and North Lowther Uplands SPA, approximately 4.5 km west of the Study Area, is designated for the protection of Golden Plover *Pluvialis apricaria* (breeding), Hen Harrier *circus cyaneus* (breeding and non-breeding), Merlin *Falco columbarius* (breeding), Peregrine *Falco peregrinus* (breeding), and Short-eared Owl *Asio flammeus* (breeding). • Miller's Wood SSSI, designated for upland birch woodland, enters the Buffer Zone briefly to the north, near Burnfoot. • Falls of Clyde SSSI, approximately 5.8 km north west of the Study Area, near New Lanark. Is designated for upland mixed ash woodland. • Upper Nethan Valley Woods SSSI, enters the Buffer Zone briefly in the north, near Burnfoot. This site is designated for the protection of wet woodland and upland mixed ash woodland. • Muirkirk Uplands SSSI, approximately 4.3 km west of the Study Area, is designated for blanket bog, hen harrier (breeding and non-breeding), short-eared owl (breeding), and upland habitat assemblage. The Ancient Woodland Inventory shows ancient woodlands to be scattered throughout the Buffer Zone, with several larger blocks near Poniel Hill and Douglas, surrounding the Glen of Douglas Water.

Table A3:1: Baseline Environment of Study Area and Buffer Zone		
	• Other tall herb and fern-ruderal (0.1%) • Other tall herb and fern- non-ruderal (0.4%) • Dry dwarf shrub heath- acid (<0.1%) • Blanket sphagnum bog (15.6%) • Swamp (0.4%) • Standing water (0.4%) • Running water (0.7%) • Cultivated/disturbed land-amenity grassland (1.4%) • Bare Ground (0.3%) • Other habitat (8.9%) Figure 3.4 illustrates the results of the phase 1 habitat survey.	
Landscape	**Landscape Designations and Classifications** There are no designated landscapes of national importance within the Study Area. **Landscape Character (Figure 3.5)** The Study Area lies almost entirely within the Plateau Farmlands (Western Plateau) Landscape Character Type (LCT). According to the South Lanarkshire LCA[15] this landscape is identified as Plateau Farmland with Open Cast Mining Influence of open cast works. A pocket of Plateau Moorland is identified within the Plateau Farmland. Although the South Lanarkshire LCA[15] provides a comprehensive description of the landscape of the Study Area, given the relatively small extent of the Study Area and scale of the proposed development it is considered good practice to highlight local differences in landscape character, which were identified during the field survey.	**Landscape Designations and Classifications** The Buffer Zone contains no nationally important designated landscapes. *Special Landscape Areas (Figure 3.6)* Part of the Buffer Zone is comprised of local landscape designations such as the Special Landscape Areas (SLAs). Policy 15 of the Proposed South Lanarkshire LDP[16] affords SLAs a Category 1 level of protection. The 'key qualities' of specific SLA are set out in the Local Landscape Designations document[17] (published by South Lanarkshire Council in November 2010). *Douglas Valley SLA* This SLA abuts with the southern edge of the south eastern corner of the Study Area. The SLA extends around the sheltered upland river valley of the Douglas Water and Douglas village, enclosed by

[15] Ironside Farrer (2010) South Lanarkshire Landscape Character Assessment

[16] Planning and Building Standard Services, South Lanarkshire Local Development Plan, Adopted 29th June 2015, South Lanarkshire Council, Community and Enterprise Resources

[17] Ironside Farrer (2010) South Lanarkshire Validating Local Landscape Designations

	Plateau Farmland The eastern half of the Study Area incorporates an area of Plateau Farmland between Coalburn and the M74 corridor and extending southwards from the neighbouring Upland River Valley LCT. This landscape is typified by: • A predominantly flat landscape, gently sloping or gently undulating; • A predominance of large scale pastoral fields increasingly enclosed by post and wire fences, but with some remnant of beech and hawthorn hedgerows; • Some remnant stone dykes and ditches in higher elevations; • Occasional mosses; • Tree cover limited to sparse rows of wind-blown trees along field boundaries, with localised patterns of deciduous and coniferous plantations near East Kilbride; • Areas of moorland and forest plantation e.g. near Carnwath and Carstairs; • Sparse settlement comprising scattered dwellings and farmsteads, often accompanied by increased woodland cover/enclosure; • Extensive transportation and communication network in the form of major roads and rail links, power infrastructure and associated with the uniformity of this LCT and linked with the long established extractive industries in the LCT. In contrast to adjoining sheltered valleys, this landscape is relatively open and exposed, with the consequence that there is increased visual sensitivity. The presence of extensive grid infrastructure and extraction works also presents potential cumulative sensitivities within this landscape. *Plateau Farmland, Open cast Mining Influence* Plateau Farmland, Open cast Mining is a sub-character type of the Plateau Farmland LCT, as described above. This landscape is typified by predominantly flat, gently sloping or slightly undulating, an exposed topography, offering very little shelter from wind.	rolling moorland hills. It should be noted that the SLA is crossed by the existing 400 kv steel lattice tower power line and some of the turbines of Hagshaw wind farm and Douglas West wind farm are located within this SLA. *Middle Clyde Valley SLA* This SLA extends within the middle section of the Clyde Valley and the associated tributaries between Hamilton and Lanark. Its south western edge extends beyond Lesmahagow, 1.9 km north of the Study Area. *Upper Clyde Valley and Tinto SLA* This SLA extends 4 km to the east of the Study Area and recognises the importance of the River Clyde and Tinto Hills. <u>Gardens and Designed Landscapes</u> Policy 15 of the Proposed South Lanarkshire LDP[16] affords Gardens and Designed Landscapes a Category 2 level of protection. The Falls of Clyde GDL are located 5.6 km to the north east of the Study Area, within the World Heritage Site of New Lanark. **Landscape Character (Figure 3.5)** *Plateau Farmland, Open cast Mining Influence* The Plateau Farmland landscape, within which the most of the Study Area lies, extends beyond the Study Area to the north and east, encompassing the main transport corridor of the M74 and the town of Lesmahagow. *Plateau Moorland, Opencast Mining* To the north east of the Study Area, next to the M74 extends the Plateau Moorland landscape, which is strongly influenced by the presence of the opencast works of Broken Cross. Immediately to the west of the existing surface mine operations, next to the M74, is a partially restored overburden, which has been graded to form a rounded, uniform landform. This restored landform is predominantly covered by regenerating grassland.

Table A3:1: Baseline Environment of Study Area and Buffer Zone		
	Streams such as Coal Burn and Poniel Water have little visual impact on this landscape. There is no visible field pattern, although the boundaries of fields next to the roads are defined by post and wire fences. Tree cover is generally limited to individual trees, copses and shelterbelts. Most of this landscape is underlain with extensive coal deposits. Open-cast coal working has taken place throughout the Plateau Farmland. Coal working activities have had a major influence on the landscape in the form of bings and tips, areas of derelict land, operating open-cast workings and associated industrial infrastructure including disused railway embankments. A dismantled railway extends between the B7078 and Coalburn and Auchlochan Bing, which has become a landmark by itself and part of the recreational area to the north of Coalburn. The B7078 crosses the north eastern edge of this landscape unit, and is parallel to the M74, which extends beyond the Study Area. A 400 kV steel lattice tower power line extends within this landscape and 33 kV pole mounted overhead power lines cross the Study Area to the east of Coalburn. Although these features are often visible in the landscape, the scale of the landscape is such that these vertical features only become intrusive within a limited vicinity. The Coalburn substation is located close to the 400 kV steel lattice tower power line and becomes visible in views from the B7078. The Plateau Farmlands have also provided locations for the Coalburn settlement, scattered properties, farmsteads and network of minor roads. The LCA[15] suggests that there may be opportunities for a more radical enhancement of the landscape by the creation of a more extensive woodland framework. Several new planted woodland areas were identified during the field survey; on the north facing slope to the east of Braehead and to the south of Mayfield Farm next to the minor road, which links Braehead with the B7078. The landscape is valued by local residents for recreational purposes. This medium scale landscape is already crossed by transport and communication routes, electricity pylons and telegraph poles, which exploit the relatively simple topography of the area. The visual and landscape impacts of wind	*Rolling Moorland* The Rolling Moorlands LCT coincides with a large proportion of the area to the south and south west of the Study Area. The moorlands consist of blanket bog, heather and grass moorland at an altitude of between 250 m AOD and 600 m AOD but rising to no more than 488 m AOD (Common Hill) within the Buffer Zone. The landscape is generally open and exposed and compromises conifer plantations and a large number of existing/consented/proposed wind turbines (renewable energy developments). The relative importance of some features or aspects of the Rolling Moorlands landscape is lessened by the presence of wind turbines. The addition of wind turbines, tracks and ancillary development interrupts outward visibility to a degree and shifts the focus of attention from distant views to those of the wind farms themselves. The wind turbines have also introduced movement into the landscape and are a key characteristic within this LCT. *Upland River Valley (opencast Mining)* The Study Area extends between upland river valleys; the river Nethan to the north/north west and Douglas Water to the south/ south east. The Upland River Valley of the River Nethan has deep sides and enclosure, which clearly distinguish it from the surrounding moorland and farmland. Douglas Water meanders along the south eastern side of the Study Area. The Upland River Valley Opencast Mining unit is centred on Douglas Water and also forms part of the Douglas Valley SLA. The valley of Douglas Water is also tightly enclosed between the steeply rising slopes. The valley slopes comprise a mixture of improved pasture and coniferous woodland. *Broad Valley Upland* Broad Valley Upland extends to the north east of the Douglas Water unit of the Upland River Valleys, where the Douglas Valley broadens at its confluence with Coal Burn. The valley is comparatively

Table A3:1: Baseline Environment of Study Area and Buffer Zone		
	turbines, electricity transmission and communication infrastructure within, and adjacent to, this open upland fringe landscape is identified as a 'key landscape issue' in South Lanarkshire LCA[15]. Therefore its susceptibility to the proposed development is considered to be low. However the potential cumulative effects with the existing features (wirescape effects) increase the susceptibility and sensitivity of the Plateau Farmland and is considered to be medium. *Plateau Moorland* A pocket of Plateau Moorland extends to the south west of the Hollandbush Golf Course, to the west of Coalburn. The Plateau Moorland consists primarily of blanket bog, heather and grass moorland with a comparatively level topography. This pocket of Plateau Moorland has not yet been modified by wind farms or forestry. This exposed large scale moorland landscape is considered to have medium to low sensitivity to the proposed development. *Rolling Moorland* The southern/south eastern part of the Study Area lies within the Rolling Moorland landscape, which accommodates the Douglas West Wind Farm. The Dalquhandy substation is located within the Rolling Moorland, flanked by the turbines of Dalquhandy and Douglas West wind farms. The topography of this part of the Rolling Moorland has been changed by opencast works and therefore it is considered to have low sensitivity to the proposed development. **Cumulative Context** The Study Area contains four wind turbines which are located close to the B7078 and two small (24.8 m to tip) turbines of Johnshill Farm close to the Golf Course. Although outside the Study Area, the turbines of Hagshaw Hill are visible over a considerable distance, including the Study Area. The turbines form an elevated skyline to the south, approximately 1.6 km from the southern boundary of the Study Area. Six turbines of Nutberry wind farm appear on	elevated and exposed, at about 200 m AOD, enclosed by Foothills to the south east/east. *Rolling Farmlands* The Rolling Farmlands are distinguished from Plateau Farmland by their more complex landform. The Rolling Farmland extends around the settlement of Lanark and is traversed by the River Clyde. *Foothills* Tinto Hills unit of Foothills landscape extends beyond the Douglas Water Valley to the south east. The conical shape of Tinto Hill forms a prominent landmark within the area. Rising to over 700 m AOD it is visible from the Study Area and from the moorlands to the south. *Rolling Moorland Forestry* The Rolling Moorlands LCT contains a sub-character area which is differentiated from the main LCT by a predominance of significant afforestation such as at Kype Muir, in contrast to the generally open moorland cover of the wider Rolling Moorland LCT. **Cumulative Context** The Buffer Zone contains a large number of existing/consented and proposed wind turbines. The existing Hagshaw Hill and Nutberry wind farms and the adjacent consented (Galawhistle, Dalquhandy, Douglas West) developments are /will be located within the Plateau Moorland Wind Farm unit, occupying the southern part of the Buffer Zone. Beyond Warlaw Hill (338 m AOD), the Auchrobert wind farm will be seen 4 km to the north west of the Study Area on Auchrobert Hill (346 m AOD). The consented Broken Cross turbines will be located within the Plateau Moorland Opencast Mining unit, next to the eastern boundary of the Study Area; and the consented three turbines of Poniel wind farm will be located within the Upland River Valleys Opencast Mining unit, just 900 m to the south east of the Study Area on Poniel Hill (269 m AOD). These developments are all

Table A3:1: Baseline Environment of Study Area and Buffer Zone		
	the lower skyline 2.5 km south west of the Study Area (the turbines are at an elevation of around 70 m lower than Hagshaw wind farm). The consented Dalquhandy and Douglas West wind farms will appear along the southern boundary of the Study Area. Six turbines of Broken Cross Wind Farm will appear close to the M74, to the north east of the Study Area.	located on parts of the surface mining sites which have been restored. In this context, a number of single turbine developments, located in close proximity to the M74 motorway corridor, have been constructed or consented (such as Birkhill, Garlewood Farm, Righead Cottage and Auchren Farm). Several single turbines are located within the Plateau Farmlands LCT between Lesmahagow and Lanark, within the northern part of the Buffer Zone. Also single turbines occur on low hills to the west of Lesmahagow, within the north west part of the Buffer Zone.
Visual Amenity	**Visual Envelope** The Study Area is well contained by the surrounding topography and consequently views of the Study Area would be largely confined to the immediate locality. In views from/within the Study Area the following landforms form the skyline around the Study area: • Common Hill (488 m AOD) and associated turbines to the south/south west; • Law (419 m AOD) and Tod law (383 m AOD) to the west; • Warlaw Hill (338 m AOD) to the north west (some lattice steel towers and turbines appear above the landform); • smooth ridge of Burnhead (329 m AOD) and Broken Cross Muir (265 m AOD) to the north east; • landmass of Tinto to the east and Robert Law (406 m AOD) to the south east. Apart from some higher or more distinctive summits such as Common Hill or the Tinto Hills, outside the Study Area, the skyline in views within the Study Area is relatively flat. Therefore, the conical peak of Auchlochan Bing appears on the skyline within the Study Area.	**Visual Envelope** The Study Area lies on a lower level than the surrounding Buffer Zone and consequently views of the Study Area would be gained from elevated locations around it; such as Warlaw Hill (338 m AOD) 1.6 km to the north west, Boghill (226 m AOD) 2 km to the north, Broken Cross Muir (265 m AOD) immediately to the east, Robert Law (406 m AOD) 4.7 km to the south east, Common Hills (488 m AOD) 2.1 km to the south, Law (319 m AOD) 2.7 km to the south west and Tod Law (383 m AOD) 2.4 km to the west. **Settlements** The main settlements within the Buffer Zone are: • Auchlochan – within River Nethan valley, 560 m to the north west of the Study Area; • Lesmahagow - next to the B7078, 800 m to the north of the Study Area; • Rigside – next to the A70, within the Douglas Water valley, 2.5 km to the east of the Study Area; • Douglas - next to the A70, within the Douglas Water valley, 2.2 km to the south west of the Study Area; and

Table A3:1: Baseline Environment of Study Area and Buffer Zone		
	Settlements The railway settlement of Coalburn village, which is associated with local coal mines, is located on the Coal Burn (a tributary of Poniel Water). The village is formed alongside two main streets; north south directed Coalburn Road and south west north east directed Bellfield Road. Views from the village are enclosed to the west/south west and south east by the topography, which ascends in these directions. A number of individual dwellings and farmsteads are present within the Study Area. Most of these are located alongside the minor road which extends between Coalburn and the B7078. **Transport Routes** The B7078 runs through/along the north eastern boundary of the Study Area, approximately 350 m from the M74 and at approximately 10 to 20 m lower level than the motorway. Several minor roads extend within the Study Area linking Coalburn and Lesmahagow, Auchlochan and Stockbriggs, as well as providing access to the B7078. The existing 400 kv steel lattice tower power lines cross the M74 and enter the Study Area and 33 kv pole mounted overhead power lines cross the Study Area to the east of Coalburn. Four single turbines are located close to the road. **Tourism and Recreation** Hollandbush Golf Club lies within the north western section of the Study Area. It extends to the south of Auchlochan/River Nethan. The golf club's official website notes that the golfers can enjoy "*the magnificent scenery and panoramic views of the Southern Uplands dominating to the East, South and West while playing the course and on a clear day, the peaks of Ben More and Ben Vorlich can be seen to the North*."[18] Also several operating wind turbines appear in views from the golf course, as noted on the site visit.	• Kirkmuirhill - next to the B7078, 5.5 km to the north west of the Study Area. Views of the Study Area from these settlements are screened by the intervening topography and vegetation. **Transport Routes** The M74 road corridor is a key strategic route which provides direct access between the south west of Scotland and the north west of England. The M74 forms the eastern boundary of the Study Area. The B7078 extends through the Buffer Zone, beyond the Study Area, parallel to the M74. The A70 extends through the Douglas Water valley in a north east south west direction. The network of minor roads extends mainly between Lesmahagow and Lanark, within the northern part of the Buffer Zone. Elevated transient views of the Study Area on the backdrop of distant hills, are available from the M74. **Tourism and Recreation** New Lanark World Heritage Site is located 5.9 km to the north east of the Study Area and its Buffer Zone 5.2 km to the north east. Policy 15 of the Proposed South Lanarkshire LDP[16] affords WHS a Category 1 level of protection. There is a dense network of Core Paths extending within Douglas Water valley and around/within the settlement of Lesmahagow. National Cycle Route 74 extends through the centre of South Lanarkshire, broadly, following the line of the M74 road corridor. It is unlikely that the proposed development would affect any tourism in respect of the recreational receptors within the Buffer Zone.

[18] http://www.hollandbushgolfclub.co.uk/home.aspx?i=no

Table A3:1: Baseline Environment of Study Area and Buffer Zone		
	The Core Path network circles around/within the settlement of Coalburn[19]. Several Core Paths provide access to the moorlands in the southern section of the Study Area. NCR No.74 extends on the B7078, connecting Gretna and Glasgow.	
Archaeology and Cultural Heritage	Cultural heritage features within the Study Area are shown on Figure 3.7. **World Heritage Sites** There are no World Heritage Sites (WHS) within the Study Area. **Scheduled Monuments** There are no Scheduled Monuments within the Study Area. **Listed Buildings** Two listed Category B listed Buildings are present within the Study Area. These are: Birkhill House and Stable block (LB7692) in the east; and West Toun statue (LB13402) in the south east. **Inventory status Gardens and Designed Landscapes** There are no Gardens and Designed Landscapes within the Study Area. **Inventory status Historic Battlefields** There are no Historic Battlefields within the Study Area. **Conservation Areas** There are no Conservation Areas within the Study Area. **Historic Environment Record (HER)** The Historic Environment Record (HER) for the area contains records for approximately 60 non-designated assets throughout the Study Area. They are concentrated around Coalburn, and scattered elsewhere. The HER sites principally comprise features associated with medieval or later rural settlement with agricultural land use features and historic mining. The former includes: field clearance cairns, former rig and furrow cultivation and lime kilns. The latter includes: colliery remains linked with Dalquhandy	Cultural heritage features within the Buffer Zone are shown on Figure 3.7. The Buffer Zone defines the study area for the identification of heritage assets whose settings may be affected by the proposed development. **World Heritage Sites** New Lanark World Heritage Site (WHS) is located 5.9 km to the north east of the Study Area. As noted above, Policy 15 of the Proposed South Lanarkshire LDP[16] affords WHS a Category 1 level of protection. The WHS Buffer Zone (Figure 3.7) has been defined to protect the immediate setting of the WHS; the adjacent environment that is part of, and contributes to the character, significance and understanding of the WHS. **Scheduled Monuments** There are eight Scheduled Monuments within the Buffer Zone, these are: • St Brides Chapel (SM90265), which is also a Historic Environment Scotland Property in Care, in Douglas, ca. 2.4 km south east of the Study Area. • Craighead Mill in Lesmahagow (SM3907), ca. 3 km north of the Study Area. • Thorril Castle (SM5425), ca. 4.3 km south east of the Study Area, near Parkhead. • Black Hill Fort and Cairn (SM2882) and Blackhill Barrow (SM4529) both near Kirkfield, ca. 5.5 km north of the Study Area.

[19] South Lanarkshire Council's Core Path Plan, Oct 2010, Strategic Environmental Assessment Environmental Report

Table A3:1: Baseline Environment of Study Area and Buffer Zone		
	Colliery, Auchlochan Colliery Auldton Colliery and Coalburn Colliery, miner cottages and mineral railway lines. Prehistoric activity within the Study Area is evident with the records of several burial cairns having been uncovered in the mid-19th century at Poniel and Birkhill (Fauldhouse), while the Ordnance Survey 1st Edition map shows the site of a former standing stone at Crowhill. Some activity in the area during the Roman period is also indicated by the discovery of a Roman bronze jug found at the bottom of a small burn close to Sadlerhead Farm in the early 19th century. Examination of modern aerial photographs[20] and the Coal Authority on-line map[21] indicates that extensive late-20th century open cast mining works have been undertaken around Coalburn. HER sites recorded within areas of recent open cast mining are mostly likely to no longer survive; although some areas within the mining sites would not have been subject to opencast. As part of the proposed Douglas West & Dalquhandy DP Renewable Energy Project a series of heritage trails have been proposed to link Douglas and Coalburn, and these may include a series of heritage trail points, for instance at Former Dalquhandy Opencast Coal Site and Old Colburn Collieries (Douglas West & Dalquhandy DP Non-Technical Summary, p. 10, 7.21-7.22).	• Auchensaugh Hill, cairn (SM4234) on the summit of Auchensaugh Hill, ca. 5.5 km south east of the Study Area. • Glenbuck Ironworks (SM2931) near Newmains, ca. 5.5 km south west of the Study Area. • Corra Castle (SM2597) on the banks of the Falls of Clyde and forming part of the New Lanark WHS, ca. 6 km to the north east of the Study Area . The castle is also a Category A Listed Building. **Listed Buildings** There are 70 listed buildings within the Buffer Zone: six Category A Listed Buildings, 37 Category B Listed Buildings, and 27 Category C Listed Buildings. These are concentrated primarily within the settlements of Douglas, Uddington and Lesmahagow and principally comprise residential and commercial properties. **Inventory status Gardens and Designed Landscapes** The Falls of Clyde Garden and Designed Landscape enters the Buffer Zone marginally to the north east, on the outskirts of New Lanark near Parkhead. The designed landscape forms part of New Lanark WHS. **Inventory status Historic Battlefields** There are no Historic Battlefields within the Buffer Zone. **Conservation Areas** Three Conservation Areas are present within the Buffer Zone, these are located at within Douglas, to the south east of the Study Area; Lesmahagow, to the north of the Study Area, and within New Lanark on the periphery of the Buffer Zone to the north east of the Study Area. The New Lanark Conservation Area forms part of the New Lanark WHS. **Historic Environment Records (HER)**

[20] GoogelEarth™

[21] mapapps2.bgs.ac.uk/coalauthority/home.html

Table A3:1: Baseline Environment of Study Area and Buffer Zone		
		The HERs contain details of many (>1000) non-designated assets throughout the 6 km buffer. They are principally focused in and around Lesmahagow, Glenbuck and Glespin, and along the main waterways (Douglas Water and River Nethan). Twelve of these are recorded within the HER as likely to be of national importance (Non-Registered Sites (NSRs)) including a farmstead and associated features at Whiteside, the remains of Lesmahagow Priory, and the remains of several enclosures, three burial cairns, an unenclosed platform settlement and a burnt mound concentrated at Auchensaugh Hill, Whitside Hill and Dillar Hill.
Geology Hydrogeology and Hydrology	Hydrological and hydrogeological features within the study area are shown on Figure 3.8. According to the BGS website[22] the superficial deposits underlying the site primarily comprises Quaternary Glacial Till, described as sandy, silty clay with pebbles, which can contain gravel-rich or laminated sand layers. Patches of Quaternary Peat are recorded primarily to the north and west, with subordinate Quaternary Alluvium and Quaternary Glaciofluvial Deposits to the east/south east. The Peat deposits are described as clay rich in organics; humic deposits composed from both described brushwood (freshwater) peat and phragmites (brackish water), the Alluvium is described as soft to firm consolidated, compressible silty clay, containing layers of silt, sand, peat and basal gravel, and the Glaciofluvial deposits are characterised by sand and gravel, with localised lenses of silt, clay or organic material. Natural superficial deposits are not mapped by the BGS in several scattered pockets of land within the site (particularly in the south), suggesting bedrock could be at, or close to the surface at these locations. Bedrock underlying the site consists of various Carboniferous Limestone Formations which belong to the Clackmannan Group; principally comprising the Passage Formation in the east, the Upper Limestone Formation in the centre of the site, and the Limestone Coal Formation in the west. The subordinate Carboniferous Kinnesswood Formation of the Inverclyde Group edges over the south western Study Area boundary. The Passage Formation	According to the BGS website, the Buffer Zone is primarily underlain with Quaternary Glacial Till superficial deposits. Quaternary Peat deposits are observed to concentrate in the west/south-west, underlying the forested area around Nutberry Hill, and Quaternary Alluvium and Quaternary Glaciofluvial (Sheet) deposits are largely identified along the entire eastern stretch of the Buffer Zone boundary; minor patches of these latter formations are also observed in the west/north west. Areas recorded as not containing natural superficial deposits are identified in small pockets throughout the Buffer Zone. The principal bedrock geologies underlying the Buffer Zone are sedimentary. The north/north east region of the Buffer Zone is predominantly underlain with the Devonian and Silurian Swanshaw Sandstone Formation, which is interspersed with igneous intrusions that were deposited during a similar period; South of Scotland Granitic Suite – Felsite, Midland Valley Siluro-Devonian Felsic Intrusion Suite – Felsite, and North Britain Siluro-Devonian Plug and Vent Suite – Microgabbro. The Swanshaw Sandstone Formation is described as sandstone with minor siltstone and mudstone, which is at least 750 m in thickness. Carboniferous Limestones (including the Limestone Coal Formation, Lower Limestone Formation and Lawmuir Formation) extend over the northern Study Area boundary and

[22] http://mapapps.bgs.ac.uk/geologyofbritain/home.html, accessed 5th August 2016.

Table A3:1: Baseline Environment of Study Area and Buffer Zone		
	is described as cyclic sequences of coarse sandstones and seatearths (typically 357 m in thickness), the Upper Limestone Formation is described as cyclic sequences of marine limestones (typically 435 m in thickness), and the Limestone Coal Formation is characterised by cyclic sequences of limestone and coal seams (typically 530 m in thickness). The Kinnesswood Formation is characterised by sandstone with carbonate (limestone or dolomite) nodular pedogenic horizons which can be up to 400 m in thickness. Faulting of the bedrock units within the Study Area is apparent on the BGS maps, primarily in a north west/south east orientation. The Hydrogeological and Groundwater Vulnerability Maps of Scotland (1:625,000) characterise the bedrock underlying the Study Area as a highly productive, moderately permeable aquifer unit in which groundwater flow is predominantly through fissures and other discontinuities. The overlying superficial deposits are considered to be of low permeability and can sometimes be substantial in thickness. According to the Scottish Natural Heritage carbon and peatland map of 2016[23], the Study Area is characterised by areas of Class 1 (carbon-rich soils, deep peat and priority peatland habitats), Class 5 and areas of non-soil. The areas mapped as Class 1 exhibit the highest environmental sensitivity and correlate to those areas previously recorded by the BGS as Quaternary Peat Deposits. According to the SEPA website[24] the site is located within the regional groundwater body of the Lanark bedrock and localised sand and gravel aquifers, which extend to an area of approximately 767.70 km^2. In 2008, SEPA classified this groundwater body using Water Framework Directive (WFD) guidelines as having an overall status of Poor, combining Poor qualitative and Poor quantitative status. Targets have been set to achieve a quantitative status of Good by 2027; no targets have yet been set to improve the chemistry status. Pressures on this water body include diffuse source pollution and abstraction for the mining and quarrying of coal. Licenced groundwater abstractions in Scotland in excess of 10m^3/day are	infringe the Buffer Zone in the north, whilst also being established along the northern Buffer Zone boundary. The Lawmuir Formation is characterised by sequences of mudstone, siltstone, sandstone, coal and limestones (of 250 m thickness), and the Lower Limestone Formation is described as sequences of limestone and coal (of 210 m thickness). The aforementioned limestones, in addition to the Passage Formation and Upper Limestone Formation, are the predominant bedrock geologies underlying the Buffer Zone to the east, with the lesser Kinnesswood Formation along the eastern Buffer Zone boundary. The Biggar Volcanic Formation is the prime bedrock geology in the south east, with the limestone formations slightly overstepping the south eastern Study Area boundary (into the Buffer Zone), and the Auchtitench Sandstone Formation residing along the south-eastern Buffer Zone boundary. The Auchtitench Sandstone Formation is described as volcaniclastic sandstones and substantial interbeds of lava pebble conglomerates, with thin sandstone, siltstone, mudstone and igneous beds, which is at least 1,800 m in thickness. The Buffer Zone to the south is underlain by numerous bedrock geologies, with the most predominant comprising the Biggar Volcanic Formation, the Scottish Coal Measures Formation (Upper, Middle and Lower) in the central southern area, and the Greywacke Conglomerate Formation and undifferentiated faulted Silurian Rocks (e.g. Birkenhead Sandstone Formation, Burn Formation and Plewland Sandstone Formation; which consists of sandstones, siltstones and mudstones) in the south western Buffer Zone area. The Greywacke Formation is described as a conglomerate of cobbles consisting of greywacke with few sandstone beds (of between 25 and 560 m thickness), and the Scottish Coal Measures Formations is described as cyclic sequences of mudstone, siltstone and sandstone with coal seams (variable thickness).

[23] http://www.snh.gov.uk/docs/A2009248.pdf, accessed 5th August 2016.

[24] http://gis.sepa.org.uk/rbmp/, accessed 5th August 2016.

Table A3:1: Baseline Environment of Study Area and Buffer Zone		
	regulated by SEPA under the Water Environment (Controlled Activities) (Scotland) Regulations 2011. The most significant watercourse in the area is Poniel Water which is located within the southern Study Area region and flows in an easterly direction. SEPA has classified Poniel Water as having an overall status of Moderate ecological potential, combining an overall ecological status of Moderate and overall chemical status of Pass. The objective for this water body under the WFD is for sustainable improvements to be made over time in order to achieve an overall status of Good by 2027. A small river water body, identified as Coal Burn, is also present positioned in the centre of the Study Area and flows in an easterly direction; however, no classification has been set by SEPA using WFD guidelines for this water body. A review of SEPA's flood risk maps[25] indicates that approximately 5-10% of the total Study Area is considered by SEPA as having a high probability (less than 1 in 10 chance of flooding in any given year; i.e. a 10% chance of happening in any one year) of flooding by rivers; such areas are concentrated around Coal Burn and Poniel Water to the east and south east; in addition to a pond located to the south which is adjacent to Longhill Burn. Small scattered pockets of the site (approximately 5% of the total Study Area) are also considered by SEPA as having a high likelihood of flooding associated with rainfall and sewers. It should be noted that the flood maps provide a general indication of flood risk in an area and do not constitute site-specific flood risk assessments. According to South Lanarkshire Council, there are no private water supplies recorded on the Council's Private Water Supply Register within the Study Area.	The Buffer Zone to the west is underlain by a combination of the Kinnesswood Formation, Swanshaw Sandstone Formation and undifferentiated faulted Silurian Rocks (chiefly the Patrick Burn Formation), scattered with igneous intrusions (South of Scotland Granitic Suite). The Groundwater Vulnerability Map of Scotland (1:625,000) characterises the bedrock geology underlying the Buffer Zone as moderately permeable, whilst the superficial deposits overlying the Study Area are generally considered to be of low permeability and often of substantial thickness. The Hydrogeological Map of Scotland (1:625,000) recognises several hydrogeological conditions associated with the superficial and bedrock geologies of the Buffer Zone. The bedrock geologies underlying the Buffer Zone to the north are characterised by locally important aquifers where flow is predominantly through fissures and other discontinuities; representative of the Swanshaw Sandstone Formation. The Buffer Zone to the east is underlain by locally important aquifers where flow can be chiefly intergranular; representative of the Quaternary Glaciofluvial Deposits, or through secondary permeability features (i.e. cracks, fractures, fissures); conforming to the Carboniferous Limestones. The southern and western regions of the Buffer Zone are typified by bedrock geologies that can be impermeable (except for where flow is permitted within potential near-surface cracks) such as the igneous formations, as well as locally important aquifers which would exhibit moderate, but variable permeability, principally through secondary permeability features; representative of the undifferentiated sedimentary formations. According to the Scottish Natural Heritage carbon and peatland map of 2016, the Buffer Zone is characterised by similar soil and peat classifications as the Study Area.

[25] http://map.sepa.org.uk/floodmap/map.htm, accessed 5th August 2016.

Table A3:1: Baseline Environment of Study Area and Buffer Zone		
		According to the SEPA website, the principal groundwater body within the Buffer Zone is the Lanark bedrock and localised sand and gravel aquifers. An additional groundwater body is recognised in the east and south of the Buffer Zone, orientated north east/south west, following Douglas Water. This groundwater body is recognised as the Douglas Valley Sand and Gravel and extends to 57.59 km^2. In 2008 SEPA classified this groundwater body using WFD guidelines as having an overall status of Poor, combining Poor qualitative and Good quantitative status. Targets have been set to achieve a qualitative status of Good by 2027, and to sustain a quantitative status of Good. Pressures to this water body include diffuse source pollution from livestock farming. Major surface water courses within the Buffer Zone include Parkhall Burn, Douglas Water, Poniel Water, River Clyde, Nethan Water, Logan Water and Cander Water/White Corse Burn. Parkhall Burn is located in the south east (flowing northwards) and is confluent with Douglas Water just north of Junction 12 of the M74, which flows in a north eastward direction. Parkhall Burn and Douglas Water (pre-confluence stretch) is classified by SEPA under the WFD as having an overall ecological status of good and overall chemical status of pass; Douglas Water (post-confluence; Parkhall Burn to Poniel Water) is classified by SEPA as having an overall ecological status of moderate and overall chemical status of pass. Douglas Water becomes confluent with Poniel Water in the eastern Buffer Zone region (north west of Rigside), exhibiting the same WFD classification as Poniel Water. The River Clyde traverses along the Buffer Zone boundary in the north east at the 'Falls of Clyde' and in the north at Kirkfieldbank, flowing in a west/north-westward direction. SEPA has classified this water body as having an overall ecological status of moderate (in the north east) and poor (in the north), with an overall chemical status of Pass. Nethan Water is situated within the western region of the Buffer Zone, adjacent to the Study Area boundary, and is indicated to flow

Table A3:1: Baseline Environment of Study Area and Buffer Zone		
		in a north-eastward direction. SEPA has classified this water body as having an overall ecological status of poor and overall chemical status of pass. Logan Water also flows in a north eastward direction, but is positioned further west from the Study Area boundary, and becomes confluent with Nethan Water approximately 1.8 km north west of Coalburn. Logan Water has been classified by SEPA as having an overall ecological status of poor and overall chemical status of pass. The Cander Water/White Corse Burn commences flow approximately 7.5 km north west of Coalburn and flows in a northerly direction. SEPA has classified this waterbody as having an overall ecological status of poor and overall chemical status of pass. Several smaller surface water features were also identified within the Buffer Zone but no classifications have been set by SEPA under the WFD. A review of SEPA's flood risk maps indicate that approximately 5-10% of the total Buffer Zone area is considered by SEPA as having a high probability (less than 1 in 10 chance of flooding in any given year; i.e. a 10% chance of happening in any one year) of flooding by rivers; such areas are primarily concentrated around Douglas Water, the River Clyde and Nethan Water. Small scattered pockets of the Buffer Zone (approximately 1-3% of the total site area) are also considered by SEPA as having a high likelihood of flooding associated with rainfall and sewers. It should be noted that the flood maps provide a general indication of flood risk in an area and do not constitute site-specific flood risk assessments. An enquiry has been sent to the Environmental Health Department of the Local Authority to determine whether any private water supplies are located within the Buffer Zone (a response is awaited).
Recreation Amenity and Tourism	Recreation amenity and tourism features are shown on Figure 3.9.	A network of core paths is located within the Buffer Zone, particularly to the north west surrounding the settlements of Lesmagahow and Blackwood, and in the south east surrounding

Table A3:1: Baseline Environment of Study Area and Buffer Zone		
	There is a small network of core paths in the southern section of the Study Area, focussed around the settlement of Coalburn, and linking with West Toun and Muirburn. Tourist facilities within the Study Area include: • Craigend Bed and Breakfast; • The Roost, Self-Catering Studio; • Coalburn Leisure Complex; and • Hollandbush Golf Club. Figure 3.9 also maps a 100 m buffer on all residential dwellings within the study area.	Douglas and the B7078. There are also several short core path incursions in the north east, spanning from New Lanark. Tourist facilities, including hotels, guest houses and other accommodation serving the tourism industry in the 6 km Buffer Zone are located mainly around the settlements located along main roads.
Land use and Infrastructure (e.g. roads)	**Forestry and Agricultural Land:** Where not included in urban development, the land within the Study Area is used primarily for agricultural practices and mining activities. A large block of coniferous plantation woodland is present immediately west of Coalburn. Smaller and more fragmented deciduous and coniferous forestry blocks can be found throughout the Study Area, the largest of which are at Glaikhead, Auldtonheights, Lintfieldbank and West Toun. **Historic Land Use:** Historic land use assessment data indicates the following historic land uses within the Study Area: • Agriculture and Settlement (37%) • Moorland and Rough Grazing (30%) • Energy, extraction and waste (22%) • Woodland and Forestry (6%) • Built-up area (2%) • Leisure and recreation (2%) • Designed Landscape (<1%) In terms of its agricultural land classification, the land comprises:	**Forestry and Agricultural Land:** Large blocks of forestry and woodland cover the 6 km Buffer Zone, including the named “Long Plantation” north of Douglas, “Happendon Wood”, and “TownHead Wood”, as well as several unnamed plantations near Caramacoup and Dykehead in the south, in the east near Rigside, at Auchrobert in the west, at Nutberry Hill, and west and south of Coalburn. Smaller areas of forestry are found generally within the various river valleys. **Historic Land Use:** The historic land use assessment data within the 6 km Buffer Zone mirrors that of the smaller Study Area, and comprises: • Agriculture and Settlement (40%) • Moorland and Rough Grazing (32%) • Woodland and Forestry (19%) • Built-up area (2%) • Energy, extraction and waste (5%) • Designed Landscape (>1%) • Leisure and recreation (<1%) • Rural Settlement (<1%) • Spiritual and Ritual (<1%)

Table A3:1: Baseline Environment of Study Area and Buffer Zone		
	• 35% is class 5.3: Land is capable of use as improved grassland and although the sward can be established, deterioration can be rapid due to a range of factors. • 27% is class 4.1: Land capable of producing a narrow range of crops; enterprises are based primarily on grassland with short arable breaks. • 33% is class 5.2: Land is capable of use as improved grassland. Sward establishment presents no difficulties, but physical limitations can cause maintenance problems. • 4% of the Study Area is classified as urban. • 1% is class 4.2: Land is primarily suited to grassland with some limited potential for other crops (barley, oats and forage crops). • <1% is class 6.3: Land is capable of only rough grazing due to intractable physical limitations; the semi-natural vegetation provides grazing of moderate value. **Settlement Distribution and Housing Allocations:** Residential properties are concentrated around Coalburn in the central west of the Study Area, with further properties located along the minor roads that traverse the Study Area from Lintfieldbank to Coalburn, and Coalburn to Johnshill (Figure 3.9). A review of South Lanarkshire LDP (2015) identified the following within the Study Area: • A Development Framework Site is located to east of Coalburn. This area should be used for the development of residential, recreation and amenity use, to include the reclamation of Bellfield Bing. • A Strategic Economic Investment Area is located to the south east of Coalburn, near Junction 11 of the M74. **Roads:** The primary road within the Study Area is the B7078 which traverses the east boundary of the Study Area from north to south east. A network of unnamed roads and tracks provide access throughout Coalburn, Nethertown of Poniel, Muirburn, West Toun and other small settlements which are scattered throughout the Study Area (Figure 3.9).	• Transport (<1%) • Water body (<1%) In terms of its agricultural land classification, the Buffer Zone is predominantly comprised of Classes 3.2, 4.1 and 4.2 (68%), this land is classified as capable of supporting mixed agriculture. The remaining land is Class 5 (15.5%), land that is capable of supporting improved grassland, and Class 6 (15%), land capable of supporting only rough grazing. **Settlement Distribution and Housing Allocations:** The Buffer Zone encompasses part or all of the villages of Blackwood, Kirkfieldbank, New Lanark, Douglas, Turfholm, and Lesmagahow. Many smaller settlements are also present within the Study Area buffer, focussed in the north and east. **Roads and Railway** Roads within the 6 km Buffer Zone include the M74, A73, A70, B7078, B7018, and B7055 in addition to an extensive network of unnamed roads. A 17.5 km stretch of the M74 traverses the Buffer Zone from north west to south east between Blackwood and Abington. The B7078 roughly follows the M74, connecting to the B7086, M74, B7018, and several unnamed roads within the Buffer Zone. The A73 enters the Buffer Zone for approximately 2.4 km in the north, roughly following the course of the Clyde River and connecting to the B7086 and B7018. The B7018 links the A74 near Kirkfieldbank in the north to the B7078 at Turfholm. The B7055 enters the Buffer Zone from the east, connecting to the A70 and an unnamed road near Rigside. The A70 spans the Buffer Zone from Sandilands in the north east to Glenbuck in the south west, approximately following Douglas Water.

Table A3:1: Baseline Environment of Study Area and Buffer Zone		
	Utilities Infrastructure: There are several distribution lines within the Study Area. Two of these OHL's enter the Study Area briefly from the north to meet approximately 200 m west of Broken Cross wind farm, whilst the third enters the Study Area from the east, continuing south west along the Water of Poniel. **Wind Farms:** The boundaries of the approved Douglas West and Dalquhandy wind farms enter the Study Area to the south and south west respectively (Figure 3.9). **Mineral Rights:** The Study Area was reviewed in relation to existing and potential mineral developments in order to identify former, existing, and future potential areas for mineral extraction (Figure 3.9). Former Extraction Activity: The study area has history of mining/extraction activity in relation to coal, peat, sands and gravels, limestone, fireclay and ironstone. Evidence mining activities includes the presence of spoil heaps and areas of restored and unrestored land. In more recent history, the following two sites have ceased activity within the Study Area: • Dalquhandy Opencast Mine occupies much of the land to the south and west of Coalburn and covers an area of approximately 10 km^2. This mine was operated for coal extraction. Whilst the opencast licence is still active the site is mainly restored. • Poniel Quarry was a sand and gravel pit in the south east of the Study Area which was operational until a few years ago and has now been restored. Existing Extraction Consents: There are a couple of existing planning consents for mining related activity within the study area: • Auchlochan Bing No. 9 is a coal spoil heap that has planning consent for reclamation and subsequent landscaping and restoration to nature conservation (planning reference: CL/01/0034) (northern bing on Figure 3.9); and	**Wind Farms:** Hagshawhill, Hagshaw Hill Extension, and Hill of Easteron Wind Farms and their associated infrastructure (access tracks, grid connection, etc) are located within the Buffer Zone. Further proposed and consented wind farms are located within the Buffer Zone including: • Auchrobert Wind Farm; • Cumberhead Wind Farm; • Nutberry Wind Farm; • Dalquhandy Wind Farm; • Ladehead Farm Wind Cluster; • Broken Cross Wind Farm; • Galawhistle Wind Farm; • Douglas West Wind Farm; and • Poniel Wind Farm.

Table A3:1: Baseline Environment of Study Area and Buffer Zone		
	• Bellfield Bing has planning consent for the spoil heap to be reclaimed and followed by reuse of the site for residential use (planning reference: CL/13/0118) (southern bing on Figure 3.9). Potential for Future Extraction: Two areas have been identified within the Study Area as having potential for future extraction: • A large area of sand and gravel in the south east of the Study Area which has been assessed as having a moderate potential for future extraction; • An area of shallow coal seams is located in the north of the Study Area. However, due to the small area and the nature of the seams, this area has been assessed as having very low potential for future extraction.	

APPENDIX 4
ENVIRONMENTAL CONSTRAINT SENSITIVITY

Table A4.1: Environmental Constraint Sensitivity				
Constraint	**Sensitivity (High -Red Medium - Amber Low - Green)**	**Buffer (m)**	**Sensitivity of Buffer (High -Red Medium - Amber Low - Green)**	**Notes**
Landscape				
Scenic Area	N/A		N/A	None within the Study Area
Gardens and Designed Landscapes	N/A		N/A	None within the Study Area
Cultural Heritage				
Listed Buildings - A	N/A		N/A	None within the Study Area
Listed Buildings – B	Medium	50	Medium	Buffer to reduce potential setting impacts
Listed Buildings – C	Medium	50	Medium	Buffer to reduce potential setting impacts
Scheduled Monuments	N/A		N/A	None within the Study Area
Conservation Area	N/A		-	None within the Study Area
Ecology				
Special Area of Conservation	High	0	-	
RAMSAR	High	0	-	
Special Protection Area	N/A	0	-	None within the Study Area
Site of Special Scientific Interest Biological or Mixed	High	0	-	
Important Bird Area	N/A	0	-	None within the Study Area
Ancient Woodland Inventory	Medium	0	-	
Geology, Hydrogeology and Hydrology				
Waterbodies (rivers, burns, lakes, ponds etc.)	High	50	High	Buffer to ensure no infrastructure located within 50 m.

Table A4.1: Environmental Constraint Sensitivity				
Constraint	**Sensitivity (High -Red Medium - Amber Low - Green)**	**Buffer (m)**	**Sensitivity of Buffer (High -Red Medium - Amber Low - Green)**	**Notes**
Recreation and Tourism				
Core Paths	High	0	-	
Infrastructure				
Existing HV lines	Medium	70	Medium	Buffer allows for typical stand-off distance. Medium sensitivity assigned due to potential technical solutions for crossing.
Properties	High	100	High	Buffer to reduce potential impacts on residential amenity.
Wind farm turbine locations (existing, consented and application stage)	High	Variable depending on turbine height plus 10% = topple height	Medium	Buffer defined as 3x maximum rotor diameter, to avoid technical issues (wake effects).
Consented Mineral Sites	High			
Areas of Potential Future Mineral Extraction (low-medium)	Medium			

APPENDIX 5
DETAILED ENVIRONMENTAL ANALYSIS OF ROUTE OPTIONS

1.1 Introduction

Two potential routes have been identified as potentially feasible to accommodate the proposed OHL to connect the consented Dalquhandy wind farm to the existing Coalburn substation. Route options 1 and 2 are shown on Figure 4.3.

This annex provides the detailed environmental analysis of each route option, presenting a preference for each environmental topic area.

1.2 Ecology & Ornithology

Chapter 3 describes the main ecology interests which have been identified within the study area, including: designated sites and species; other protected species; habitat types and known sensitive habitats including potential for groundwater dependent terrestrial ecosystems (GWDTE).

The degree of interaction of each route option with these identified ecological sensitivities has been considered in order to identify differentiator(s) between the route options under consideration. The route option most able to avoid identified ecological sensitivities wherever possible is preferable.

The ecological sensitivities discussed below are shown on Figure 3.3 and 3.4.

Route Option 1

Section 1a

At its southern end, the route is exclusively marshy grassland, as the route moves north and westwards the marshy grassland includes two small areas of coniferous forestry plantation before returning to marshy grassland habitat until it reaches the road that bisects this route variation. North of the road is a short section of a habitat mixture including semi-natural broadleaved woodland, marshy grassland and blanket sphagnum bog. Beyond this habitat mix, the habitat consists of unimproved acid grassland, which continues until the northern extent of this route variation.

There is potential for GWDTE within areas of marshy grassland habitat type. The blanket bog crossed, though not part of the Coalburn Moss SAC designation, is a bog of similar quality.

No protected species were recorded from within this Section 1a during the protected species surveys conducted. However, seven ponds with Great Crested Newt potential have been identified less than 1 km south of the Section 1a. A common lizard was also recorded near the pond at Porterhall. No bats were recorded within this Section 1a; however, two mature oak trees with bat roost potential were recorded less than 1 km south of the Section 1a at its most southern extent.

A single male hen harrier was observed hunting approximately 500 m east of this Section 1a. The habitat is considered to provide a potential foraging resource for wintering birds, with no breeding recorded in the study area. This is not considered to present a significant ornithological constraint.

A marginal preference for Section 1a is identified on the basis that it would involve a lesser amount of tree felling and therefore have a lesser effect on habitat.

Section 1b

At its southern end, the route consists exclusively of marshy grassland, as the route moves north this section enters a coniferous forestry plantation for approximately 400 m. Beyond the coniferous forestry plantation Section 1b consists of a habitat mixture of marshy grassland, coniferous forestry, improved grassland and swamp before terminating with approximately 560 m of unimproved acid grassland.

There is potential for GWDTE within areas of marshy grassland habitat type. Furthermore, the rides and gaps within areas of coniferous forestry plantation are likely to be of marshy grassland habitat type and hence have potential to support GWDTE.

No protected species were recorded from within Section 1b during the protected species surveys conducted. However, seven ponds with Great Crested Newt potential have been identified less than 1 km south of this section. A common lizard was also recorded near the pond at Porterhall. No bats were recorded within this route option variation; however, two mature oak trees with bat roost potential were recorded less than 1 km south of Section 1b, at its most southern extent.

A single male hen harrier was observed hunting approximately 500m east of Section 1b. The habitat is considered to provide a potential foraging resource for wintering birds, with no breeding recorded in the study area. This is not considered to present a significant ornithological constraint.

Section 1c

At its southern end, the Section 1c is dominated by marshy grassland, with two small areas of wet dwarf shrub heath. As the Section 1c turns northwards it continues through a marshy grassland dominated habitat until entering the same coniferous plantation as Sections 1a and 1b for approximately 600 m before terminating in a small area of marshy grassland habitat at its connection with Section 1b.

A marginal preference for Section 1a is identified on the basis that it would involve a lesser amount of tree felling and therefore have a lesser effect on habitat.

There is potential for GWDTE within areas of marshy grassland habitat type. Furthermore, the rides and gaps within areas of coniferous forestry plantation are likely to be of marshy grassland habitat type and hence have potential to support GWDTE.

No protected species were recorded from within Section 1c during the protected species surveys. However, seven ponds with Great Crested Newt potential have been identified less than 1 km south of Section 1c. A common lizard was also recorded near the pond at Porterhall. No bats were recorded within Section 1c; however, two mature oak trees with bat roost potential were recorded less than 1 km south of Section 1c at its most southern extent.

A single male hen harrier was observed hunting approximately 150 m east of Section 1c. The habitat is considered to provide a potential foraging resource for wintering birds, with no breeding recorded in the study area. This is not considered to present a significant ornithological constraint.

Section 1d

At its southern end, the Section 1d consists of a habitat mixture of marshy grassland and broadleaved woodland. Beyond the woodland, Section 1d is dominated by semi-improved neutral grassland and semi-improved acid grassland as it stretches northwards towards Johnshill Farm. As Section 1d turns east around Johnshill Farm it passes through another area of marshy grassland before terminating in an area of semi-improved neutral grassland.

There is potential for GWDTE within areas of marshy grassland habitat type.

No protected species were recorded from within 1 km of Section 1d during the protected species surveys.

Section 1e

At its southern end, the Section 1e consists of a habitat mixture of marshy grassland and broadleaved woodland. Beyond the woodland Section 1e is dominated by semi-improved neutral grassland and semi-improved acid grassland as it stretches northwards towards Johnshill Farm.

Before terminating at its connection with Section 1d, Section 1e passes through another area of marshy grassland and an area of semi-improved neutral grassland.

There is potential for GWDTE within areas of marshy grassland habitat type.

No protected species were recorded from within 1 km of this Section 1e during the protected species surveys.

Section 1f

Section 1f consists predominantly of semi-improved neutral grassland, with an area of marshy grassland and broadleaved woodland at its eastern limit.

There is potential for GWDTE within areas of marshy grassland habitat type.

No protected species were recorded from within 1 km of Section 1f during the protected species surveys.

Route Option 2

Section 2a

Section 2a runs south east away from the connection point around a small pond and then turns north east running to the south of Coalburn. Here the route crosses reinstated habitats on a former coal mining site, with the main habitats being marshy grassland and wet heath, both of which have potential to be GWDTE, and tall ruderal habitat. Section 2a then runs across the fields to the south and east of Coalburn. Here the habitats are improved and semi-improved neutral grassland and areas of planted coniferous habitat. These habitats and not considered to provide a significant ecological constraint. Section 2a then runs between Bellfield and Netherfield before joining Section 2c to the south of Mayfield.

No protected species were recorded within Section 2a during the protected species surveys. However, seven ponds with Great Crested Newt potential have been identified less than 1 km south of Section 2a. A common lizard was also recorded near the pond at Porterhall. No bats were recorded within this route option variation, however, two mature oak trees with bat roost potential were recorded less than 1 km south of Section 2a at its most southern extent.

A single male hen harrier was observed hunting within Section 2a. The habitat is considered to provide a potential foraging resource for wintering birds, with no breeding recorded in the study area. This is not considered to present a significant ornithological constraint.

As Section 2a crosses less of the marshy grassland and planted coniferous habitat then it is considered preferable to Section 2b.

Section 2b

Section 2b is an alternative to 2a and crosses largely similar habitats. It starts crossing the reinstated marshy grassland and wet heath before crossing the improved grassland, semi-improved neutral grassland and planted coniferous fields. Section 2b runs to the south and east of Netherfield before joining Section 2c. This variation crosses more marshy grassland habitat, which is a potential GWDTE, and more planted coniferous habitat.

No protected species were recorded from within Section 2b during the protected species surveys. However, seven ponds with Great Crested Newt potential have been identified less than 1 km south of Section 2b. A common lizard was also recorded near the pond at Porterhall. No bats were recorded within Section 2b; however, two mature oak trees with bat roost potential were recorded less than 1 km south of Section 2b at its most southern extent.

A single male hen harrier was observed hunting within Section 2b. The habitat is considered to provide a potential foraging resource for wintering birds, with no breeding recorded in the study area. This is not considered to present a significant ornithological constraint.

As Section 2b crosses more of the marshy grassland and planted coniferous habitat then Section 2a is considered more preferable.

Section 2c

Section 2c runs north east away from Mayfield over semi-improved neutral grassland and planted broadleaved woodland. It then turns north to the west of Birkhill, near a pond that is not considered to provide habitat for Great Crested Newts, and continues over more planted broadleaved woodland. Section 2c crosses a spur of blanket bog associated with the Coalburn Moss SAC, though not part of the designation. This is considered a potentially significant ecological constraint. Section 2c continues north across some marshy grassland, potentially GWDTE around Fauldhouse Burn, and through an area of broadleaved woodland.

After crossing the B7078, Section 2c crosses improved grassland and then marshy grassland, again potentially GWDTE, around Faulhouse Burn, before turning sharply south east and running into the Coalburn substation through broadleaved woodland, marshy grassland and semi-improved neutral grassland. This skirts around the northern edge of Coalburn Moss SAC.

1.3 Landscape Character

Chapter 3 describes the main landscape interests which have been identified within the study area, including national and regional level landscape designations and Landscape Character Types (LCT) and designations/classifications which could be directly affected by the proposed development. The degree of interaction of each route option with these identified landscape sensitivities has been considered in order to identify differentiator(s) between the route options under consideration. The potential impact of land take, as well potential wirescape impacts, are considered and the route most able to avoid identified landscape sensitivities, wherever possible, is preferable.

The landscape sensitivities discussed in this section are shown on Figures 3.5 and 3.6.

Route Option 1

Landscape Fabric

The existing landscape comprise a predominance of pastoral fields with few remnant hedgerows or tree cover. Consequently, the landscape fabric is considered to have a low sensitivity as the proposed OHL could, with careful routing and design, be accommodated within Route Option 1 without significant effects. Moreover, effects on landscape fabric during both construction and operational phases of the proposed development are likely to be overwhelmingly reversible. This is also true of the landscape in the southernmost part of Route Option1, at the Coalburn opencast site, which is subject to considerable disturbance already.

Landscape Designations

Route Option 1 is located over 2 km from the nearest landscape designations identified in the buffer Zone (Figure 3.6: Landscape Designations). Whilst the landscape in which Route Option 1 occurs (Plateau Farmland) is gently undulating and relatively open, suggesting potential intervisibility of any new OHL from SLAs, especially from elevated parts of SLAs within the Buffer Area. However, given the distance at which an OHL in any of Route Option 1 would be seen and its backclothed position means that significant effects on SLAs are unlikely. This conclusion applies in respect of all sections (1a to 1f) of Route Option 1.

Landscape Character

Route Option 1 is situated in the Plateau Farmland LCT which is considered to have a medium sensitivity to the type of development proposed due to its scale and the potential for mitigation that is in keeping with its current character. The landscape contains existing OHLs which provide a potential cumulative context and basis for the formation of wirescape, as well as linear landscape elements such as a dismantled railway and tree belts, which would serve to reduce the extent of the OHLs visibility and as a consequence, significant effects on this landscape are considered unlikely, irrespective of which variations are chosen for Route Option 1.

Much of the southern half of Route Option 1 bisects the Plateau Moorland landscape, which is considered to have a medium sensitivity to the type of development proposed. However, any felling associate with the establishment of wayleaves within forests that abut the western edge of Coalburn would result in the loss/modification of a key constituent of this landscape and to emphasise the position of the OHL. Notwithstanding this, significant effects on this landscape are considered unlikely irrespective of which variations are chosen for Route Option 1.

South west of Coalburn, Route Option 1 enters the Plateau Farmland Opencast Mining LCT. Given the highly developed and disturbed condition of this landscape it is considered to have a medium to low sensitivity to the type of development proposed. In this context, and given the relatively small scale of the type of OHL proposed, no significant effects are anticipated within this LCT, irrespective of which variations are chosen for Route Option 1.

Route Option 2

Landscape Fabric

Route Option 2 is also set within a context of pastoral fields with few remnant hedgerows or tree cover. Consequently, a new OHL could, with careful routeing and design, be accommodated within Route Option 2 without significant effects. Effects on the southernmost part of the Route Option 2, at the Coalburn opencast site are similarly unlikely to be significant due to its disturbed condition.

Landscape Designations

Route Option 2 is located over 1.5 km from the nearest landscape designations (Douglas Valley SLA) (Figure 3.6: Landscape Designations). Whilst the landscape in which Route Option 2 occurs (Plateau Farmland) is gently undulating and relatively open, suggesting potential intervisibility of any new OHL from the SLA, the distance at which an OHL in this route option would be seen means that significant effects on SLAs are unlikely. Moreover, the northern extents of the SLA has extensive coniferous forest cover, providing substantial screening of Route Option 2 from key parts of the SLA, and where views would be provided (i.e. from elevated positions) the OHL would be backclothed and therefore less evident. This conclusion applies in respect of route Sections 2a, 2b and 2c in for Route Option 2.

Landscape Character

The northern two thirds of Route Option 2 are located within the Plateau Farmland LCT which is considered to have a medium sensitivity to the type of development proposed due to its scale and the potential for mitigation that is in keeping with its current character. This landscape contains existing OHLs which would provide a cumulative context (especially in respect of Section 2c) as well as linear landscape elements such as a dismantled railway and tree belts which would serve to reduce the extent of any OHLs visibility. Consequently, significant effects on the character of this landscape are considered unlikely, irrespective of which section alternative is chosen.

South of Coalburn, Route Option 2 enters the Plateau Farmland Opencast Mining LCT. Given the highly developed and disturbed condition of this landscape it is considered to have a medium to

low sensitivity to the type of development proposed. In this context, and given the relatively small scale of the proposed OHL, no significant effects are anticipated within this LCT irrespective of which variation is chosen.

1.4 Visual Amenity

Chapter 3 describes the main visual amenity interests which have been identified within the study area, including residential receptors; walkers, users of recreational trails and footpaths, cycle routes, and visitors to tourist attractions, beauty spots or picnic areas, whose attention may be focused on the landscape.

Route Option 1

Whilst the Buffer Area contains a number of elevated vantage points and receptor locations they are considered to be distant from Route Option 1 and the OHL would be backclothed by its prominence even further.

The most pertinent visual receptors in the vicinity of Route Option 1 include:

- Residents and visitors to Coalburn;
- Residents of a small number of individual dwellings and farmsteads located along Coalburn Road and between Coalburn and the River Nethan;
- Members of the Hollandbush Golf Club; and
- Residents of Neuk and Auldtonheights, which are located north of Section 1f.

Within the northern half of Route Option 1, Section 1f has potential to cause cumulative effects on residents of Neuk, Auldtonheights, especially in respect of the connection into Coalburn substation. Sections 1d and 1e are likely to add to the cumulative effect of existing OHLs, but would be subject to only restricted/filtered visibility from properties along Coalburn Road and Hollandbush Golf Club, intervening roadside vegetation forming subdivision of the properties from the proposed Route Option 1. Notwithstanding this, Section 1d would affect the principal view from the Johnshill property, whereas Section 1e would run around the eastern side of this farm where farm buildings could provide greater screening of the OHL.

Sections 1b and 1c have the greatest potential for significant effects on the visual amenity of Coalburn due to their closer proximity of these alternatives compared with Section 1a.

Route Option 2

Whilst the Buffer Area contains a number of elevated vantage points and receptor locations they are considered to be distant from Route Option 2 and any OHL would be backclothed by topography and vegetation, thereby reducing its prominence.

The most pertinent visual receptors in respect of Route Option 2 comprise:

- Residents and visitors to Coalburn, Braehead and Bellfield as well as a series of scattered dwellings at Birkhill, Crowhill, Nethertown, Netherfield and Mayfield/Mayfieldbank;
- Users of the B7078 Carlisle Road and network of minor local roads; and
- Local recreational users on a series of local footpaths north east of Coalburn.

Whilst Section 2c would avoid potential effects on Neuk and Auldtonheights properties that were identified in respect of Route Option 1, it would pose potential wirescape issues east of Carlisle Road, and in the vicinity of Birkhead, Mayfield and Mayfieldbank properties. Similarly, both route Sections 2a and 2b are also likely to compound existing wirescape north of Bellfield. Whilst route Sections 2a and 2b have the potential to affect a number of scattered dwellings, Section 2a would have the greatest effect on the amenity of Coalburn due to its closer proximity to this

settlement. Section 2a would also affect a small number of public footpaths on the outskirts of the settlement.

1.5 Archaeology and Cultural Heritage

Chapter 3 describes the main archaeology and cultural heritage interests which have been identified within the study area, including listed buildings.

The degree of interaction of each route option with these identified archaeological and cultural heritage sensitivities has been considered in order to identify differentiator(s) between the route options under consideration. The route option most able to avoid identified sensitivities, wherever possible, is preferable.

The locations of the key archaeological and cultural heritage features discussed in this section are shown on Figure 3.7.

Route Option 1

There are no designated heritage assets within Route Option 1 (e.g. Scheduled Monuments, Conservation Areas or Listed Buildings).

One non-designated heritage asset has been previously recorded within Section 1a of Route Option 1: Coalburn coal mine (HER12277). There are no details regarding this site in the HER and no coal mining works are shown on the Ordnance Survey 1st Edition or 2nd Edition mapping in this area. It would appear that this record probably relates to the 20th century opencast, surface mining works at Coalburn and it is an asset of little or no heritage value.

Two non-designated heritage assets have been previously recorded within Section 1b of Route Option 1. The first relates to an unroofed building (HER12277), which is depicted on the Ordnance Survey 1st Edition map (1864) just west of Coalburn but which is not shown on the 1991 Ordnance Survey map. If upstanding remains of the building survive, the asset could be avoided through careful routeing of the proposed development. The second is a record of Westown Colliery (HER58094), which is shown on the Ordnance Survey 2nd Edition map (1899). The colliery was located in an area that has been subject to surface mining[21] in the late-20th century and no remains of the former colliery survive.

Route Option 2

There are no designated heritage assets within Route Option 2.

Three non-designated heritage assets have been previously recorded in Section 2b of Route Option 2. These are: a water tank (HER5802),close to Coalburn shown on the Ordnance Survey 2nd Edition map (1899); a standing stone (HER53196), shown on the Ordnance Survey 1st Edition map (1864); and former Westown Colliery (also known as Bankend) (HER41036), which opened in 1890 and closed in 1961. The standing stone is not shown on Ordnance Survey maps after 1864 and no longer survives. Both the water tank and Westown (Bankend) Colliery were located in an area that has been subject to surface mining[26] in the late-20th century and no remains of these two assets survive.

Category B Listed Westoun Town Statue, a stone sculpture of a soldier, stands approximately 700 m south of the route of Section 2b, within the gardens of West Toun House. The sculpture is back-dropped by trees and the proposed development is unlikely to have any effect on the setting of the sculpture.

Two non-designated heritage assets have been previously recorded in Section 2c of Route Option 2. The first is a building (HER54105) depicted on the Ordnance Survey 1st Edition map (1864).

[26] mapapps2.bgs.ac.uk/coalauthority/home.html (Date accessed: 02/03/17)

The building has been demolished, although its location is still visible as a level platform on otherwise sloping ground. The second is a small quarry (HER54104) recorded on the 1st Edition Ordnance Survey map just south of Newfield Inn. Field survey in 2007 recorded that the quarry still existed at that time. Both the building platform and the quarry could be avoided through careful routeing of the proposed development.

Birkhill House and Stables are Category B Listed Buildings located approximately 300 m to the east of the route of Section 2c. Given the distance and the fact that there are trees in the intervening landscape, the proposed development is unlikely to have any effect on the setting of this property.

1.6 Geology, Hydrogeology and Hydrology

Chapter 3 describes the main geological, hydrogeological and hydrological interests which have been identified within the study area, including details of the solid and drift geology, the groundwater vulnerability, the surface water features and peatland.

The degree of interaction of each route option with any identified sensitivities is considered in this section, in order to identify differentiator(s) between the routes under consideration. The route option most able to avoid identified sensitivities, wherever possible, is preferable.

The locations of the relevant features discussed in this section are shown on Figure 3.8.

Route Option 1

Route Option 1 does not cross any watercourses; there are a few drainage ditch crossings (for Sections 1b, 1d and 1e).

Route Option 1 does not pass through any nationally important carbon-rich soils, deep peat and priority peatland habitat (i.e. Class 1 or 2), as defined by SNH. Most of Route Option 1 is underlain by land classified by SNH as Class 4. Class 4 is defined as an area unlikely to be associated with peatland habitats or wet and acidic soils / an area unlikely to include carbon rich soils.

Part of Route Option 1 approximately between Shoulderigg Road and Coalburn Road (Sections 1a and 1b) pass through an area of peat, as identified by the 1:625,000 scale BGS mapping. However, the SNH peat data is mapped on smaller scale than BGS and is therefore more representative.

Route Option 2

Route Option 2 requires two watercourse crossings, which both occur within Section 2c. The first crossing would be of the Coal Burn. The second watercourse crossing would be of Fauldhouse Burn to avoid encroaching into Coalburn Moss SAC.

Route Option 2 does not pass through any nationally important carbon-rich soils, deep peat and priority peatland habitat (i.e. Class 1 or 2), as defined by SNH. Section 2a and 2c are underlain by land classified by SNH as Class 4. Most of Section 2b is also underlain by Class 4 with the exclusion of a small area of unclassified land south of Braehead.

1.7 Recreation and Tourism

As described in Chapter 3, the recreational and tourist resources in the vicinity of the route options are limited to core paths and some recreational resources such as the Hollandbush Golf Club.

The locations of key recreation and tourism features discussed in this section are shown on Figure 3.9.

Route Option 1

Route Option 1 crosses a couple of core paths. Sections 1a-c all cross Dalquhandy core path which crosses through Dalquhandy wind farm. Section 1a approximately follows the routeing of Dalquhandy core path, albeit with approximately 50-150 m standoff. The open nature of the plateau moorland does not offer natural screening. Coalburn core path runs along the edge of the disused workings to the west of Coalburn and is crossed by Sections 1a-c at various locations.

Hollandbush Golf Club is on the opposite side of Coalburn Road to the proposed Sections 1d and 1e for Route Option 1 and trees along the eastern side of the road would offer screening of the OHL.

Route Option 2

Route Option 2 crosses Dalquhandy core path as it leaves the substation at Dalquhandy wind farm. Sections 2a and 2b also cross Wallace's Cave core path.

1.8 Land Use and Material Assets

As described in Chapter 3, land use varies throughout the study area between residential settlement, agricultural land, surface mining (previous activity), moorland and some pockets of plantation forestry. The analysis documented here has taken account, where possible, of land use sensitivities.

The locations of the relevant features discussed in this section are shown on Figure 3.9.

Route Option 1

An area of coniferous plantation forestry is located to the west of Coalburn and Sections 1a-1c all pass through it.

A 100 m buffer has been applied to residential properties within the study area. The only area where it has not been possible to adhere to this 100 m buffer is near Glaikhead where a pinch point is created between the residential buffer and the consented development at Auchlochan Bing to the south, where Sections 1a and 1b converge. This is discussed under Visual Amenity above.

It has been necessary to extend the route into the application area for Auchlochan Bing to maintain a 100 m route width; however it is noted that route avoids the footprint of the Bing.

Route Option 1 generally has avoided any sections which run parallel to roads. There are a couple of road crossings for Route Option 1: one of Shoulderigg Lane (Sections 1a and 1b); and another of Coalburn Road (south of Glaikhead). Section 1d would also require a crossing of the approach road to Johnshill.

Dalquhandy wind farm is located in the south western part of the refined study area. Sections 1a and 1b both pass through the 3 x rotor diameter buffer of the turbines of Dalquhandy wind farm. However, the key constraint to avoid is the topple distance, which both of these sections do not encroach upon.

Route Option 2

Route 2 does not cross through any areas of plantation forestry nor does it encroach on any of the residential buffers.

Both Section 2a and Section 2b cross Bellfield Road and then converge to cross it again as Section 2c in two more locations (one near Mayfield and the other near Lintfieldbank). These crossings are required in order to avoid the residential buffers of Mayfield, Aikmanhill and

Lintfieldbank. As Section 2c progresses northwards it crosses the B7078 (Carlisle Road) to run along its eastern side before crossing back (north of the SAC) to reach Coalburn Station.

Section 2c crosses a 400 kV overhead line in two locations on its approach to Coalburn substation. This section also crosses a 132 kV overhead line near the Coalburn substation.

None of Route 2 lies within the topple distance of a turbine; however, Section 2c, as it crosses Fauldhouse Burn encroaches within the 3 x rotor diameter buffer of the Birkhill Commercial Park turbines. This section of the route is constrained as it heads northwards by the SAC on the west and residential properties and wind turbines in Birkhill Commercial Park to the east.

Route 2 avoids areas with consent for future mineral extraction. However an area to the west of Coalburn has been identified as having medium potential for future extraction of sand and gravels. It has been necessary to for Section 2c to pass through this area in order to avoid the residential buffers of Mayfield, Aikmanhill and Lintfieldbank.

APPENDIX 6
APPENDIX 1: HOLFORD RULES TAKEN FROM SP ENERGY NETWORKS 2015 – MAJOR ELECTRICAL INFRASTRUCTURE PROJECTS – APPROACH TO ROUTEING AND ENVIRONMENTAL IMPACT ASSESSMENT

Appendix 1 : The Holford Rules

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

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

A subsequent review of the Holford Rules (and NGC clarification notes) was undertaken by Scottish Hydro Electric Transmission Limited (SHETL) in 2003 to reflect Scottish circumstances. The principles of these guidelines for the routeing of new high voltage overhead transmission lines, with the NGC 1992 and SHETL 2003 notes have been considered within this Strategic Environmental Review. The Holford Rules are detailed below.

Rule 1

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

Note on Rule 1

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

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

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

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

Rule 2

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

Note on Rule 2

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

(d) Impacts on the setting of historic buildings and other cultural heritage features should be minimised.

(e) If there is an existing transmission line through an area of high amenity value and the surrounding landuses

have to some extent adjusted to its presence, particularly in the case of commercial forestry, then the effect of remaining on this line must be considered in terms of the effect of a new route deviating around the area.

Rule 3

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

Note on Rule 3

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

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

Rule 4

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

Rule 5

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

Notes on Rules 4 and 5

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

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

(c) Where possible follow open space and run alongside, not through woodland or commercial forestry, and consider opportunities for skirting edges of copses and woods. Where there is no reasonable alternative to cutting through woodland or commercial forestry, the Forestry Commission Guidelines should be followed (Forest Landscape Design Guidelines, second edition, The Forestry Commission 1994 and Forest Design Planning – A Guide to Good Practice, Simon Bell/The Forest Authority 1998).

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

Rule 6

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

Note on Rule 6

(a) In all locations minimise confusing appearance.

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

Rule 7

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

Note on Rule 7

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

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

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

Explanatory Note on Rule 7

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

Supplementary Notes

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

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

(c) Alternative Lattice Steel Tower Designs

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

Further Notes on Clarification to The Holford Rules

Line Routeing and People

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

The following notes are intended to reflect this.

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

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

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

Supplementary Notes on the Siting of Substations

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

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

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

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

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

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

APPENDIX A

INTERPRETATION OF THE HOLFORD RULES 1 AND 2 AND THE NOTES TO RULE 2 REGARDING THE SETTING OF A SCHEDULED ANCIENT MONUMENT OR A LISTED BUILDING

1 Interpretation of The Holford Rules 1 and 2

1.1 Introduction

Rules 1 refers to avoiding major areas of highest amenity value, Rule 2 refers to avoiding smaller areas of high amenity value. These rules therefore require identification of areas of amenity value in terms of highest and high, implying a hierarchy, and the extent of their size(s) or area(s) in terms of major and smaller areas.

The NGC Notes to these Rules identify at Rule 1(b) areas of highest amenity value and at Rule 2(a) and (b) of high amenity value that existed in England circa 1992.

1.2 Designations

Since 1949 a framework of statutory measures has been developed to safeguard areas of high landscape value and nature conservation interest. In addition to national designations, European Community Directives on nature conservation, most notably through Special Areas of Conservation under the Habitats and Species Directive (92/43/EC) and Special Protection Areas under the Conservation of Wild Birds Directive (79/409/EEC) have been implemented. Governments have also designated a number of Ramsar sites under the Ramsar Convention on wetlands of International Importance (CM6464). Scottish Office circulars 13/1991 and 6/1995 are relevant sources of information and guidance. In addition, a wide range of non-statutory landscape and nature conservation designations affect Scotland.

1.3 Amenity

The term 'Amenity' is not defined in The Holford Rules but has generally been interpreted as designated areas of scenic, landscape, nature conservation, scientific, architectural or historical interest.

This interpretation is supported by paragraph 3 of the Schedule 9 to the electricity Act 1989 (The Act). Paragraph 3 (1)(a) requires that in formulating any relevant proposals the licence holder must have regard to the desirability of preserving natural beauty, or conserving flora, fauna and geological or physiological features of special interest and of protecting sites, buildings, including structures and objects of architectural, historic or archaeological interest. Paragraph 3 (1)(b) requires the license holder to do what he reasonably can do to mitigate any effect which the proposals would have on the natural beauty of the countryside or on any flora, fauna, features, sites, buildings or objects.

1.4 Hierarchy of Amenity Value

Rules 1 and 2 imply a hierarchy of amenity value from highest to high.

Schedule 9 to the Act gives no indication of hierarchy of value and there is no suggestion of a hierarchy of value in either NPPG5: Archaeology and Planning, NPPG 13: Coastal Planning, NPPG 14: Natural Heritage or NPPG 18: Planning and the Historic Environment. Nevertheless, designations give an indication of the level of importance of the interest to be safeguarded.

1.5 Major and Smaller Areas

Rules 1 and 2 imply consideration of the spatial extent of the area of amenity in the application of Rules 1 and 2.

1.6 Conclusion

Given that both the spatial extent in terms of major and smaller and the amenity value in terms of highest and high that must be considered in applying Rules 1 and 2, that no value in these terms is provided by either Schedule 9 to the Act, relevant Scottish Planning Policies or National Planning policy Guidelines, then these must be established on a project-by-project basis. Designations can be useful in giving an indication of the level of importance and thus value of the interest safeguarded. The note to The Holford Rules can thus only give examples of the designations which may be considered to be of the highest amenity value.

2. The setting of a Scheduled Ancient Monument or a Listed Building

The NGC note to Rule 2 refers to the setting of historic buildings and other cultural heritage features. NPPG 5: Archaeology and Planning refers to the setting of scheduled ancient monuments and NPPG 18: Planning and the Historic Environment refers to the setting Listed Buildings. None of these documents define setting.

APPENDIX B

ENVIRONMENTAL AND PLANNING DESIGNATIONS – EXAMPLES OF DESIGNATIONS TO BE TAKEN INTO ACCOUND IN THE ROUTEING OF NEW HIGH VOLTAGE TRANSMISSION LINES

Major Areas of Highest Amenity Value

1 In Scotland relevant national or international designations for major areas of highest amenity value include the following identified from Scottish Planning Policies and National Policy Guidelines:

Special Areas of Conservation	(NPPG 14)
Special Protection Areas	(NPPG 14)
Ramsar Sites	(NPPG 14)
National Scenic Areas	(NPPG 14)
National Parks	(NPPG 14)
National Nature Reserves	(NPPG 14)
Protected Coastal Zone Designations	(NPPG 13)
Sites of Special Scientific Interest	(NPPG 14)
Scheduled Ancient Monuments	(NPPG 5)
Listed Buildings	(NPPG 18)
Conservation Areas	(NPPG 18)
World Heritage Sites	(NPPG 18)
Historic Gardens and Designated Landscapes	(NPPG 18)

Other Smaller Areas of High Amenity Value

2 There are other designations identified in development plans of local planning authorities which include areas of high amenity value:

Areas of Great Landscape Value

Regional Scenic Areas

Regional Parks

Country Parks

The nature of the landscape in these areas is such that some parts may also be sensitive to intrusion by high voltage overhead transmission lines but it is likely that less weight would b given to these areas than to National Scenic Areas and National Parks.

Flora and Fauna

3 Legislation sets out the procedure for designation of areas relating to flora, fauna and to geographical and physiogeographical features. Designations relevant to the routeing of transmission lines will include Special Area of Conservation, Special Protection Area, Sites of Special Scientific Interest, National Nature Reserves, Ramsar Sites and may also include local designations such as Local Nature Reserve.

Area of Historic, Archaeological or Architectural Value

4 Certain designations covering more limited areas are of relevance to the protection of views and the settings of towns, villages, buildings or historic, archaeological or architectural value. These designations include features which may be of exceptional interest. Of particular importance in this connection are:

Schedule of Ancient Monuments

Listed Buildings, especially Grade A and Grade B

Conservation Areas

Gardens and Designated Landscapes included in the Inventory of Gardens and Designated Landscapes of Scotland

Green Belts

5 Generally the purposes of Green Belts are not directly concerned with the quality of the landscape.