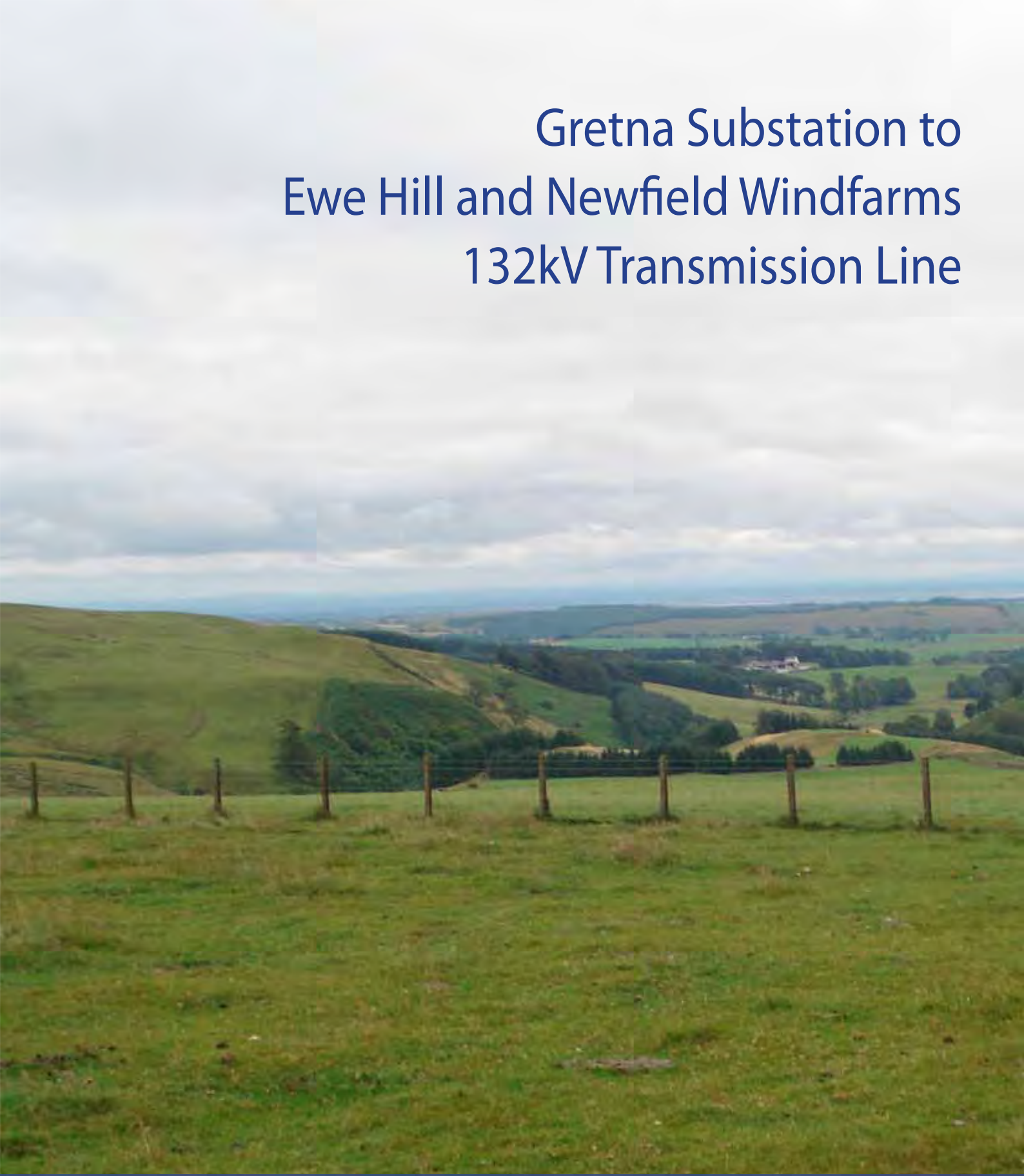
Gretna Substation to Ewe Hill and Newfield Windfarms 132kV Transmission Line



Environmental Statement

SP TRANSMISSION

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1 Introduction

1.1 INTRODUCTION

1.1.1 This Environmental Statement (ES) has been prepared in support of the Section 37 applications (under the Electricity Act 1989) to the Scottish Ministers to construct and operate the proposed scheme described below.

1.1.2 The proposed scheme will involve the construction of two new overhead electricity lines supported on double wood poles which will provide a grid connection for the consented wind farm at Ewe Hill and the proposed wind farm at Newfield, both of which are located to the west of Langholm in Dumfries and Galloway, Scotland. A shorth section of underground cable will be required to connect the overhead line into the existing electricity substation at Gretna and also at the Ewe Hill substation. The scheme will also include the construction of an electricity substation on the east side of Crawthat Hill and an access road that connects the substation to the B7068.

1.1.3 The locations of the existing Gretna substation and proposed Ewe Hill and Newfield substations are illustrated on Figure 1.1.

1.2 BACKGROUND

The Applicant

1.2.1 SPT (part of the Scottish Power group) is one of three transmission licence holders within the UK and as such is under a legal duty to develop and maintain an efficient, co-ordinated and economical transmission system of electricity supply in accordance with the Electricity Act 1989.

1.2.2 SPT is obliged to provide a connection to the existing electrical system for proposed developments within its licence area.

Project Need

1.2.3 As well as being required to provide both the proposed Ewe Hill and Newfield Wind Farms with a grid connection, Section 38 and Schedule 9 of the Act requires SPT to take account of the following when planning new overhead line developments:

"(a) to have regard to the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features of special interest and of protecting sites, buildings and objects of architectural, historic or archaeological interest; and,

(b) to do what he reasonably can to mitigate any effect which the proposals would have on the natural beauty of the countryside or on any such flora, fauna, features, sites, buildings or objects."

1.2.4 With these obligations in mind, SPT has sought to develop a grid connection which balances technical and economic considerations with environmental issues. In this case, after assessing various designs against standard technical and economic criteria, as well as environmental impacts, it was decided to make an offer to both wind farm developers based on a 132 kilovolt (kV) heavy duty wood pole connection.

Project Overview

1.2.5 SPT has identified that a grid connection is best achieved through the development of a new single circuit 132kV overhead line (OHL) approximately 15.5 kilometre (km) in length between the existing Gretna substation and the proposed Ewe Hill substation with a subsequent single circuit 132kV OHL, approximately 8.75km in length, between the proposed Ewe Hill and Newfield substations. Approximately 250m of underground cable will be installed to connect the OHL into the Gretna substation and approximately 100m of cable will also be installed to connect this line into the Ewe Hill substation.

1.2.6 Planning permission has been granted by Dumfries & Galloway Council for the construction of six turbines at the Ewe Hill Wind Farm. This development was initially part of an earlier application for 22 turbines which the wind farm developer is still progressing. The Newfield Wind Farm has not yet received planning permission and construction of the proposed scheme between the Ewe Hill and Newfield substations would be subject to this development gaining consent.

1.2.7 The OHLs proposed by SPT will be carried on heavy duty double wood pole structures. The OHLs will be subject to Section 37 consent and deemed planning permission from the Scottish Ministers.

1.2.8 The substation for the Newfield Wind Farm forms part of the individual Section 36 application submitted by the developer for that wind farm and therefore has not been assessed as part of the EIA of the proposed scheme, although it has been considered in terms of cumulative impact. The substation for the Ewe Hill Wind Farm will act as a "collector" substation to pick up load generated by both wind farms and will be operated by SPT. It has, therefore, required consideration as part of this EIA, as has a permanent access road connecting the substation to the public road network on the B7068.

1.2.9 Prior to the undertaking of the EIA and in line with SPT's obligations to consider the environmental effects of its projects, a comprehensive route selection study was undertaken. The study focused on identifying the environmental, technical and economic constraints to the routeing of both OHLs and underground cables and to the placement of the substation and access road, as discussed further in Chapter 2 of this ES.

1.2.10 Based on the route selection study, proposed routes were identified for both connections. Further information on the proposed routes, the design of the scheme and the alternatives considered are contained within Chapters 2 and 3 of this ES.

1.3 STATUTORY FRAMEWORK AND REQUIREMENT FOR EIA

1.3.1 The key legislation, policy and guidance identified as being of relevance to this project include the following:

- Electricity Act 1989;
- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 (amended 2008);
- Guidance on the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000, Energy Division of the Scottish Executive;
- European Council Directive on Environmental Assessment (85/337/EEC);
- European Council Directive on the assessment of the effects of certain public and private projects in the environment (97/11/EC);
- Town and Country Planning (Scotland) Act 1997;
- Guidelines for Environmental Impact Assessment, Institute of Environmental Management and Assessment, 2004;
- Planning Advice Note (PAN) 58 – Environmental Impact Assessment, September 1999, Scottish Executive; and
- Circular 8/2007 - The Environmental Impact Assessment (Scotland) Regulations 1999, Scottish Government.

1.3.2 Under Section 37 of the Electricity Act 1989, SPT is required to seek consent from the Scottish Ministers for the construction of any non-exempted OHL operating at a voltage greater than 20kV. Two separate applications (one for each connection) will be made by SPT to the

Scottish Ministers for Section 37 consent under the Act and at the same time, a request for deemed planning permission will be made under Section 57 of the Town and Country Planning (Scotland) Act 1997. The underground cable connections into the Gretna and Ewe Hill substations will also be subject to a request for deemed planning permission under Section 57 of the Town and Country Planning (Scotland) Act 1997.

1.3.3 The development of the proposed scheme is defined by the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 (amended 2008) as a 'Schedule 2 Development' as it is *"an electric line installed above ground with a voltage of 132 kilovolts or more, the installation of which (or the keeping installed of which) will require a Section 37 consent but which is not Schedule 1 development."*

1.3.4 Due to the nature and size of the scheme, it has been recognised that there is potential for significant effects on the environment, and on this basis SPT intends to submit this ES with the application for consent for each connection. In accordance with regulation 3(2), this intention to submit an ES confirms the scheme as an EIA development.

1.3.5 Although SPT intends that two Section 37 applications will be made (one for Gretna Substation to Ewe Hill Substation, and one for Ewe Hill Substation to Newfield Substation), one ES has been produced which identifies separately the predicted environmental effects of the two OHLs, as well as those arising from the OHLs in combination.

1.3.6 As the collector substation at Ewe Hill is necessary to the working of the OHLs, this will be included as part of the Gretna to Ewe Hill Section 37 application.

1.4 THE EIA PROCESS

1.4.1 EIA is the systematic process of identifying, predicting and evaluating the environmental effects of a proposed development. The EIA process is reported in this ES, which identifies the methodologies used to assess the beneficial and adverse environmental effects predicted to arise as a result of the construction and operation of the proposed scheme and, where appropriate, sets out mitigation measures designed to prevent, reduce and, if possible, offset significant adverse environmental effects. An assessment of residual effects (those environmental effects that remain following implementation of mitigation measures) is also presented.

1.4.2 The main steps in the assessment procedure can be summarised as follows:

- Examine the environmental character of the area likely to be affected by the development through baseline studies;
- Predict the possible effects on the environment, both beneficial and adverse, of the development;
- Introduce design and operational modifications or other measures to avoid, reduce or offset adverse effects, and where possible, enhance positive effects; and
- Summarise the results of the EIA in the ES. A Non-Technical Summary (NTS) of the ES is also produced.

1.4.3 A detailed explanation of the approach to undertaking the EIA and producing the ES is set out in Chapter 4.

1.5 ASSESSMENT TEAM

1.5.1 WSP Environmental Ltd (WSPE) has prepared the Environmental Statement with inputs from partner company Gillespies as well as RTS Ltd, SAC and Acorna Associates.

1.5.2 SPT was consulted regarding technical advice relating to design, construction and operation of the overhead line.

1.5.3 The EIA team comprised of the following key individuals:

Project Direction	Jenny Hazzard, BSc (Hons), MSc, FGS, AIEMA	WSP
Project Management	Andrew Ramand, BSc (Hons), MSc, DIC, AIEMA, MIEnvSc	WSP
Introductory Chapters, NTS	Andrew Ramand, BSc (Hons), MSc, DIC, AIEMA, MIEnvSc	WSP
Planning Context	Susan Irwine BSc (Hons), CMLI	Gillespies
Landscape and Visual Effects	Susan Irwine (Hons), CMLI	Gillespies
Ecology and Nature Conservation	Paul Baker, PhD, BSc (Hons), MIEEM	Acorna Associates
Archaeology and Cultural Heritage	Ian Barnes, BSc (Hons), MIFA	WSP
Geology and Soils	Jenny Hazzard, BSc (Hons), MSc, FGS, AIEMA	WSP
Hydrology	Andrew Ramand, BSc (Hons), MSc, DIC, AIEMA, MIEnvSc	WSP
Agriculture and Sporting Interests	Rachel Moir, MSci, MSc, AIEMA Graham Kerr, BSc (Hon)	SAC
Forestry	Norman O'Neill, BSc(For), MICFor, CEnv	RTS Ltd
Traffic and Transportation	Anna Duncan, BSc (Hons), MSc, AIEMA	WSP
Construction Noise	Lindsay McIntyre, BSc (Hons) MIOA	WSP
Operational Noise and EMFs	Various	SPT
Cumulative Effects	Various	WSP & Gillespies

1.6 STRUCTURE OF THE ENVIRONMENTAL STATEMENT

1.6.1 The main findings and conclusions of this ES are summarised in a Non-Technical Summary (NTS), as required by the EIA Regulations. The NTS is presented at the start of this ES, and is also made available as a separate document. The NTS summarises the key findings of the EIA in easily accessible, non-technical language, in order to ensure that everyone with an interest in the project can understand and access information on its predicted environmental effects without the need for a detailed understanding of the assessment process or the often technical language used to predict and report effects.

1.6.2 This ES and NTS accompany the Section 37 application for the OHLs being submitted to the Scottish Ministers in order to provide them and statutory consultees with the necessary and appropriate level of information on the proposed scheme and its predicted environmental effects.

1.6.3 The remainder of the ES is structured as follows:

- Chapter 2 Development of the Scheme and Alternatives;
- Chapter 3 Scheme Description;
- Chapter 4 Approach to Environmental Impact Assessment;
- Chapter 5 Planning Policy Context;
- Chapter 6 Landscape and Visual Effects;
- Chapter 7 Ecology and Ornithology;
- Chapter 8 Archaeology and Cultural Heritage;
- Chapter 9 Geology and Soils;
- Chapter 10 Hydrology and Hydrogeology;
- Chapter 11 Agriculture and Sporting Interests;
- Chapter 12 Forestry;

- Chapter 13 Traffic and Transportation
- Chapter 14 Construction Noise;
- Chapter 15 Electric Magnetic Fields (EMFs) and Operational Noise;
- Chapter 16 Cumulative Effects;
- Chapter 17 Schedule of Environmental Commitments; and
- Chapter 18 Summary of Predicted Residual Effects.

1.6.4 Supporting information for each of these technical chapters is presented in the various appendices to this ES.

1.7 AVAILABILITY OF THE ENVIRONMENTAL STATEMENT

1.7.1 Further copies of the ES are available from:

Ewe Hill & Newfield Project Manager
Scottish Power Energy Networks
New Alderston House
Dove Wynd
Bellshill
ML4 3FF

1.7.2 Further copies of the ES can also be obtained by emailing:

ewehillnewfield.projectmanager@sppowersystems.com

1.7.3 The Non Technical Summary (NTS) is available free of charge, a copy of the ES for £150.00 and copies of the technical appendices for £50.00. In addition, all documents are available (as a PDF for screen viewing only) as a DVD for £10.00 or can be viewed free of charge on the following web link:

www.spenergynetworks.com/publicinformation/performance.asp

1.7.4 Copies of the document will also be available for viewing at the following locations:

Council Offices	
Dumfries & Galloway Council Dryfe Road Lockerbie DG11 2AS	
Libraries	
Lockerbie Library 31-33 High Street Lockerbie DG11 2JL	Gretna Library Central Avenue Gretna DG16 5AQ
Scottish Government Library Saughton House Broomhouse Drive Edinburgh EH11 3XD	

1.8 REPRESENTATIONS TO THE APPLICATION

1.8.1 Any representations to the application should be made directly to the Scottish Government Energy Consents Unit at the following email:

representations@scotland.gsi.go.uk

1.8.2 Alternatively, representations to the application can be made by post to The Scottish Government, Energy Consents Unit, Scottish Government, 4th Floor, 5 Atlantic Quay, 150 Broomielaw, Glasgow, G2 8LU.

2 Development of Scheme and Alternatives

2.1 INTRODUCTION

2.1.1 The proposed OHL connections between Gretna substation and the proposed Ewe Hill Wind Farm and Newfield Wind Farm substations were identified following a detailed routeing study which considered the environmental, technical and economic constraints to overhead line development within the area.

2.1.2 The development of the 132kV OHL, underground cables and substation, including alternative routes and the different forms of connection considered, are summarised within this chapter.

2.2 ROUTEING STUDY

Overview

2.2.1 The early stages of work undertaken on routeing of the OHLs involved identification and analysis of environmental, landscape and technical constraints in a wide study area. From analysis of these constraints, a series of route corridor options for each OHL were identified, and more detailed appraisal of these options was undertaken. On the basis of the environmental, landscape and technical appraisals, preferred route corridors were identified for the OHL between Gretna Substation and Ewe Hill Wind Farm Substation and for the OHL between Ewe Hill and Newfield Wind Farm Substations.

Methodology

2.2.2 The first stage in the routeing assessment process was to establish and define the areas of search for the key environmental and technical constraints. The following two key areas were defined:

- Firstly, a study area was defined. This is the area within which it would be feasible to construct the proposed scheme, and to consider alternative alignments, whilst taking into account major topographical and infrastructure constraints such as high ground, ridgelines, settlements or existing OHLs.
- Secondly, a wider buffer area was identified which represents an area of 5km around the outside of the study area, in which it was recognised that there is potential for the proposed scheme to indirectly impact upon important designated areas, landscapes and views. This area was taken into consideration when defining OHL corridor options.

2.2.3 The study area and buffer area are illustrated on Figure 2.1.

2.2.4 The next stage of the process was to identify and collate relevant environmental and landscape baseline information for these areas. This process began with initial stakeholder consultation (discussed further in section 2.4) to identify relevant data and to obtain views from consultees on constraints and potential effects of the OHL options. Information on designated areas was identified where available from internet databases of the relevant environmental regulators and data providers. Baseline information was also obtained from local authority plans and policies, Ordnance Survey mapping, Environmental Statements for other projects in the area and a number of site visits.

2.2.5 Environmental, landscape and technical constraints information was then mapped using a Geographic Information System (GIS) and used to identify areas of least environmental constraint within which OHL corridors could be identified. This process included designated and sensitive areas which were defined according to a set of guidelines known as the ‘Holford Rules’

which are the industry-standard guidance for OHL routeing (see Appendix 2.1 of this ES). The constraints plans used for the corridor options appraisal are presented in Figures 2.2 a and b.

2.2.6 The Holford Rules (Table 2.1 below) refer to a hierarchy comprising 'major areas of the highest amenity value' (Rule 1) and smaller areas of 'high amenity value' (Rule 2). No specific guidance is provided on what constitutes major or smaller areas but the rules set out a series of potential designations which may be considered as environmental and landscape constraints. Supplementary notes to the Holford Rules prepared by the National Grid in 1992 (and subsequently reviewed and clarified by Scottish Hydro-Electric Transmission Ltd and SPT in 2003) also identify residential areas as being important on the grounds of 'general amenity'Tthe terms 'highest' and 'high' amenity are used to describe features of the natural and cultural environment. Based on the project team's experience with other OHL projects, particularly for issues of proximity of lines during construction and operation, in this study residential areas were considered in the category of 'highest' amenity for the environment.

Table 2.1 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 lines change direction.
Rule 3	Other things being equal, choose the most direct line, with no sharp changes of direction and thus with few angle towers.
Rule 4	Choose tree and hill backgrounds in preference to sky backgrounds, wherever possible, and when the line has to cross a ridge, secure this opaque background as long as possible and cross obliquely when a dip in the ridge provides an opportunity. Where it does not, cross directly, preferably between belts of trees.
Rule 5	Prefer moderately open valleys with woods where the apparent height of the towers will be reduced, and views of the line will be broken by trees.
Rule 6	In country which is flat and sparsely planted, keep the high voltage lines as far as possible independent of smaller lines, converging routes, distribution poles and other masts, wires and cables, so as to avoid a concatenation or 'wirescape'.
Rule 7	Approach urban areas through industrial zones, where they exist; and when pleasant residential and recreation 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.

2.2.7 The Holford Rules 3 to 7 refer to the identification of route alignments for OHLs and where these should be located to minimise environmental impact. These rules, and the accompanying guidance, were taken into account in the process of identifying a preferred OHL alignment within the two preferred route corridors.

2.3 ROUTEING CONSTRAINTS AND OPPORTUNITIES

2.3.1 The constraints analysis undertaken identified that there were relatively few areas of highest (or high) amenity value in the study area, and the approach therefore required a more detailed analysis of constraints which might not otherwise have been required in more constrained corridors. Hence the study adopted a focus on 'lesser' areas of constraint and, due to the relatively limited numbers of designations and environmental constraints in the study area, the approach drew closely on landscape and visual constraints which were identified at an early stage as being significant in the context of the study area and which were likely to provide the basis for a reasonable comparison of the potential effects of corridor options.

2.3.2 The key constraints identified from this process in the study area are summarised in Table 2.2 below.

Table 2.2 Summary of Study Area Constraints

Classification	Constraint
Technical	■ Existing 400kV Interconnector ■ Gradient greater than 15° ■ Underground gas pipelines ■ Minimise angles in line
Environmental	■ Ecologically designated sites ■ Cultural heritage designated sites ■ Settlements (noise and air quality) ■ Protected species ■ Commercial and non-commercial woodland ■ Tourism and recreation ■ Geological sensitivities ■ Watercourses
Landscape and Visual	■ Langholm Hills Regional Scenic Area ■ Individual residential receptors ■ Settlements (setting and views) ■ Cultural heritage designated sites (setting) ■ Landform ■ Intimate landscapes ■ Double climbing

Identification of Corridor Options

2.3.3 An initial process of identifying broad route corridors for OHLs indicated that there were too few highest and high amenity sites (as defined by the Holford Rules) within the study area to allow preferred route alignments for the two OHLs to be clearly identified using that approach. Therefore, an alternative approach was developed to identify narrower corridors which could be compared and appraised.

2.3.4 The process for defining the narrow corridors involved avoidance of the (relatively few) areas of Highest Amenity and using High Amenity constraints as a 'second tier' of constraints to be avoided as far as possible. This process also took account of guidance in the Holford Rules, particularly Rules 3 to 7 described in Table 2.1 above.

2.3.5 Each narrow corridor option comprised an approximately 400 metre wide buffer zone, within which it was considered an OHL could be aligned. These corridors sought to avoid the areas of Highest Amenity, although some sections of the corridors crossed small parts of various Highest Amenity areas. It was considered that these could be avoided through detailed routeing (also known as micrositing). The identification of these corridors also sought to avoid, where practicable, High Amenity constraints including landscape features such as summits, steep slopes,

ridgelines and intimate landscapes. However, given the nature of the topography, ground cover and land uses within the study area, it was not possible to completely avoid all of these constraints.

2.3.6 As a result of this process, six narrow corridor options were identified between Gretna Substation and Ewe Hill Substation and five options were identified between Ewe Hill Substation and Newfield Substation, as illustrated on Figures 2.3 a and b.

Appraisal of OHL Corridor Options

2.3.7 The corridor options were appraised through a high level assessment against environmental, landscape and visual, technical and economic criteria in order to filter out less favourable options, based on a matrix/framework approach. Since landscape and visual issues were identified as being important at an early stage in the options process, more detailed landscape and visual appraisal was undertaken involving the identification of landscape character types across the study area, fieldwork to determine and assess key views and assessment of landscape fit, visual amenity effects from individual properties and settlements and impacts on the settings of scheduled ancient monuments and other key buildings.

2.3.8 This appraisal was undertaken qualitatively, employing professional judgement of the relevant specialists in each case and drawing upon knowledge of the study area and its baseline landscape and environmental conditions. Based on this appraisal and taking consideration of the environmental, technical and economic constraints, preferred corridors were identified from the options to link both wind farms with Gretna Substation.

2.3.9 A detailed description of the corridor options appraised and the findings of the appraisals undertaken on each option were presented in the Consultation Document, which is presented in Appendix 2.2.

2.4 CONSULTATION

Preliminary Consultation and Options

2.4.1 Consultation has been on-going throughout the routeing assessment study. The main data gathering was undertaken at the start of the study (in August 2006) to provide essential baseline data and views of consultees on potentially significant environmental and landscape issues. This baseline data was then assembled and analysed. The baseline data gathering exercise was repeated again in 2008 and 2009 to ensure that all data remained current and up-to-date. Key regulatory authorities were also consulted to discuss the project.

2.4.2 Focussed consultation was undertaken in late 2006 and then again in 2009 to provide verification on a small number of issues which were identified by the study team during fieldwork on the options assessment. The consultations focussed on further identification of the presence of, and potential for, protected species and wintering birds, and on the potential effects of corridor options on existing commercial forestry and agricultural operations. The findings of this consultation were used to verify and finalise the options assessment process and the identification of the proposed corridors and alignments.

Landowner Consultation

2.4.3 SPT Wayleaves Officers have visited each of the affected landowners on several occasions during the OHL route option appraisals to ensure that landowner concerns were carefully considered as part of the appraisal process.

Public Consultation

2.4.4 A public consultation exercise was held by SPT during August and September 2009. This comprised the following:

- Production of a Consultation Document which was made widely available via Scottish Power's website.

- Production of a summary leaflet on the OHL proposals which was also made widely available via the website and at the public exhibition (see below).
- A public exhibition, open to all, was held at Waterbeck Hall close to the proposed study area from 31st August to 3rd September 2009. Exhibition boards were prepared to provide information on the proposals and copies of the Consultation Document and summary leaflet were available for review at the exhibition. The public exhibition was attended on 3rd September 2009 by staff from SPT, Gillespies and WSP to provide one-to-one information to the general public on the proposals.
- The public exhibition and the website details for obtaining information on the project were publicised in four local newspapers during August 2009. The advertisement also provided a postal address and email address to which comments on the proposals could be directed.

2.4.5 Following completion of the public consultation period in September 2009, a report of the responses received from the public and stakeholders was prepared. The key findings from this report were:

- Queries were raised as to why the proposed substations could not connect directly to the existing 400kV OHL (which follows the M74) or why the line could not be laid underground;
- Specific line positioning issues including impact on views, particularly around Kirtleton and Greenwrae Farm and areas of new forestry planting within the Solwaybank Estate;
- Queries were raised regarding electric and magnetic fields (EMFs); and
- Queries were raised regarding use of underground cables.

2.4.6 The responses received have aided SPT in reviewing and refining the preferred routes of the OHLs, a process which has culminated in the establishment of proposed routes as illustrated on Figures 2.4 a and b.

Stakeholder Consultation

2.4.7 Prior to the public consultation exercise, SPT, Gillespies and WSP met with Dumfries and Galloway Council (D&GC) and Scottish Natural Heritage (SNH) to discuss at an early stage the planning, environmental, landscape and recreational implications of the preferred OHL routes. This meeting, held in June 2009, was useful in confirming the extent of environmental surveys likely to be required to support the EIA process and in understanding the planning and development context of the study area which has also been subject to other applications for wind farm developments (see Section 5: Planning Context).

2.4.8 Gillespies also met on site with D&GC's Landscape Architect in November 2009 to discuss in greater detail potential landscape and visual impacts of the proposed OHLs and to agree viewpoints to be assessed as part of the Landscape and Visual Assessment within this EIA, including representative locations for the photomontage locations. An additional site visit was arranged in October 2010 with D&GC's Landscape Architect and SNH to discuss the potential impacts of a partial route alteration requested by the landowner at Cadgillhead Farm.

2.4.9 In parallel with the public consultation process, a large number of stakeholders were consulted during this period by means of a letter setting out information on the proposals (and including a copy of the summary leaflet or Consultation Document) and requesting views from the consultees on the project and its likely environmental implications. The organisations consulted are listed in Table 2.3 below.

Table 2.3 Stakeholder Consultees

Dumfries & Galloway Council Planning & Environment Services	Scottish Wildlife Trust
Scottish Natural Heritage	Forestry Commission
Historic Scotland	Scottish Rights of Way Society
Scottish Government Energy Consents Unit	Woodland Trust
Scottish Government Environment & Rural Affairs Department	Transco
Scottish Government Development Department	Bord Gais Eireann (Irish Gas Board)
Scottish Environment Protection Agency	Architecture & Design Scotland
Environment Agency (England)	National Trust for Scotland
Canonbie & District Community Council	Scottish Enterprise Dumfries & Galloway
Kirtle & Eaglesfield Community Council	OfCom
Middlebie & Waterbeck Community Council	Ministry of Defence
North Milk Community Council	Civil Aviation Authority
Scottish Water	National Air Traffic Services
Health & Safety Executive	Association for the Protection of Rural Scotland
Department for Trade and Industry	River Annan District Salmon Fishery Board
Visit Scotland Dumfries & Galloway	Farming and Wildlife Advisory Group (FWAG)
Coal Authority	National Farmers' Union
RSPB Scotland	British Trust for Ornithology
British Horse Society	Red Squirrels in South Scotland

2.4.10 In addition to the informal consultation undertaken, as described previously, a formal EIA Scoping Report was issued to the Energy Consents Unit (ECU) of the Scottish Government in February 2010 for wider circulation in order to consult with statutory consultees on the proposed scope of the EIA and to provide the opportunity for these organisations to comment on the proposals to inform the EIA process. The ECU coordinated circulation of the EIA Scoping Report to the statutory consultees and formal scoping responses were received from the following organisations and comments incorporated into the assessment process:

- D&GC;
- SNH;
- Historic Scotland;
- RSPB;
- Directorate for the Built Environment (Scottish Government); and
- Crown Estate.

2.4.11 Given the extensive consultation exercises undertaken during the initial routeing and later public consultation stages, including the EIA Scoping exercise, it was considered that sufficient

information had been received from consultees to allow the EIA to progress. A summary of relevant responses that were received, information provided during the initial routeing and public consultation exercises and where these responses have been addressed within this ES is presented in Appendix 2.3.

2.5 PROPOSED ALIGNMENTS AND SUBSTATION

Proposed OHL Alignments

2.5.1 Once a proposed corridor for each OHL had been selected, the OHL alignment within the corridor with the least environmental, landscape and visual, technical and economical conflicts was explored. This process was driven by technical requirements, including the appropriate distance between poles, minimum practicable changes in direction and avoiding slopes over 15 degrees, and using this information to define an alignment which minimises the effects on environmental, landscape and visual constraints.

2.5.2 The output from this process was an identified preferred OHL alignment in each of the two corridors with indicative pole positions based on average spans between poles. These preferred alignments were then presented for public consultation, as described in Section 2.4 above. The outcome of the public consultation has allowed the formalisation of these as proposed OHL alignments, as illustrated on Figures 2.4 a and b, and these are discussed further in the project description presented in Chapter 3 of this ES. These proposed alignments have been subject to detailed assessment as part of the EIA process to identify potentially significant environmental effects. They will also be subject to detailed surveying to assess suitability of the topography and ground conditions for construction.

Substations

2.5.3 The proposed OHLs will link three substations; the existing substation at Alderman's Seat (referred to as Gretna Substation in this ES), and proposed substations on Crawthat Hill for the Ewe Hill Wind Farm and on Hogg Hill for the Newfield Wind Farm. The proposed Ewe Hill Substation will be operated by SPT and therefore has been assessed as part of the EIA for the proposed scheme. A permanent access road will be required connecting the substation to the B7068. This has also been assessed as part of the EIA.

2.6 CONSIDERATION OF UNDERGROUND CONNECTION

2.6.1 As a transmission licence holder, SPT is required to comply with the relevant terms of the Electricity Act 1989. SPT is obliged to develop and maintain an efficient, coordinated and economical system of electricity supply whilst taking into account the environmental effects of its activities and mitigating any adverse effects.

2.6.2 It is SPT's policy to seek to find an overhead line solution for all transmission connections and only to use underground cables where there are exceptional constraints such as areas of the highest amenity value or in built up urban areas. Where technical constraints preclude the use of an overhead line, SPT will investigate using underground cables as an alternative.

2.6.3 The primary advantage of underground cables as opposed to an overhead line is the reduction in the impacts on landscape character and visual amenity. Whilst there are benefits to underground cable construction there are also adverse effects which require to be considered including potential effects on ground cover, vegetation, drainage, land use, habitats and natural heritage interests.

2.6.4 In addition, the costs associated with underground cables are typically significantly higher than those associated with constructing an overhead line. These costs are dependent on a number of factors such as ground conditions and the methods required to install the underground cables.

2.6.5 With regard to SPT's statutory duties under the Electricity Act, in developing the grid connections between the Gretna and Ewe Hill Wind Farm substations, and between the Ewe Hill

and Newfield Wind Farm substations, SPT considers that an OHL option would be the most efficient and economical solution, although for technical reasons, short sections of underground cable will be required to link the OHLs into the Gretna and Ewe Hill substations.

3 Scheme Description

3.1 INTRODUCTION

3.1.1 This section describes the proposed routes for the two OHLs and describes the various elements of the scheme that comprise of the following:

- 250m section of underground 132kV cable between Gretna substation and proposed terminal pole
- 15.5km of heavy duty wood pole between proposed terminal pole to the north of Gretna substation and the proposed Ewe Hill Substation at Crawthat Hill
- 100m section of underground 132kV cable between proposed terminal pole and the proposed Ewe Hill substation at Crawthat Hill
- New grid substation at Crawthat Hill
- 8.75km of heavy duty wood pole between the proposed Ewe Hill substation and the Newfield substation situated on Hogg Hill (Newfield substation does not form part of the scheme for which permission is being sought)

3.1.2 In addition, this section also presents an outline of the construction methods and associated transportation requirements associated with the elements of the scheme described above.

3.2 PROPOSED OVERHEAD LINE ROUTE

Description of the Study Area

3.2.1 The proposed OHLs will be located in Dumfries and Galloway in southwest Scotland, to the east of the M74 between the towns of Lockerbie and Langholm. A small section of underground cable will run north from the existing substation at Alderman's Seat (referred to as Gretna Substation in this ES) to the boundary of the field situated approximately 250m to the north. At this point, the cable will terminate on to an OHL that will run in a generally northwesterly direction to a new terminal pole adjacent to the proposed Ewe Hill Wind Farm substation location at Crawthat Hill. At this point the OHL will terminate on to a short 100m cable length of underground cable in order to avoid an overhead crossing of the proposed windfarm access road. Another OHL will continue from the substation in a northwest and then westerly direction to the proposed Newfield Wind Farm substation located on Hogg Hill to the southwest of Stobohill Farm.

3.2.2 The landform between the Gretna and Ewe Hill substations is generally flat or gently rolling and the land use is predominantly livestock farming, particularly cattle. North of Kirtleton, the ground rises sharply as the landform becomes more upland in nature. The landuse in this area is predominantly rough grazing and plantation woodland, reflecting the change in topography.

3.2.3 The landform between the proposed Ewe Hill and Newfield substations is uniformly upland in nature and as landuse is predominantly rough grazing and plantation forestry.

3.2.4 The closest town to the OHLs is Gretna, which is located approximately 3km to the south of the existing Gretna substation. Other town in the area include Lockerbie, which is located approximately 10km to the west of the proposed Ewe Hill substation and approximately 6km to the southwest of the proposed Newfield substation, and Langholm which is located approximately 10km to the east of the proposed Ewe Hill substation.

3.2.5 A number of villages are located within study area, including Chapelknowe, Evertown, Kirtleton, Waterbeck and Corrie Common. There are also numerous scattered settlements and dwellings located throughout the study area, as discussed further below.

Description of the Overhead Line Route - Gretna Substation to Ewe Hill Substation

3.2.6 The OHL is proposed to be routed from the existing Gretna Sub Station (located approximately 5km east of Junction 21 on the M74, NY328,714) to the proposed Ewe Hill Sub Station at Crawthat Hill (NY250,835) a distance of approximately 15.5km.

3.2.7 The line is proposed to leave the existing Gretna Sub Station in a northerly direction, passing through arable and grazing land, to the west of Greenwrae and Cadgillfoot farms and continuing in a generally northerly direction crossing the B6357 near Tympanheck. The line follows parallel with the road for approximately 300m before deviating westwards through Cadgill Wood, crossing Ned's Beck (watercourse) and passing immediately to the south of Cadgillhead Farm in order to avoid the intermediate bog and designated Site of Special Scientific Interest (SSSI) at Bell's Flow, the small stand of plantation woodland, to the south of Solwaybank and the local landowner's good quality silage fields. The line then continues in a north-westerly direction to the east of the property at High Stenries through a landscape characterised by its undulating landform, before continuing gently uphill in a north-westerly direction through a landscape of predominantly rough pasture with a few scattered trees.

3.2.8 The route then cuts through the western edge of a large area of mature coniferous tree plantation on the eastern valley side of the Kirtle Water and passing to the east of the small settlement at Kirtleton, before crossing the B7068 public road to the northeast of Setthorns and continuing northwest across the narrowing valley of the Kirtle Water and up the slope of the western side of this valley, following the incised path of the small burn, the Byre Cleuch. Above the headwaters of the Byre Cleuch, the topography flattens as the upper slopes of the moorland between Crawthat Hill (to the west) and Kirtlehead Hill (to the east) is reached and the route continues in a north-westerly alignment joining the proposed substation at an altitude of around 270m (the area of the proposed wind farm turbines is located approximately 2km to the north east).

3.2.9 The southern half of the route is characterised by flat topography (ranging from approximately 50m AOD to 120m AOD, scattered farmsteads, minor roads network and woodland copses of predominantly mixed deciduous species but also a proportion of coniferous tree groups. Due to its low lying nature the land is of a higher agricultural quality than the rest of the study area and the majority of the land cover is improved grassland with some arable fields. Views around the area, particularly from roads, are fragmented due to the field boundaries which typically consist of managed hedgerows. A striking feature within this landscape is the historic feature of Scots' Dike, a belt of mature native woodland planting, running east west from Scots' Dike to Craw's Knowe, a distance of approximately 5km.

3.2.10 The landscape character gradually changes from the lowland farmland to upland pasture landscape character areas. The topography, through the transitional areas is more undulating in nature and there are numerous small tributaries and watercourses which create localised incised valleys, with the ground rising steadily from the lower, agricultural areas to the lower slopes of the upland pasture areas. Settlements are generally isolated farmsteads with the notable exceptions of the villages of Kirtleton and Waterbeck.

3.2.11 The predominant land cover is rough pasture with some semi-improved areas and there has also been significant commercial woodland activity over the years with plantation woodland blocks at varying stages of growth. The proposed line would pass through part of one of the largest of these coniferous plantations, southeast of Kirtleton. In places longer distance views are obtainable; however these are dependant on the topography and woodland cover which can vary greatly within the study area, with striking contrasts between open, panoramic views and contained, short distant and focussed views.

3.2.12 The final 2km of the OHL passes through an upland pasture landscape, close to the Winterhope Reservoir, crossing the Kirtle Valley. The majority of the land is characterised by rough pasture and the area is sparsely settled - predominantly farm steadings. The topography is varied and the landform is undulating with gently rounded summits and rolling valleys with a range of

altitudes; the summits including Grange Fell at 319m AOD, Doe's Hill at 334m AOD and Crawthat Hill, the location of the Sub Station, at 280m AOD. On some of these summits are hill fort features associated with Iron Age settlers, the most notable being the settlement on Newhall Hill (NY237, 837).

3.2.13 Throughout the study area the road network is a series of minor roads with the key routes being; the B7068 which runs through the northern part of the site connecting the area to Lockerbie, in the west and Langholm in the east; the B725 and B722 which connect from the M74 through Waterbeck to Kirtleton and the B7068; and the B6357, the key road through the southern part of the study area, connecting to the M74 (J21) to the west and the A77(T) to the east.

3.2.14 There are no railway lines through the study area, the nearest railway is the main west coast line from London to Edinburgh/Glasgow which runs roughly consistent with the M74 corridor, approximately 3-4km to the west of the study area, at its nearest point.

3.2.15 There are no Designed Landscapes within the study area and the proposed OHL does not pass through any statutory designated sites, although the SSSI at Bell's Flow (NY318, 763) is located within 0.6km to the northeast of the line. The Regional Scenic Area around Langholm is approximately 1km to the east of the study area and just over 8km from the OHL at its nearest point. The OHL also passes through a 100m section of Cadgill Wood, which is recorded on the Ancient Woodland Inventory which requires an 80m wayleave to be felled and skirts around approximately 1km of the northern edge of the wood.

3.2.16 The alignment described here is shown on Figure 3.1.

Description of the Overhead Line Route - Ewe Hill Wind Farm Substation to Newfield Substation

3.2.17 The OHL would be routed from the proposed Ewe Hill Sub Station at Crawthat Hill (NY250,835) to the proposed Newfield Sub Station, at Hogg Hill (NY177,873) a distance of approximately 8.75km.

3.2.18 Initially the line would run north from the sub station, at Crawthat Hill before being routed to the north-west and running approximately parallel with the existing gas pipeline. The line would run near to the iron-age settlement on Craighousesteads Hill before traversing the Water of Milk valley and crossing the minor road near the property at Craighousesteads.

3.2.19 The OHL then continues in a roughly westerly direction, to the north of Corrie Common over rough grazing land and cutting through the southern part of a coniferous plantation before it continues in a westerly direction, to the south of the property at Little Whitriggs and over the Corrie Water, then in a north-westerly direction up the slopes of Hogg Hill, between existing mixed deciduous woodland blocks, to the proposed Newfield Sub Station.

3.2.20 Generally the area is sparsely settled - predominantly farm steadings. The topography is varied and the landform is undulating with gently rounded summits and rolling valleys with a range of altitudes; the summits including Grange Fell at 319m AOD, Doe's Hill at 334m AOD and Crawthat Hill, the location of the Sub Station, at 280m AOD. On some of these summits are hill fort features associated with Iron Age settlers, the most notable being the settlement on Newhall Hill (NY237, 837).

3.2.21 Woodland cover is, in the main, limited to small isolated pockets of plantation woodland which provide shelter for sheep, grazing this area, although there is a larger area of coniferous plantation to the north of Corrie Common. Much of the southern part of this woodland has been recently felled, with further felling and replanting scheduled. As with the areas of upland pasture, views are more extensive and expansive than the southern agricultural areas and the coniferous plantations around Corrie Common also include some of the few public footpaths and cycle routes. In the main, due to the area being predominantly farmland, there is very little public recreational access, in this area.

3.2.22 The area includes two attractive river valleys: the Corrie Water and the Water of Milk, the intimate nature of the landscapes, of both, contrasting strongly with the wider, open, upland grazing areas. Views are introspective or focussed along the lengths of the valleys.

3.2.23 The road network is a series of minor roads with the key route being; the B7068 which connects the area to Lockerbie, in the west and Langholm in the east. A number of other minor roads connect to local settlements such as Corrie Common, Boreland and Waterbeck.

3.2.24 There are no railway lines through the study area, the nearest railway is the main west coast line from London to Edinburgh/Glasgow which runs roughly consistent with the M74 corridor, approximately 3-4km to the west of the study area, at its nearest point.

3.2.25 There are no Ancient Woodlands or Designed Landscapes within the study area and the proposed OHL does not pass through any statutory designated sites. The Regional Scenic Area around Langholm is approximately 1km to the east of the study area and approximately 6km from the OHL, at its nearest point.

3.2.26 The alignment described here is shown in Figure 3.2.

3.3 COMPONENTS DESIGN & CONSTRUCTION

132kV Cable Installation

3.3.1 The two lengths of cable required to connect the OHL into the Gretna and Ewe Hill substations will comprise three cables in tre-foil arrangement with a multicelled duct laid alongside to allow for telecommunications control and monitoring cables. Each cable will comprise a copper or aluminium central conductor encased in XLPE insulation material, overlaid with a metallic sheath and final outer sheath of graphite coated polythene. The cables will be surrounded with well compacted, thermally selected sand and backfilled with suitably screened excavated material. Concrete cable markers will be deployed approximately every 50m along the route as a warning and indication that high voltage cable exists in the vicinity.

3.3.2 Where required, and particularly on slopes, measures such as impermeable bunds will be put in place within the cable trench to prevent this becoming a pathway for the movement of ground or surface water.

3.3.3 Following the construction of the trench and the installation of the ducts, the cables will be drawn through these.

132kV Substation

3.3.4 A new 132kV substation is proposed at Crawthat Hill near the Ewe Hill windfarm in order to collect the electricity generated by the Newfield and Ewe Hill windfarms. Due to the electrical layout and orientation of the substation it is proposed that the incoming Newfield circuit will directly tie into the substation via the wood pole OHL however the outgoing Gretna circuit will be via an underground cable for a short section before terminating on to the wood pole OHL. The substation will be unmanned, and visited only occasionally for monitoring and maintenance purposes.

3.3.5 A number of borrow pits are proposed in the Section 36 application for the Ewe Hill Wind Farm in order to provide appropriate aggregate for the construction of internal access roads within the wind farm and connecting to the substation. If practicable, aggregate from these borrow pits will also be used to construct the access road connecting the substation to the B7068. However, this will be subject to agreement between the Principal Contractor for the proposed substation and the Ewe Hill Wind Farm developer and its Principal Contractor.

3.3.6 If agreement cannot be reached between the Principal Contractor for the proposed substation and the Ewe Hill Wind Farm developer and its Principal Contractor, then it is assumed that an alternative borrow pit will require to be developed by the Principal Contractor for the

proposed substation in close proximity to the substation and its access road. However it is acknowledged that this will be subject to separate planning consent from D&GC.

3.3.7 As shown in figure 3.5, the substation will have two compounds. One compound, with an approximate footprint of 42m by 24m, will contain a custom built, brick or steel clad single storey substation control building of approximately 6m in height. A second compound, with an approximate footprint of 60m by 33m, will contain a grid transformer and one small earthing transformer. The control building will be linked to the operational equipment by a network of cables. The substation will be surrounded by a 2.74m high standard steel palisade security fence. The substation will not normally be illuminated during the hours of darkness however there is a requirement for floodlighting to enable personnel to work safely should emergency maintenance be required during this time. Lighting requirements will be designed to minimise light pollution and to direct the light source to within the substation compound.

The wood pole line

3.3.8 The proposed line will be constructed using newly designed "flat formation" wood poles with galvanised steelwork bracings supporting aluminium conductors.

3.3.9 The proposed design is described below and examples of pole support designs are shown at Figure 3.3.

Line height

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

3.3.11 Pole sizes will be selected to maintain this statutory clearance and will normally be in the range of 10.5m to 14m with 2.5m of the pole base fixed in the ground. Steelwork and insulators to support the conductors will be fitted above, adding approximately 2m to the overall line height. The maximum top height of the poles and steelwork and insulators is therefore 13.5m. Pole sizes may be reduced where there are short spans or on localised topography, or they may exceptionally be increased to provide adequate clearance for conductors over elevated land, structures or features.

Span length

3.3.12 The span lengths (distance between supports) also depend on the same criteria as line height and will vary from 59m to 100m, with an average span of 75m between supports.

Supports

- The line comprises a combination of four types of support or pole types:
- Intermediate;
- Section/angle section;
- Terminal; and
- Failure containment.

3.3.13 Intermediate structures are used where the overhead line follows a straight line/alignment. Options include single pole or 'H' pole structures. Both types of structure support steelwork and insulators to carry the conductors. In general, 'H' pole structures will allow for longer spans; the single pole structure being limited to approximately 60m spans (as outlined above). The single pole (rarely used) supports a steel cross arm of nearly 6m overall length. The 'H' pole comprises two poles set 3m apart, with a similar overall cross arm length.

3.3.14 In some situations the 'H' pole structure can be secured further with stays, allowing span lengths to increase. The 'footprint' of the structure will, however, be increased as a result. In order to maintain the stresses induced in the overhead line, 'H' pole structures are required at regular intervals along a straight line. There is also a need for the failure containment arrangement at regular intervals.

3.3.15 Angle section structures are used to enable changes of direction in the overhead line. Whilst there are minor differences in options for these structures, relating to the angle to be negotiated, all comprise 'H' pole structures, supported by a minimum of four stays (2 per pole). The maximum angle of deviation is 35 degrees from straight ahead.

3.3.16 Terminal structures are used at either end of the overhead line. The terminal structure allows the overhead line to be connected either to a cable or directly to a substation. The cable termination structure comprises a terminal pole with two smaller poles in front to support the cable termination.

3.3.17 Failure containment provision for conductor failure ('broken wire') situations is a requirement of European/British standard document BS EN 50431 specifying the design of overhead lines above 33kV. The failure containment structure is an 'H' pole configuration, with poles set at 6m apart, and stayed.

3.3.18 All wood poles are fully seasoned and treated with an appropriate preservative. The galvanised steelworks associated with this support (pole top steelwork) is assembled using galvanised high tensile steel bolts with nuts and locking devices.

Overhead line components

3.3.19 The single-circuit comprises three separate phase conductors which are attached to the pole top structure on insulators, made from porcelain, glass or modern composite materials. Insulators are fastened to the pole top steelwork. At intermediate supports the conductors sit on top of insulators. At other supports the conductors are cut and terminated on both sides of the pole with insulators placed on top of the steelwork. A fourth conductor is carried underneath the cross arm as an earth conductor. This earth conductor provides both a path for fault current and a means of transmitting protection and communication information via a fibre optic core. The overhead line is earthed at every pole using a copper conductor and copper rods beneath the ground in a cross formation emanating from the foot of the pole(s). The amount of earth conductor laid in the ground at any particular pole position is dependent on the resistance of the surrounding soil/rock at that point.

3.3.20 The conductors will be aluminium and will be 300mm^2 cross-section (24mm diameter) in order to provide the required capacity for the wind farms at Ewe Hill and Newfield. The earth wire which is carried beneath the conductors is 154mm^2 in cross section (14mm diameter).

Construction Access and Delivery of Materials

3.3.21 It is preferred to have vehicular access to every pole site for foundation excavation and installation. Additionally, the conductors are winched to/pulled from angle structures and thus access to these sites is required for conductor drums and winch tensioner.

3.3.22 No structures are proposed to be constructed within any watercourses during construction of the overhead lines. Where possible, construction vehicles will access pole positions using existing tracks and roads. Any watercourse crossing which are found to be necessary will be temporary and will comply with the Controlled Activities Regulations General Binding Rule 6.

3.3.23 Where new temporary access is required, this can take various forms and is dependent on ground conditions. In poorer conditions more access works may be required which can vary from laying temporary wooden or aluminium matting to, in some cases, installing crushed stone roads. Helicopters may also be used to facilitate access in sensitive or remote areas.

3.3.24 As discussed previously, a permanent access road will be constructed, connecting the Ewe Hill substation to the B7068, to the east of Grange of Tundergarth, as shown on Figure 3.4. This will require the installation of culverts to allow the bridging of three small watercourses, following discussion with SEPA.

3.3.25 Typically, construction and stringing of the conductors will require use of the following equipment:

- Tracked excavators;
- Conventional road lorries;
- Four-wheel drive lorries;
- Diesel generators; and
- Conductor drums and winch.

3.3.26 Site storage/assembly areas are identified and materials and equipment are delivered to these sites by conventional road transport using the local transport network. The locations of the site storage / assembly areas would therefore be carefully chosen by SPT's Principle Contractor to minimise traffic impact on the road network. Materials and static equipment are then transferred to tower sites using suitable four wheel drive vehicles while mobile equipment such as excavators and mobile cranes would track to these locations.

3.3.27 Access routes and detailed access arrangements would be agreed with each landowner by SPT's wayleaves staff following approval of the Section 37 application. Specific access track locations are therefore currently unknown and assessment of the environmental impacts of the tracks in this ES is, by necessity, generic. However, detailed mitigation measures have been included in the relevant chapters to reduce environmental impacts. Further consideration of the environmental effects specifically relating to movements of construction traffic for the Ewe Hill substation and access road is presented in Chapter 13, Traffic and Transportation.

Wood pole line sections

3.3.28 Single-circuit wooden pole line construction follows a standard sequence of activities these include:

- Felling where required;
- Establishment of temporary construction compounds;
- Preparation of accesses;
- Excavation of foundations;
- Delivery of poles;
- Erection of poles;
- Undergrounding/deviation of lower voltage lines where necessary for safety clearances;
- Delivery of conductor drums and stringing equipment;
- Insulator and conductor erection and sagging; and
- Clearance and reinstatement.

3.3.29 Construction is anticipated to take approximately three to four weeks per kilometre, resulting in a construction period of approximately 12 months for Gretna to Ewe Hill and 6.5 months for Ewe Hill-Newfield.

Underground Cable Section

3.3.30 The first three steps set out in 3.3.28 above will also apply to the underground cable construction process. For each cable, a 1m to 1.5m deep by 1m wide trench will then be excavated. The cables will be laid on a bed of thermally selected sand and backfilled with the previously excavated material, with the excess material spread in proximity to the excavation, in agreement with the landowner.

Land use during construction

3.3.31 Access for construction requires an area at least 600m^2 (30m x 20m) at pole sites (to be fenced off/demarcated to limit construction activities to this area) and a 5m wide swathe under the conductors along the route, whilst conductor stringing is in progress. Where required this area will be locally levelled to allow installation of the wood poles.

3.3.32 Additionally a working area of 1,200m^2 (60m x 20m) will be required approximately every 2km along the overhead line to accommodate the winches required for stringing the conductors. These working areas will be located depending on the availability of access and the terrain, number of angle structures and severity of angle deviations and in the light of the pre-construction environmental surveys. The greater the severity of angle deviations, the closer the working areas will be required. These working areas will not extend more than 80m beyond the last wood pole being strung in that section.

3.3.33 At convenient places along the route, temporary storage areas may be required for the dispersal of plant and equipment. These will be agreed between the contractor and the landowners. Identification of these will be undertaken to minimise any potential environmental effects and will comply with the requirements of the contractor's Environmental Management Plan.

Wood pole erection

3.3.34 The erection of wood poles requires excavation (typically 3m^2 and 2m deep) to allow the pole brace blocks and/or steel foundation braces to be positioned in place. Each support's earth mat is installed, comprising two earth conductors laid at the base of the pole in an 'X' arrangement horizontally, about 600mm deep. Earth rods are inserted vertically along the route of these conductors.

3.3.35 The excavation is then backfilled and consolidated in layers, normally with the original materials. Topsoil is reserved for the top layer and any surplus subsoil or rock is removed from the site. Any turf or similar vegetative covering will have been carefully removed and stored for the duration of the works and will be used to complete the reinstatement.

3.3.36 Where required limited levelling of the ground will be undertaken at the location of the woodpoles to allow the construction processes to be undertaken. This will be kept to the minimum required to undertake the construction and will be made good following construction to avoid any additional effects.

3.3.37 Where required the woodpoles are stayed using galvanised wires located with earth anchors or "deadmen" as appropriate to the ground conditions.

3.3.38 Where required the construction of woodpoles can involve the use of "floating foundations" or soil mixing techniques to stabilise poor ground conditions for construction.

Wood pole conductor stringing

3.3.39 Once all poles within the section of line under construction have been erected, all poles are fitted with insulator supports. Running blocks are fitted to the top of the insulator support and the conductors are fitted using the following techniques.

3.3.40 Drums of conductor and a tensioner with a hydraulic brake are located in a working area at one end of the line section, with the pulling winch at the other. The conductor is joined to a

single, heavy-duty pilot wire and drawn through the section, one conductor at a time, under constant tension. During stringing, radio communication is maintained between the operators of the pulling winch, the tensioner, hydraulic brake and intermediate observation points so the pulling can be stopped if problems arise. By using the 'Continuous Tension Stringing' method the conductors are held aloft at all times and do not touch the ground or any other structures.

3.3.41 Overhead line conductors are usually erected from one end of the line, in short sections (up to 2km, dependent upon the terrain and complexity of the design). Temporary stays will be required along the line to balance the conductors as the build progresses to the other end. These stays will be installed and removed along the length of the line as the individual sections are completed.

Infrastructure Location Allowance

3.3.42 Allowance needs to be made for minor on-site 'micrositing' to allow for slight deviations to wood pole locations depending on localised ground condition issues identified in pre-construction surveys and also landowner requests. This is also referred to as the 'Infrastructure Location Allowance' (ILA). For heavy duty wood poles, an ILA of 25m either side of the OHL is required in order to allow for minor adjustments to wood pole locations. Any adjustment to the wood pole locations would be subject to agreement with the landowner.

3.4 CONSTRUCTION OF THE SUBSTATION

3.4.1 The construction of the substations will comprise the following tasks:

- Felling (where required);
- Preconstruction activities;
- Earthworks to form construction platform;
- Formation of concrete bases for control building, transformer and other structural elements;
- Construction of control building;
- Electrical plant and cable installation;
- Establishment of secure compound and facilities;
- Commissioning of installations; and
- Reinstatement of perimeter and removal of any temporary works.

Pre-construction activities

3.4.2 Prior to commencement of permanent works, a secure site compound, facilities and access will be provided. This will include for the provision of bunding and other measures to ensure that environmental management can be achieved and that any plant or items which may give rise to spills of contamination are protected.

Earthworks

3.4.3 Any turves, topsoil and subsoil over the site will be removed and stored for subsequent reuse in restoring temporary works areas. Any unsuitable material will be disposed of according to the waste management plan.

3.4.4 In order to create a level flat construction platform, suitably graded aggregate will be placed in layers and compacted. This work will include provision for local patterns of drainage to be retained and drainage measures will be incorporated as required. It is envisaged that the aggregate for these bases will be sourced from the site borrow pits that have been approved and established for the construction of the wind farms.

Concrete bases

3.4.5 Following the completion of the construction platform, concrete bases will be cast for the individual elements of the substation requiring this support.

Control buildings and electrical plant installation

3.4.6 The control buildings will be single storey (see Figure 3.5) and constructed using normal construction techniques, using brickwork or profiled steel cladding. These will be fitted out with the electrical and control plant required for the substation.

3.4.7 The equipment forming the network within the compound including busbars, insulator supports and disconnectors will be delivered on normal HGVs and will be assembled and prepared on the pre cast foundations as required.

3.4.8 The transformers will be delivered by specialist HGVs and located within the substations.

3.4.9 The electrical connections within the substations and switchyard will be completed using large diameter tubular conductors and cabling.

3.4.10 The connections to the overhead lines on the strain gantries will be made to complete the required electrical connections.

3.4.11 Following completion of this there will be a period of commissioning and testing.

Construction Noise

3.4.12 Noise impacts associated with the delivery and installation of the wooden support poles and electricity cabling, including all ancillary operations such as site preparation and delivery, are likely to be short-term and transient in nature. To ensure construction noise is minimised, a number of measures will be implemented as outlined in British Standard (BS) 5228. These include:

- Exhaust silencing and plant muffling equipment to be maintained in good working order;
- All working to be undertaken during the normal working day; and
- Loading/unloading sites to be located away from residential or other sensitive properties and shielded from those properties where practicable.

3.4.13 Further consideration of Construction Noise is presented in Chapter 14 of this ES.

3.5 SITE REINSTATEMENT AND RESTORATION

3.5.1 Once the new OHLs have been commissioned, the sites will be reinstated. Contract requirements will include removal of all temporary access tracks, all work sites around conductor pulling positions and the restoration of all construction compounds. All work will be carried out taking account of environmental constraints and committed mitigation measures would be implemented (see Schedule of Environmental Commitments in Chapter 17).

Tracks

3.5.2 Little if any ground restoration would be required where matting used for short-term access on reasonably firm ground is removed. Where tracking has been left in-situ for lengthy periods of time, some compaction may have taken place. Remedial sub-soiling / cultivation might be required in these locations depending on the levels of compaction and taking account of any environmental constraints such as buried archaeology etc.

3.5.3 Where floating stone access tracks have been used over peat, an indentation as a result of the compaction and settling from the stone installation could be left. The risk of compaction would be minimised by:

- Using suitably graded geotextiles and geofabrics to spread the weight of the track;
- Micrositing tracks to avoid any particularly wet areas of peat; and

- Using appropriate drainage techniques to maintain the natural hydrology of the peat.

3.5.4 Following removal of the floating tracks, the line of the tracks would be allowed to revegetate naturally to reduce the risk of impact from further intrusive methods.

3.5.5 Where tracks which have been dug in are removed, the land would be gently graded back to fit with the surrounding topography. Culverts could be left in place in these situations unless an environmental interest makes this undesirable. Leaving culverts in place could reduce disturbance in the future if maintenance works were required.

3.5.6 A separate planning permission would be required to leave any temporary tracks in place permanently.

3.6 OPERATIONAL PHASE

General Operation and Maintenance

3.6.1 In general, a transmission line requires very little maintenance. It is periodically inspected to identify any unacceptable deterioration of components so that they can be replaced. From time to time inclement weather, storms or lightning, can cause damage to either the insulators or the conductors. If conductors become damaged, short sections may have to be replaced and that would involve winching to or from angle poles. Insulators and conductors are normally replaced after approximately 40 years.

3.6.2 Operational traffic is considered to be limited to pedestrian access although the use of four wheel drive vehicles or vans may be required to undertake routine maintenance of the lines and poles. Helicopter surveys may also be undertaken at times.

3.7 DECOMMISSIONING

3.7.1 It is recognised that the lifetime of the proposed scheme is directly linked to that of the wind farms, and may therefore require dismantling and removal at some point in the future.

Wood Pole Line

3.7.2 The typical sequence of events for the dismantling of an overhead line is as follows:

- select sections for dismantling;
- prepare access (if not already existing);
- prepare conductors at intermediate poles;
- bring a winch into position and winch conductors onto drums;
- transport drums away to storage area;
- excavate poles;
- remove poles from site; and
- re-instate pole site and access.

3.7.3 The position of the winch which removes the conductors is not as critical as it is for new build. It can normally be placed some distance from the angle poles, close to existing tracks or roads.

3.7.4 Empty drums will be delivered to the winch position, and full drums of old conductor removed from site using four-wheel drive crane lorries.

3.7.5 Insulators will be taken down from the poles after the conductors have been removed, and then the poles are removed from site.

Substation

3.7.6 The substation compounds would all be made good at the end of construction with all buildings and materials removed and soils appropriately restored. The requirement for any planting and/or seeding would be identified once sites are chosen and all necessary measures would be identified in the EMP.

4 Approach to Environmental Impact Assessment

4.1 INTRODUCTION

4.1.1 This chapter sets out the broad approach which has been followed in undertaking the EIA. It summarises the key stages followed, consistent with EIA legislation, guidance and good practice, in addition to setting out the assumptions made during the EIA process.

4.1.2 The structure of the ES follows the requirements of the Electricity Works (EIA) (Scotland) Regulations 2000 (amended 2008) and other relevant EIA good practice guidance as described in Planning Circular 8/2007. The ES comprises three main components – a non-technical summary (NTS), the main ES text and figures (including a summary table of the predicted Environmental Impacts and a Schedule of Mitigation), and the ES Technical Appendices.

4.1.3 An overview of the methodology adopted for each technical study is provided within the respective ES chapters (Chapters 6 to 15).

4.2 THE ELECTRICITY WORKS (EIA) (SCOTLAND) REGULATIONS 2000 (AMENDED 2008)

4.2.1 EIAs have been required for certain major developments since the implementation in the UK of the European Council Directive on Environmental Assessment (EC Directive 85/337/EEC). The Directive was implemented in the UK in 1988 and subsequently amended by Directive 97/11/EC.

4.2.2 Directive 97/11/EC is implemented by the Electricity Works (EIA) (Scotland) Regulations 2000 (amended 2008). These Regulations set out the information that must be included in an ES, such as:

- A description of the development, comprising information about the site and the design and size of the project;
- An outline of the main alternatives considered and an indication of the main reasons for the chosen scheme;
- The data necessary to identify and assess the main effects that the project is likely to have on the environment;
- A description of the likely significant effects of the project on the environment;
- A description of the mitigation measures envisaged to avoid, reduce or remedy significant adverse effects;
- An indication of any difficulties encountered in compiling the required information; and
- A Non-Technical Summary of the above information.

4.2.3 The proposed scheme, as described in Chapter 3 of this ES, is defined by the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 (amended 2008) as a 'Schedule 2 Development' as it is "an electric line installed above ground with a voltage of 132 kilovolts or more, the installation of which (or the keeping installed of which) will require a Section 37 consent but which is not Schedule 1 development."

4.2.4 Due to the nature and size of the proposal, it is recognised that the scheme has the potential to have significant effects on the environment, and on this basis SPT proposes to submit this Environmental Statement with the application for consent for each connection. In accordance with regulation 3(2), this intention to submit an Environmental Statement confirms the scheme as an EIA development.

4.2.5 Although SPT intends that two Section 37 applications will be made (one for Gretna Substation to Ewe Hill Substation, and one for Ewe Hill Substation to Newfield Substation), it is proposed that one ES should be produced which identifies separately the predicted environmental effects of the two OHLs, as well as those arising from the scheme in combination.

4.2.6 The substation for the Newfield Wind Farm forms part of the individual Section 36 application submitted by the developer for that wind farm and therefore will not be assessed in the EIA for the proposed OHLs, although it has been considered in terms of cumulative impact.. The substation for the Ewe Hill Wind Farm will act as a "collector" substation to pick up load generated by both wind farms and will be operated by SPT. It has, therefore, required consideration as part of this EIA, as has a permanent access road connecting the substation to the public road network on the B7068.

4.3 ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

4.3.1 The findings of the EIA are presented in this ES which has been prepared in accordance with the relevant EIA Regulations and best practice guidance.

4.3.2 The broad approach which has been followed in undertaking the EIA is presented in this chapter and an overview of the methodology adopted for each technical study is provided within the respective ES chapters (Chapters 6 to 15).

4.4 THE EIA PROCESS

4.4.1 EIA is the systematic process of compiling, assessing and presenting all of the significant environmental effects of a proposed development. The assessment is designed to inform the decision-making process to result in an environmentally acceptable project. Identification of potentially significant adverse environmental effects then leads to the design and incorporation of appropriate mitigation measures into both the design of the scheme and the way in which it is constructed.

4.4.2 Throughout the assessment, a distinction has been made between the term 'impact' and 'effect'. The EIA Regulations refer to the requirement to report the significance of "effects". An impact has been defined as the physical change of characteristics of the receiving environment being described as a result of the development (e.g. noise from construction traffic), whereas an effect refers to the outcome or result of this impact (e.g. a significant increase in noise levels above baseline conditions at roadside properties). These terms have been adopted throughout this ES to present a consistent approach to the assessment and evaluation of effects and their significance.

4.4.3 The main steps in the EIA process for the proposed scheme have been as follows:

- Baseline surveys, where required, have been undertaken to provide information on the current environmental character of the site and the surrounding area;
- Key features which may change the character of the site, both positively and negatively, have been identified;
- Consideration has been given to the possible interactions between the proposed scheme and the existing and predicted future site conditions. These interactions or effects have been assessed using stated criteria based on accepted guidance and best practice;
- Using the initial designs of the proposed scheme, the possible environmental effects, both direct and indirect, has been predicted;
- Mitigation measures have been identified to avoid, reduce or off-set adverse effects and enhance positive impacts. Alterations to the design were then reassessed and the effectiveness of mitigation proposals determined;

- An assessment of the significance of any residual effects after mitigation has been undertaken in relation to the sensitivity of the feature impacted upon and the magnitude of the effect predicted, in line with the methodology identified below;
- Any uncertainties inherent in the methods used, the predictions made and the conclusions drawn were identified and recorded during the course of the assessment process; and
- The results of the EIA are reported in this ES.

4.5 CONSULTATION AND EIA SCOPING

4.5.1 As part of the Routeing Study and Public Consultation process, consultation has been undertaken with statutory and non-statutory consultees. The aims of this were:

- To request information in order to understand and identify the environmental baseline;
- To inform consultees and the public about the details of the proposed scheme and how routes for the OHLs were identified; and
- To enable consultees to express their opinion on the scheme and the methods that would be employed in undertaking the EIA.

4.5.2 The consultation process followed as part of the Routeing Study and Public Consultation has been described previously in Section 2.4 of this ES.

EIA Scoping

4.5.3 Following the end of the Consultation period and production of the Consultation Document, an EIA Scoping Report was prepared and submitted in February 2010 to the Energy Consents Unit (ECU) of the Scottish Government with a request for an EIA Scoping Opinion in accordance with Regulation 7 of the Electricity Works (EIA) (Scotland) Regulations (As amended) 2008.

4.5.4 This provision of the Regulations allowed SPT to seek clarification from Scottish Ministers as to the information required to inform the EIA process prior to preparing the ES and submitting the Section 37 Application. Scoping is a preliminary task within the EIA process and the Scoping Request provides a focus and mechanism for consulting on and agreeing the content and methodology of the subsequent EIA.

4.5.5 In responding to the request with a formal Scoping Opinion, the Scottish Ministers obtained the views from the following organisations and comments incorporated into the assessment process:

- D&GC;
- SNH;
- Historic Scotland;
- RSPB;
- Directorate for the Built Environment (Scottish Government); and
- Crown Estate.

Consultation Responses

4.5.6 The key issues identified during the various consultation processes (including the Routeing Study and Public Consultation) and a reference to where each issue has been addressed within the ES is presented is presented in Appendix 2.3.

4.6 SCOPE OF THE EIA

Technical Scope

4.6.1 The proposed scheme has been assessed in relation to a number of environmental topics as part of the EIA. Each issue has been considered to the appropriate level of detail in this ES, using the information collated during the various stakeholder and public consultation exercises

Temporal Scope

4.6.2 For construction effects, the assessment takes into account the time of day that works are likely to be undertaken, for example any night time working required to minimise disruption to road users may have a noise impact on residential properties.

4.6.3 Given the time lag between assessment and commencement of construction, it is likely that various check surveys will be required prior to commencement of construction, for example to confirm the presence or absence of protected species. These are included as proposed mitigation measures in this ES where appropriate.

Spatial Scope

4.6.4 The spatial scope of the EIA, in other words the geographical coverage of the assessment undertaken, has taken account of a number of factors, in particular:

- The extent of the proposed works, as defined by the proposed OHL route alignments;
- The nature of the baseline environment, sensitive receptors and the likely effects that could arise; and
- The distance over which predicted effects are likely to remain significant and in particular the existence of pathways which could result in the transfer of effects to a wider geographical area than the extent of proposed physical works.

4.6.5 In addition to effects arising as a result of the scheme, the ES is also required to assess the predicted significant cumulative effects likely to arise as a result of the proposed scheme in combination with other proposed developments in the area. A geographical buffer has not been defined for identifying relevant developments to include in this assessment, but rather professional judgement and the knowledge of the project team and consultees has been used to determine the most appropriate other developments to consider. The assessment of cumulative effects is presented in Chapter 16.

4.7 ASSESSMENT OF EFFECTS

4.7.1 Within this ES, the assessment of effects for each environmental topic takes into account the environmental impacts of both the construction and operational phases of the scheme. Furthermore a number of criteria are used to determine whether or not the potential effects of the development are likely to be ‘significant’. These significance criteria vary between topics but generally include:

- International, national and local designations or standards;
- Relationship with planning policy;
- Sensitivity of the receiving environment;
- Reversibility and duration of the effect; and
- Inter-relationship between effects.

Sensitivity or Importance of Receptor

4.7.2 The sensitivity of the baseline conditions is assessed according to the relative importance of existing environmental features on or near to the proposed scheme (e.g. whether it is of

national, regional or local importance), or by the sensitivity of receptors which would potentially be affected by the proposed scheme. Criteria for the determination of sensitivity (as 'high', 'medium', or 'low') or of importance (e.g. 'international', 'national', 'regional' or 'authority area') are established based on approved guidance, legislation, statutory designation and/or professional judgment. The criteria for each environmental parameter are provided in the relevant chapter of the ES.

Magnitude of Impact

4.7.3 The magnitude of potential impacts (both positive and negative) on environmental baseline conditions is identified through detailed consideration of the proposed scheme taking into account the following:

- Relevant legislative or policy standards or guidelines;
- The degree to which the environment is affected, e.g. whether the quality is enhanced or impaired;
- The scale or degree of change from the existing situation as a result of the effects;
- The duration of the effect, e.g. whether it is temporary or permanent; and
- The reversibility of the effect.

4.7.4 The criteria used to assess impact magnitude are provided in the relevant chapter of the ES

Significance of Effects

4.7.5 The significance of effects reflects judgements as to the importance or sensitivity of the affected receptor(s) and the nature and magnitude of the predicted changes. For example a major negative impact on a feature or site of low importance will be of lesser significance than the same impact on a feature or site of high importance. Table 4.1 below is used as a guide to the relationship between the sensitivity of the identified receptor and the anticipated magnitude of an impact. Professional judgement is however equally important in verifying the suitability of this guiding 'formula' to the assessment of the significance of each individual effect.

Table 4.1 Guide to the inter-relationship between Magnitude of Impact and Sensitivity of Receptor

Magnitude	Sensitivity		
	High	**Medium**	**Low**
High	Major	Moderate/Major	Moderate
Medium	Moderate/Major	Moderate	Minor
Low	Minor/Moderate	Minor	None

4.7.6 The following terms are used in the ES, unless otherwise stated, to determine the level of effects predicted to occur:

- **Major positive or negative effect** – where the scheme would result in a significant improvement (or deterioration) to the existing environment;
- **Moderate positive or negative effect** – where the scheme would result in a noticeable improvement (or deterioration) to the existing environment;
- **Minor positive or negative effect** – where the scheme would result in a small improvement (or deterioration) to the existing environment; and

- **None** – where the scheme would result in no discernible improvement (or deterioration) to the existing environment.

4.7.7 The effects considered to be significant are determined within each chapter with significant effects generally considered as those predicted to be Moderate or above.

Construction, Permanent & Operational Effects

4.7.8 Effects have been separated into three 'types' based on different phases of the scheme:

- Construction effects are temporary, short-term effects that occur during the construction phase only;
- Permanent effects are those long-term effects that would occur as a result of the scheme and may include the introduction of new structures or the loss of habitat; and
- Operational effects, i.e. those resulting from operation and maintenance of the OHLs, underground cables, substation and access track.

Decommissioning Effects

4.7.9 Should the OHLs, underground cables, substation and access track require decommissioning, this would involve the use of small scale plant and equipment similar to those involved in construction. Therefore, effects arising from decommissioning are similar to those predicted to occur during construction. They would include temporary disturbance of land and habitats as well as the increased risk of pollution. For the purposes of this EIA, effects resulting from decommissioning have been assessed as the same for construction.

Inter-Relationships Between Effects

4.7.10 For the purposes of the EIA, the potential effects of the scheme are considered in terms of effects on each of the discrete environmental topic areas. However, in reality, topic areas such as 'water quality', 'ecology' or 'landscape' cannot always be considered in isolation since changes affecting one factor may often have secondary implications for other areas. Thus, if one effect of the scheme is alteration of the quality and quantity of a watercourse, flora and fauna may be affected as a secondary effect. Under some circumstances, it is possible for the secondary or indirect effects to actually be more significant than the changes that triggered them. Therefore where potential interactions between environmental topic areas occur these are highlighted in the text.

Cumulative Effects

4.7.11 As previously discussed, it has also been necessary to consider the cumulative effects of the proposed scheme alongside other proposed developments in the area through a review of live planning applications and other known committed development proposals. This review has taken into account existing planning applications which are not yet determined together with developments which benefit from a development consent such as planning permission or consent under the Electricity Act.

4.7.12 Cumulative effects may arise where, for example, landscape and visual resources, land use or ecological receptors are impacted on by other developments in addition to the proposed scheme. The cumulative assessment also considers the combined effects of the proposed scheme on a combination of elements of the environment or of sensitive receptors, and the cumulative effects of different impacts upon individual and groups of receptors.

4.7.13 Cumulative Effects are addressed in more detail in Chapter 16 of this ES.

4.8 UNCERTAINTY, ASSUMPTIONS AND LIMITATIONS

General

4.8.1 The EIA process is designed to enable good decision-making based on the best possible information about the environmental implications of a proposed development. However, there will always be some uncertainty as to the exact scale and nature of the environmental effects. This uncertainty arises because of the level of detail and information about the scheme available at the time the assessment was carried out and/or due to the limitations of the prediction process itself.

4.8.2 Key issues relating to assumptions are described below. Other topic specific assumptions are set out, where necessary, in Chapters 6 to 15 of this ES.

Level of Design Detail for EIA

4.8.3 It is acknowledged that the scheme which is eventually designed and constructed may differ slightly from the design details that have been used in the EIA and reported in this ES. Allowance needs to be made for minor on-site 'micrositing' to allow for minor deviations to wood pole locations according to pre-construction surveys and landowner issues. This is referred to as the 'Infrastructure Location Allowance' (ILA). Further discussion of the ILA is presented in Section 3.3 of this ES. The EIA has been undertaken based on a design which specifies pole locations, however, as these are subject to minor deviations depending on site specific topography and ground conditions, the assessment considers the area surrounding wood pole locations. A balance has been sought in the EIA between, on the one hand, specifying enough detail to undertake an assessment that meets the requirements of the EIA Regulations, and on the other hand, avoiding over specification of the design to a point that restricts the scope for cost effective design.

4.8.4 The environmental effects that are reported in this ES represent a worst case scenario and the level of mitigation described effectively sets the minimum standard which will be achieved by the final scheme. SPT is committed to ensuring that where details of the scheme differ from those assessed in the EIA, the project will not generate additional significant adverse environmental effects that have not been assessed in the EIA.

4.9 MITIGATION

Approach to Mitigation

4.9.1 The EIA Regulations require the EIA to present a description of the measures proposed to avoid, reduce and, if possible, offset significant adverse effects. Wherever reasonably practicable, mitigation measures are proposed for each significant environmental effect predicted, and can take various forms including:

- Changes to the scheme design;
- Physical measures applied on site; and
- Measures to control particular aspects of the construction or operation of the scheme.

4.9.2 The extensive routeing process that was undertaken for the OHLs was an iterative process, the main aim being to seek to avoid sensitive receptors where possible and therefore avoid or reduce the potential for significant effects.

4.9.3 Mitigation measures have been presented as commitments by SPT within each of the technical chapters of this ES in order to ensure a level of certainty as to the environmental effects of the proposed scheme. These have also been collated in the Schedule of Environmental Commitments presented in Chapter 17. As a result, it can therefore be assumed that SPT is committed to implementing, or to require implementation of all of these measures.

4.9.4 There are various ways in which a level of certainty can be ensured, such as through the use of planning conditions. Whilst the planning authority can seek to ensure the implementation of

specific mitigation measures where these are deemed to address a significant environmental impact that would otherwise make the proposal unacceptable on planning grounds, there are a range of other mitigation measures proposed in the ES which do not fall into this category but which, nonetheless, seek to ensure the most environmentally acceptable scheme.

4.9.5 An Environmental Management Plan (EMP) will be produced to ensure that due cognisance is made of the impact of the development on the environment and to outline the means by which the effects of the works are to be minimised. The document will be read in conjunction with SPT's Construction, Health, Safety and Welfare requirements. The EMP will help control and guide the working practices used during the construction of the development, and will be reviewed and amended as necessary throughout construction. The document will also incorporate SNH and SEPA guidelines by reflecting current best practice in protecting the environment during the works.

4.9.6 The content of the document will contain, as a minimum, the contents of the Schedule of Environmental Commitments (Chapter 17) and all legal and other requirements and such other guidance and requirements as to provide best practice environmental management.

4.9.7 In addition to the EMP, the appointed contractor will be required to produce and implement an Environmental Management System (EMS) that meets the requirements of ISO 14001 and which reflects the content of the EMP. Compliance with the requirements of the EMS and EMP will be a contractual obligation for the appointed contractor and will be audited by a representative of SPT.

4.9.8 The appointed contractor will be required to produce Construction Method Statements (CMS) to detail the methodology and control of any works identified in the EMP as potentially environmentally sensitive.

4.9.9 Therefore, notwithstanding any statutory mechanisms to ensure implementation, the construction contract when awarded will include a contractual obligation to ensure that all mitigation measures identified in this ES relating to construction of the scheme are implemented by the contractor, and these will be made explicit throughout the tender process.

5 Policies and Plans

5.1 INTRODUCTION

5.1.1 This chapter comprises a review of policies and plans at a national, regional and local level to determine the extent to which the proposals for the proposed scheme, as described in Chapter 3, conform to, or conflict with, the relevant documents and commitments. The review is presented in the form of an explanation of relevant environmental policies followed by a discussion, in italics, of the findings of the environmental assessments in relation to each policy.

5.1.2 National planning policy is currently set out through the following documents:

- The Scottish Planning Policy (SPP)
- Planning Advice Notes (PANs): the following are those that are relevant to this ES
  - PAN 42 Archaeology
  - PAN 51 Environmental Protection
  - PAN 58 Environmental Impact Assessment
  - PAN 60 Natural Heritage
- Designing Places
- Circulars

5.1.3 Statements of Scottish Government policy in the SPP, Designing Places and Circulars can be material considerations to be taken into account in development plans and development management decisions.

5.1.4 The consolidated SPP provides a short, clear and focused statement of national planning policy. The SPP sets out:

- the Scottish Government's view of the purpose of planning,
- the core principles for the operation of the system and the objectives for key parts of the system,
- statutory guidance on sustainable development and planning under Section 3E of the Planning etc. (Scotland) Act 2006,
- concise subject planning policies, including the implications for development planning and development management, and
- the Scottish Government's expectations of the intended outcomes of the planning system.

5.1.5 Alongside policy on development plans, development management, community engagement, sustainable development, climate change and sustainable economic growth, the SPP sets out policy on economic development, town centres and retailing, housing, rural development, fish farming, coastal planning, historic environment, landscape and natural heritage, open space and recreation, green belts, transport, renewable energy, flooding and drainage, waste management, minerals, onshore oil and gas operations, surface coal mining and communications infrastructure.

5.1.6 A guiding principle in the advice is that the policy should be positively accommodated by the planning system whilst international and national obligations to protect landscape, habitats, species and cultural heritage must be met and effects on local communities must be minimised.

5.1.7 Responsibility for land use planning rests principally with the Unitary Authorities who have responsibility for Structure and Local Plans. Structure Plans set out the broad planning

strategy for structure plan areas and Local Plans lay down the main planning policies and proposals at a detailed level for local plan areas.

5.2 RENEWABLE ENERGY TARGETS

5.2.1 Under the Kyoto protocol the UK Government committed to reducing the levels of carbon dioxide and five other greenhouse gases by 12.5%, below 1990 levels, by 2008 to 2012. Beyond this, the Government has also committed to cutting carbon dioxide emissions by 20% by 2010 and pledged to reduce emissions by 80% (replacing the former target of 60%) by 2050, compared to 1990 levels.[1] In December 2008, the government's Climate Change Committee also recommended an interim target of 34%, by 2020.

5.2.2 As part of these aspirations, the UK Government has set a target of achieving 10% contribution to electricity supply from renewables by 2010 (subject to cost to consumers being acceptable). An obligation has been placed on all electricity suppliers to source a percentage of their output from renewable technologies, such as wind, solar and hydro.

5.2.3 As part of the Scottish Climate Change programme, the Scottish Government is working towards raising the overall proportion of electricity generated from renewable sources to 18% by 2010 and 11% of heat demand to be met from renewable sources, with the current target for 50% of Scotland's electricity to be generated from renewable sources by 2020.[2] This is to be achieved by the Scottish Renewables Obligation (SRO) which requires Scottish Power and Hydro Electric to increase the percentage of energy obtained from renewable sources.

5.2.4 The proposed scheme would be contributing to meeting this obligation by delivering the energy to the national grid, produced by the proposed wind farm at Ewe Hill. In doing so, the proposed alignment, construction and maintenance of the proposed scheme requires to take into consideration the environmental polices set out in the various planning policies and guidelines.

5.3 NATIONAL POLICY

Scottish Planning Policy

5.3.1 The policies expressed in the SPP inform the content of development plans, should be a consideration in decisions on planning applications and should be used to inform development proposals from initial concept to implementation. With regards to the ES, the core principle stating that *"there should be a clear focus on the quality of outcomes, with due attention given to the sustainable use of land, good design and the protection and enhancement of the built and natural environment"* is particularly relevant.

5.3.2 Under the SPP heading of 'Subject Policies' the following have been reviewed and considered to be relevant to this assessment:

- Rural Development (Prime Quality Agricultural Land)
- Historic Environment (Scheduled Monuments, Archaeology, Other Historic Environmental Interests)
- Landscape and Natural Heritage (International Designations, National Designations, Local Designations, Trees and Woodland)
- Renewable Energy

[1] Committee on Climate Change
[2] Dumfries and Galloway Structure Plan, February

Rural Development

Prime Agricultural Land

5.3.3 Development on prime agricultural land should not be permitted unless it is an essential component of the settlement strategy or is necessary to meet an established need. Renewable energy generation development or minerals extraction may be acceptable where restoration proposals will return the land to its former status. When forming the settlement strategy, planning authorities should consider the impact of the various options on prime quality agricultural land and seek to minimise its loss.

Gretna to Ewe Hill

5.3.4 *The proposed scheme will require to pass through agricultural land. The land capability, along the proposed route ranges between Class 3 (capable of producing a moderate range of crops) to Class 6 (land capable of use only as rough grazing). Although no prime quality agricultural land would be affected, extensive consultation has taken place with all the landowners to ensure that the proposed scheme passes through areas of the lowest quality possible.*

Ewe Hill to Newfield

5.3.5 *The proposed scheme will require to pass through agricultural land. The land capability, along the proposed route ranges between Class 3 (capable of producing a moderate range of crops) to Class 6 (land capable of use only as rough grazing). Although no prime quality agricultural land would be affected, extensive consultation has taken place with all the landowners to ensure that the proposed scheme passes through areas of the lowest quality possible.*

Historic Environment

5.3.6 The historic environment is a key part of Scotland's cultural heritage and it enhances national, regional and local distinctiveness, contributing to sustainable economic growth and regeneration. It is of particular importance for supporting the growth of tourism and leisure.

5.3.7 The historic environment includes ancient monuments, archaeological sites and landscape, historic buildings, townscapes, parks, gardens and designed landscapes and other features. It comprises both statutory and non-statutory designations.

Scheduled Monuments

5.3.8 Scheduled monuments are archaeological sites, buildings or structures of national or international importance. The purpose of scheduling is to secure the long term legal protection of the monument in the national interest, in-situ and as far as possible in its existing state and within an appropriate setting. Scheduled monument consent is required for any works that would demolish, destroy, damage, remove, repair, alter or add to the monument. Where works requiring planning permission affect a scheduled monument, the protection of the monument and its setting are important considerations. Development which will have an adverse effect on a scheduled monument or the integrity of its setting should not be permitted unless there are exceptional circumstances.

5.3.9 *Whilst the Royal Commission for Ancient and Historic Monuments Scotland (RCAHMS) database identifies a considerable number of archaeological sites in the region, there are no Scheduled Ancient Monuments (SAMs) along the actual alignment of the OHL. However, there is potential for the setting of any nearby archaeological and cultural heritage sites to be altered by the proposals.*

Gretna to Ewe Hill

5.3.10 *Three SAMs, within 1km of the proposed scheme (Scot's Dike, Tympanheck and Newhall Hill settlement) have been considered with a view to impact upon their settings within the*

Landscape and Visual Assessments Chapter and have concluded that the settings for these will be not significantly affected.

Ewe Hill to Newfield

5.3.11 *There is one SAM with 1km of the proposed scheme (Craighousesteads Hill settlement). Whilst the proposed scheme would pass within 0.25km of this of this SAM, it would not be physically affected. Within the Landscape and Visual Assessment Chapter, the conclusion is that there would no significant effects to the setting.*

Archaeology

5.3.12 Archaeological sites and monuments are an important, finite and non-renewable resource and should be protected and preserved in situ wherever feasible. The presence and potential presence of archaeological assets should be considered by planning authorities when allocating sites in the development plan and when making decisions on planning applications. Where preservation in-situ is not possible planning authorities should, through the use of conditions or a legal agreement, ensure that developers undertake appropriate excavation, recording, analysis, publication and archiving before and/or during development. If archaeological discoveries are made during any development, a professional archaeologist should be given access to inspect and record them.

Gretna to Ewe Hill

5.3.13 *There are no currently scheduled archaeological sites along the route of the proposed scheme. However, the ES has detailed appropriate site construction management and best practices to avoid any inadvertent damage to areas of archaeological potential during construction works, such as through compaction by mobile and static plant.*

Ewe Hill to Newfield

5.3.14 *There are no currently scheduled archaeological sites along the route of the proposed scheme. However, the ES has detailed appropriate site construction management and best practices to avoid any inadvertent damage to areas of archaeological potential during construction works, such as through compaction by mobile and static plant.*

Other Historic Environmental Interests

5.3.15 There is a range of non-designated historic assets and areas of historical interest, including battlefields, historic landscapes, other gardens and designed landscapes, woodlands and routes such as drove roads which do not have statutory protection. These resources are, however, an important part of Scotland's heritage and planning authorities should protect and preserve significant resources as far as possible, in-situ wherever feasible. The effect of new development on these resources should be considered by planning authorities when allocating sites in the development plan and when making decisions on planning applications. Planning authorities should ensure they have access to a Sites and Monuments Record and/or a Historic Environment Record that contains necessary information about known historic environment features and finds in their area.

Gretna to Ewe Hill

5.3.16 *There are no identified Listed Buildings along the route of the proposed scheme although there are a number of Listed Buildings, including the Half Morton Parish Church and churchyard, High Stenries (including the barn), Kirtleton Former Stable and Dovecot, within the study area. There are no historic landscape designations in the locality.*

Ewe Hill to Newfield.

5.3.17 *There are no identified Listed Buildings along the route of the proposed scheme although there are a number of Listed Buildings, including Paddockhole, Milton House and Corriestand, within the study area. There are no historic landscape designations in the locality.*

Landscape and Natural Heritage

5.3.18 Landscape in both the countryside and urban areas is constantly changing and the aim is to facilitate positive change whilst maintaining and enhancing distinctive character. The European Landscape Convention defines landscape as an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors, and makes it clear that all landscapes require consideration and care. Different landscapes will have a different capacity to accommodate new development, and the siting and design of development should be informed by local landscape character. The natural and cultural components of the landscape should be considered together, and opportunities for enhancement or restoration of degraded landscapes, particularly those affecting communities, should be promoted through the development plan where relevant.

International Designations

5.3.19 Sites classified as Special Protection Areas (SPA) under the Birds Directive and designated as Special Areas of Conservation (SAC) under the Habitats Directive form an EU-wide network of protected areas known as Natura 2000. Any development plan or development proposal which is likely to have a significant effect on a Natura site and is not directly connected with or necessary to the conservation management of that site must be subject to an appropriate assessment

5.3.20 Ramsar sites are wetlands designated under the Ramsar Convention on Wetlands of International Importance, especially as waterfowl habitat. All Ramsar sites are also Natura sites and/or Sites of Special Scientific Interest (SSSI) and are protected under the relevant statutory regimes.

Gretna to Ewe Hill

5.3.21 *There are no identified international designated sites, within the study area, although there are a number of species of flora and fauna present and these may be affected by the proposed scheme. These have been considered within the EIA, with full surveys undertaken to determine effects and necessary mitigation measure*.

Ewe Hill to Newfield

5.3.22 *There are no identified international designated sites, within the study area, although there are a number of species of flora and fauna present and these may be affected by the proposed scheme. These have been considered within the EIA, with full surveys undertaken to determine effects and necessary mitigation measure*.

National Designations

5.3.23 A National Scenic Areas (NSA) is an area which is nationally important for its scenic quality. A SSSI is notified for the special interest of its flora, fauna, geology or geomorphological features. A National Nature Reserve (NNR) is an area considered to be of national importance for its nature conservation interests. Development that affects a NSA, SSSI or NNR should only be permitted where:

- it will not adversely affect the integrity of the area or the qualities for which it has been designated, or
- any such adverse effects are clearly outweighed by social, environmental or economic benefits of national importance.

5.3.24 There are no landscape designations within the study area. However the Langholm Hills Regional Scenic Area (RSA) lies approximately 12km to the east of the Ewe Hill substation. RSA are areas of scenically valued landscape which form recognisable and comprehensible geographic units and the siting and design of any development should respect the special nature of these areas. The Landscape and Visual Assessment Chapter has concluded that there will be no direct or indirect effects on the RSA.

Gretna to Ewe Hill

5.3.25 *A search of the Scottish Natural Heritage (SNH) digital datasets was carried out to establish if any statutory designated sites are present within 2km of the proposed scheme. The nearest statutory designated site is Bells Flow SSSI which is located some 600m to the northeast of the proposed scheme. There is no potential for direct impact on Bells Flow SSSI as the proposed scheme will not extend into the SSSI and will be situated downslope thus minimising any hydrological effects.*

Ewe Hill to Newfield

5.3.26 *A search of the SNH digital datasets was carried out and established that there are no statutory designated sites present within 2km of the proposed scheme.*

Local Designations

5.3.27 International and national designations can be complemented by local designations which protect, enhance and encourage the enjoyment and understanding of locally important landscapes and natural heritage.

Gretna to Ewe Hill

5.3.28 *There are three sites, indicated on the Annandale and Eskdale Local Plan Proposals Map, that are within 1km of the proposed route: at Cowgarth Flow (NY 324,716), Greenwrae Flow (NY 331,725) and Cadgill Flow (NY 318,737).*

Ewe Hill to Newfield

5.3.29 *There are no locally designated sites within the study area.*

Trees and Woodland

5.3.30 Ancient and semi-natural woodland is an important and irreplaceable national resource that should be protected and enhanced, as should other native and long established woodlands with high nature conservation value.

5.3.31 Other woodlands, hedgerows and individual trees, especially veteran trees, may also have significant biodiversity value and make a significant contribution to landscape character and quality so should be protected from adverse impacts resulting from development. If a development would result in the severing or impairment of connectivity between important woodland habitats, workable mitigation measures should be identified and implemented, potentially linked to the creation of green networks.

Gretna to Ewe Hill

5.3.32 *There are a number of areas of Ancient Woodland and Semi-Natural Woodland identified within the SNH Ancient Woodland Inventory which fall within the proposed OHL route corridor. The proposed scheme passes through a 100m section of Cadgill Wood, which is recorded on the Ancient Woodland Inventory which requires an 80m wayleave to be felled and skirts along the northern edge of the woodland for approximately 1km.*

Ewe Hill to Newfield

5.3.33 *There are a number of areas of Ancient Woodland and Semi-Natural Woodland identified within the SNH Ancient Woodland Inventory which fall within the proposed OHL route*

corridor. However, the alignment of the proposed scheme has ensured that none of these will be physically affected, either during construction or by the actual pole positions.

Renewable Energy

5.3.34 The commitment to increase the amount of electricity generated from renewable sources is a vital part of the response to climate change. Renewable energy generation will contribute to more secure and diverse energy supplies and support sustainable economic growth. The current target is for 50% of Scotland's electricity to be generated from renewable sources by 2020 and 11% of heat demand to be met from renewable sources.

5.3.35 Factors relevant to the consideration of applications will depend on the scale of the development and its relationship with the surrounding area, but are likely to include impact on the landscape, historic environment, natural heritage and water environment, amenity and communities, and any cumulative impacts that are likely to arise.

Gretna to Ewe Hill

5.3.36 *This assessment is for a single circuit 132kV OHL connection between the existing grid substation at Gretna and the proposed Ewe Hill Wind Farm substation and therefore does not in itself constitute part of the renewable energy commitments.*

Ewe Hill to Newfield

5.3.37 *This assessment is for a single circuit 132kV OHL connection between the proposed substation at Ewe Hill and the proposed sub station at Newfield. The Newfield Wind Farm has not yet received planning permission and construction of the proposed scheme would be subject to this developments gaining consent. The ES for the wind farm would need to address the likely impacts and effects caused by the wind farm development.*

5.4 PLANNING ADVICE NOTES

5.4.1 Planning Advice Notes provide advice and information on technical planning matters. The following are those that are relevant to this Environmental Assessment:

- PAN 42 Archaeology
- PAN 51 Environmental Protection
- PAN 58 Environmental Impact Assessment
- PAN 60 Natural Heritage

5.4.2 PAN 45 used to provide Government advice on all aspects of renewable energy technology, but this along with Annex 2 has been replaced with web based renewables advice.

5.4.3 PAN 45 made reference to grid connections in support of renewable energy projects. It recognised that consideration should be given to routing of transmission and distribution lines underground in exceptional circumstances where visual amenity considerations can be considered to be of sufficient importance. Whilst the current available advice documents do not specifically comment on grid connections, careful and detailed consideration has been given to selecting the proposed route for the scheme with extensive negations having been undertaken with all the landowners and tenants.

PAN 42: Archaeology – The Planning Process and Scheduled Monument Procedures

5.4.4 PAN 42 includes advice on the handling of archaeological matters within the planning process and on the separate contols over scheduled monuments under the Ancient Monumnets and Archaeological Areas Act 1979.

5.4.5 It states the importance of archaeology as a tangible and physical link with the past and that archiaeological remains are a finite an non-renewable resource. As such, care must be taken to ensure that they are not needlessly destroyed.

5.4.6 *Chapter 8 sets out in detail the methodology and assessment with respect to Archaeology and Cultural Heritage and concludes that there will be no significant effects either physically or on the setting of any sites of archaeological interest as a result of the proposed scheme.*

PAN 51: Planning, Environmental Protection and Regulation

5.4.7 A range of specific environmental protection regimes are designed to safeguard the natural and built environment. The central purpose of PAN 51 is to support the planning system in relation to the environmental protection regimes and also summarises the statutory responsibilities of the environmental protection bodies.

5.4.8 *Through the process of the EIA, the appropriate consultation process has taken place and the impacts on the natural and built environment have been assessed. The effects have been set out in the relevant Chapters 6 to 14.*

PAN 60: Planning for Natural Heritage

5.4.9 Scotland has a great diversity of natural heritage and whilst there is little today that can be considered entirely natural in strict ecological terms, there is much to be valued and conserved.

5.4.10 PAN 60 provides advice on how development and the planning system can contribute to the conservation, enhancement and understanding of Scotland's natural environment.

5.4.11 *Whilst the proposed scheme does not contribute to the aspirations defined in this PAN, neither does it restrict access to the natural environment nor does it preclude future development from attaining these ideals.*

5.5 STRUCTURE PLAN POLICY

5.5.1 Structure Plan policy is currently represented by the Dumfries and Galloway Structure Plan (December 1999) and comprises the Council's strategic land use planning framework. The following review focuses on the key policy areas which are relevant to the proposed scheme and include policies relating to the economy, environment and infrastructure.

Dumfries and Galloway Structure Plan – December 1999

5.5.2 The Dumfries and Galloway Structure Plan has four aims for developing the strategy set out for the Structure Plan. These are:

- To support development of the local economy;
- To support urban and rural communities;
- To support and protect the natural and built environment; and
- To make best use of services and facilities.

5.5.3 Of these, supporting and protecting the natural and built environment are of particular relevance with regards to the proposed development as the quality of the natural and built environment is deemed to be one of Dumfries and Galloway's greatest assets. The Structure Plan sets out a number of polices, relating to the environment, to achieve its aims which are supported by the more detailed Local Plan Policies. To avoid repetition, comments pertaining to the policies will be made under section 11.4: Local Plan Policy.

Policy E1: National Scenic Areas

5.5.4 The siting and design of development should respect the special nature of the area. Development within, or which would have a significant impact on National Scenic Areas (NSAs), will only be permitted where it can be demonstrated that either:

- the proposed scheme will not compromise the area's scenic and landscape character, and overall integrity; or
- any significant adverse effects on the scenic interest and integrity of the area are clearly outweighed by social or economic benefits of national importance.

5.5.5 This issue is also addressed in Chapter 6: Landscape and Visual Effects.

Policy E2: Regional Scenic Areas

5.5.6 The siting and design of development should respect the special nature of the area. Development within, or which would have a significant impact on Regional Scenic Areas (RSAs), may be permitted where it can be demonstrated that:

- the landscape character and scenic interest for which the area has been designated would not be adversely affected; or
- there is a specific need for the proposed scheme at that location which could not be located in a less sensitive area.

5.5.7 This issue is also addressed in Chapter 6: Landscape and Visual Effects.

Policy E3: Landscape Character

5.5.8 When assessing development proposals likely to have a significant impact on the landscape the Council will take into account the guidance set out in the Landscape Assessment. The Council will encourage and where resources permit support initiatives to conserve and enhance the landscape character of Dumfries and Galloway.

Policy E4: International Sites

5.5.9 Development proposals likely to have a significant effect on an existing or potential Special Protection Area (SPA), candidate Special Area of Conservation (SAC) or proposed Ramsar Site, including developments outwith the site, will require an appropriate assessment and will only be permitted where:

- the development does not adversely affect the integrity of the particular habitats or species being protected; or
- there are no alternative solutions and there are imperative reasons of overriding public interest including those of a socio-economic nature.

5.5.10 This issue is further addressed in Chapter 6: Landscape and Visual Effects.

Policy E5: Site of Special Scientific Interest

5.5.11 Development affecting Sites of Special Scientific Interest (SSSIs) not designated as International Sites will only be permitted where it can be adequately demonstrated that:

- it will not compromise the underlying objectives and overall integrity of the site; or
- there is a proven national interest in allowing the development to take place which cannot be met at another more suitable location.

5.5.12 This issue is further addressed in Chapter 7: Ecology and Ornithology.

Policy E6: Conservation of Habitats and Species

5.5.13 When assessing development proposals, the Council will seek to ensure that the impact on any habitat which is valued for its nature conservation interests is fully considered. Particular attention will be given to those habitats and species which are identified in Circular 6/1995, but which do not fall within the boundaries of national or international nature conservation designations. Where important nature conservation interests would be adversely affected, the Council will consider the use of Section 75 agreements to maintain existing interests or in exceptional circumstances encourage the creation of new or replacement habitats where possible.

5.5.14 This issue is further addressed in Chapter 7: Ecology and Ornithology.

Policy E11: Historic Gardens and Designed Landscapes

5.5.15 Development in or affecting the setting of a site listed in the Inventory of Gardens and Designed Landscapes or mentioned in the list of Non-Inventory Sites will require an evaluation of the proposal's impact on the site and its setting. There will be a presumption against development which would adversely affect the landscape features, character and setting of these sites and the approaches and environs of Inventory Sites.

5.5.16 This issue is further addressed in Chapter 6: Landscape and Visual Effects.

Policy E12: Development Affecting Archaeological Sites

5.5.17 There will be a presumption against development which would destroy or adversely affect the appearance, fabric or setting of Scheduled Ancient Monuments, sites of national importance and other areas of significant archaeological interest. In exceptional circumstances, where it is not possible to secure the preservation of archaeological remains, the Council will require an appraisal of the impact of the development on the site. The developer will be responsible for securing an agreed programme of archaeological work to the satisfaction of the Council.

5.5.18 This issue is further addressed in Chapter 8: Archaeology and Cultural Heritage.

Policy E13: Archaeologically Sensitive Sites

5.5.19 The Council will safeguard the character and archaeological interest of 'archaeologically sensitive areas', the boundaries of which will be defined in Local Plans.

5.5.20 This issue is further addressed in Chapter 8: Archaeology and Cultural Heritage

5.6 LOCAL PLAN POLICY

5.6.1 The second tier of the statutory development plan framework is the Local Plan, which contains specific local policies and proposals agreed through formal community consultation. Local plans are required to take account of the strategies adopted in the Structure Plan and seek to comply, wherever possible, with those elements of the Structure Plan which specifically apply to the local plan area.

5.6.2 There are four Local Plans in Dumfries and Galloway, one for each of the former District Council areas. They were all adopted in 2006 and set out policies for development and conservation applying to particular localities. The relevant Local Plan, with regards to this development, is the adopted Annandale and Eskdale Local Plan.

5.6.3 It should be noted, that the Local Plans (along with the Structure Plan) are due to be replaced by a single New Local Development Plan, as part of the Scottish Governments revisions to the planning system. The New Local Development Plan is in the early stages of development and consultation and is due to be adopted in May 2013. Until such time, the current plans will continue to be valid until the new Plan is adopted.

Background to the Adopted Annandale and Eskdale Local Plan

5.6.4 The Local Plan contains the following overarching principles which are relevant to this development:

- The conservation of the built, natural and cultural heritage; and
- The improvement of the physical environment.

5.6.5 The commitments to these are set out in more detail under a series of Environment policies. Those relevant to this assessment are:

- General Policy 7: Siting and Design
- General Policy 41: National Scenic Areas
- General Policy 42: Regional Scenic Areas
- General Policy 43: Areas of Local Environmental Importance
- General Policy 44: Nature Conservation Sites of International Importance
- General Policy 45: Nature Conservation Sites of National Importance
- General Policy 46: Nature Conservation Sites of Local Importance
- General Policy 53a: Historic Gardens and Designed Landscapes
- General Policy 54: Known Archaeological Sites – Including Scheduled Ancient Monuments

General Policy 7: Siting and Design

5.6.6 The Dumfries and Galloway Landscape Assessment indicates that the landscape of the Upper Annandale area can be split into a number of different landscape character types. Each of these landscape types has differing sensitivities to different forms of development. In each case developments in the countryside should have careful regard to these sensitivities. Detailed considerations should be taken from the Dumfries and Galloway Landscape Assessment.

Gretna to Ewe Hill

5.6.7 *Within the Landscape and Visual Assessment, the differing landscape character types have been identified and the effects upon them assessed. There will be very localised moderate to significant effects due to the inclusion of the proposed wood poles. However, overall effects would be slight to negligible due to landform and features reducing the intervisibility of the proposed scheme within and between landscape character types.*

Ewe Hill to Newfield

5.6.8 *Within the Landscape and Visual Assessment the differing landscape character types have been identified and the effects upon them assessed. There will be very localised moderate to significant effects due to the inclusion of the proposed wood poles. However, overall effects would be slight to negligible due to landform and features reducing the intervisibility of the proposed scheme within and between landscape character types.*

5.6.9 This issue is further addressed in Chapter 6: Landscape and Visual Effects.

General Policy 41: National Scenic Areas

5.6.10 "The Planning Authority will assess development proposals within or adjacent to National Scenic Areas using the criteria set out in Structure Plan Policy E1 and having regard to the guidance contained in and resulting from the National Scenic Areas Management Strategies. Justification: National Scenic Areas have been so designated to reflect the outstanding importance of their natural beauty and scenery. Management strategies have been prepared for each of the three NSAs in the region. These aim to:- 'Recognise, protect, conserve and enhance the

landscape character, scenic qualities and local distinctiveness of the National Scenic Areas with particular reference to their natural and cultural heritage, and with regard to their economic well being.' and will be used as supplementary guidance to this plan. It is essential that these qualities are not compromised by inappropriate or insensitive development, to protect the appearance of these areas and in recognition of the role they play in contributing to the quality of life and to the local economy such as tourism."

5.6.11 *There are no National Scenic Areas within the study area.*

General Policy 42: Regional Scenic Areas

5.6.12 "The Planning Authority will assess development proposals within the Regional Scenic Areas using the criteria set out in Structure Plan Policy E2. Justification: The areas identified are valued regionally and locally for their special scenic qualities and the contribution they make to tourism and the quality of life. Consequently they merit special protection."

5.6.13 *The Langholm Hills Regional Scenic Area (RSA) lies approximately 12km to the east of the proposed Ewe Hill substation. This is outwith the defined study and buffer areas for the Landscape and Visual assessment and therefore beyond the determined distance of any likely effects.*

5.6.14 This issue is further addressed in Chapter 6: Landscape and Visual Effects.

General Policy 43: Areas of Local Environmental Importance

5.6.15 There will normally be a presumption against development having a materially adverse effect on areas of local environmental importance. Justification: Many towns and villages in the Plan area contain features such as areas of woodland, rivers and their banks, wetlands, old graveyards or areas of open space which are important to the amenity, character, setting of or approach to the settlement. As well as having an amenity value many of these areas are important to the natural or cultural heritage of the settlement, and are valued by the local community. These areas may also help to further the urban habitat objectives of the Local Biodiversity Action Plan.

5.6.16 *The route of the OHL has been carefully selected to avoid, wherever possible, areas that are likely to have local amenity value. Much of the route passes through agricultural land which is not generally used by the public for amenity purposes.*

5.6.17 This issue is also addressed in Chapter 11: Agriculture and Sporting Interests.

General Policy 44: Nature Conservation Sites of International Importance

5.6.18 The Planning Authority will assess development proposals which may affect the nature conservation sites against the criteria set out in Structure Plan Policy E4. Justification: Sites of international importance in nature conservation terms which have a higher level of protection than sites with a national designation, include Special Protection Areas (SPA), Special Areas of Conservation (SAC), Ramsar Sites and Proposed or Candidate International Sites. Careful consideration must therefore be given to protecting the integrity of these sites from any adverse effects brought about by development.

5.6.19 *Although within the wider area, the Inner Solway Firth is designated as an SPA, Ramsar Site and SAC and Raeburn Flow is also an SAC, there are no designated sites of international importance, within the study area. However, as previously stated in 5.3.21 and 5.3.22 there are a number of species of flora and fauna present which may be affected by the proposals and these have been considered within the EIA.*

5.6.20 This issue is further addressed in Chapter 7: Ecology and Ornithology.

General Policy 45: Nature Conservation Sites of National Importance

5.6.21 The Planning Authority will assess development proposals which may affect the nature conservation sites of national importance against the criteria set out in Structure Plan Policy E5.

Justification: There is a range of sites which are of national importance in nature conservation terms and are the core areas for the protection and enhancement of nature conservation interest. These include Sites of Special Scientific Interest and National Nature Reserves.

5.6.22 This issue is further addressed in Chapter 7: Ecology and Ornithology.

Gretna to Ewe Hill

5.6.23 *The nearest statutory designated site is Bells Flow SSSI which is located to the northeast of the proposed scheme. As stated in 5.3.25 there is no potential for direct or indirect impact on Bells Flow SSSI as the proposed scheme will be a minimum of 600m from the edge of the SSSI. Raeburn Flow is located approximately 3km west of the existing Gretna Sub Station – there would be no direct or indirect impacts on this SSSI.*

Ewe Hill to Newfield

5.6.24 *As stated in 5.2.26, a search of the Scottish Natural Heritage (SNH) digital datasets was carried out and established that there are no statutory designated sites present within 2km of the proposed scheme.*

5.6.25 This issue is further addressed in Chapter 7: Ecology and Ornithology.

General Policy 46: Nature Conservation Sites of Local Importance

5.6.26 Development proposals which are likely to affect the sites identified by the Council as Nature Conservation Sites of Local Importance will be considered against Structure Plan Policy E6. Justification: As part of the implementation of the Local Biodiversity Action Plan (LBAP) the Council, in partnership with the Scottish Wildlife Trust, SNH and landowners, has begun a process of identifying local wildlife sites. These have been identified, in order to protect and manage some of the priority habitats identified in the LBAP, following a formal process of agreement. These sites have been added to the existing list of Local Nature Reserves and other managed reserves in the Plan area, which together will be referred to as Nature Conservation Sites of Local Importance. Sites which have been agreed to date are listed below:

- Cadgill Flow;
- Cowgarth Flow; and
- Greenwrae Flow.

Gretna to Ewe Hill

5.6.27 *It is unlikely that these sites will be directly or indirectly affected. However, ecological receptors during construction and operation have been assessed with mitigation measures identified, where required.*

Ewe Hill to Newfield

5.6.28 *There are no sites of local conservation importance in the study area.*

5.6.29 This issue is further addressed in Chapter 7: Ecology and Ornithology.

General Policy 53a: Historic Gardens and Designed Landscapes

5.6.30 The Planning Authority will assess development proposals in or affecting the setting of a site against Structure Plan Policy E11. Justification: The Inventory of Historic Gardens and Designed Landscapes in Scotland, identifies those sites which are considered by SNH and Historic Scotland to be of national importance and which merit protection. The integrity of these sites can also be damaged by development which affects their setting.

5.6.31 *There are no Designed Landscapes identified within the study area.*

General Policy 54: Known Archaeological Sites - Including Scheduled Ancient Monuments

5.6.32 The Planning Authority will assess development proposals within or adjacent to these sites, in accordance with Structure Plan Policy E12. Justification: development impacting upon areas of archaeology is a material consideration in the determination of any planning application. Although responsibility for Scheduled Monument Consent lies with the Scottish Minister, the Planning Authority must take account of the potential effects of any development upon a SAM and its setting.

Gretna to Ewe Hill

5.6.33 *Three SAMs, within 1km of the proposed scheme (Scot's Dike, Tympanheck and Newhall Hill settlement) have been considered with a view to impact upon their settings within the Landscape and Visual Assessments Chapter and have concluded that the settings for these will be not significantly affected.*

Ewe Hill to Newfield

5.6.34 *There is one SAM with 1km of the proposed scheme (Craighousesteads Hill settlement). Whilst the proposed scheme would pass within 0.25km of this, it would not be physically affected. Within the Landscape and Visual Assessment Chapter, the conclusion is that there would no significant effects to its settings.*

5.6.35 This issue is further addressed in Chapter 8: Archaeology and Cultural Heritage.

General Policy 55: Archaeologically Sensitive Areas

5.6.36 The Planning Authority will assess development proposals in accordance with Structure Plan Policy E13. Justification: Within some settlements and within the countryside the archaeological interest is not confined to a particular site but extends over a large area. Two types of area have been identified: Historic Settlements and Sensitive Rural Areas. Development proposals falling within these areas may have impact on the archaeological remains. Where proposals involve ground disturbance, developers should seek appropriate archaeological advice at an early stage in developing their proposals. It is equally important that the setting of monuments is fully considered by all development proposals in these areas.

Gretna to Ewe Hill

5.6.37 *There are no archaeologically sensitive sites along the alignment of the proposed scheme.*

Ewe Hill to Newfield

5.6.38 *There are no archaeologically sensitive sites along the alignment of the proposed scheme.*

5.6.39 This issue is further addressed in Chapter 8: Archaeology and Cultural Heritage.

Renewable Energy

5.6.40 Within the Adopted Local Plan there are no specific policies or statements regarding energy projects.

5.7 SUMMARY AND CONCLUSIONS

Gretna to Ewe Hill

5.7.1 The proposed scheme is required to support the proposed Ewe Hill Wind Farm, which is in keeping with requirements for an increase in the production of renewable energy in Scotland.

5.7.2 Detailed Environmental Assessment has demonstrated that there would be some environmental impacts associated with the construction, operation and maintenance of the proposed scheme. However, the assessment has also demonstrated that these impacts and residual effects would be localised and they would not materially endanger the landscape quality, biodiversity interests or cultural heritage of the study area and its wider setting. Therefore the proposed scheme does not conflict with national, regional and local planning policy.

Ewe Hill to Newfield

5.7.3 The proposed scheme is required to support the proposed Newfield Wind Farm, which is in keeping with requirements for an increase in the production of renewable energy in Scotland.

5.7.4 Detailed Environmental Assessment has demonstrated that there would be some environmental impacts associated with the construction, operation and maintenance of the proposed scheme. However, the assessment has also demonstrated that these impacts and residual effects would be localised and they would not materially endanger the landscape quality, biodiversity interests or cultural heritage of the study area and its wider setting. Therefore the proposed scheme does not conflict with national, regional and local planning policy.

6 Landscape and Visual Effects

6.1 INTRODUCTION

6.1.1 This chapter assesses the impact of the proposed scheme as described in Chapter 3 of this ES on the landscape resources and visual receptors, within the study area. In particular, it considers the potential effects of the proposed scheme in terms of direct impacts on key landscape components, landscape features and views from surrounding residential properties, businesses, roads and public recreation areas). It considers the extent to which any loss of features and the introduction of the scheme would influence perception of and the visual enjoyment of the landscape and the wider character of the area.

6.1.2 This chapter (and its associated figures) is not intended to be read as a stand alone assessment and reference should be made to the Front End of this ES (Chapters 1 to 5), as well as Chapter 16 Cumulative Effects.

6.1.3 Following the methodology and baseline conditions, set out in Sections 6.3 and 6.4, Section 6.5 deals with the character of the landscape i.e. the natural processes and human activities that have worked over long periods to shape the land into its present condition.

6.1.4 The assessment of landscape and visual effects for the proposed scheme between Gretna Substation and Ewe Hill Substation is presented in Sections 6.6 to 6.10.

6.1.5 The assessment of landscape and visual effects for the proposed scheme between Ewe Hill Substation and Newfield Substation is presented in Sections 6.11 to 6.15.

6.1.6 There are a number of ways in which the proposed scheme might impact on the existing landscape and the enjoyment of views from, to and within the study area. The potential impacts, arising from the introduction of the OHLs, underground cables, substation and access track are:

- direct physical changes to individual landscape elements (e.g. removal of a group or groups of trees);
- changes to the composition of elements that may disrupt a distinctive local pattern;
- the introduction of and likely increase of obviously man-made elements into the landscape;
- physical or visual effects on sensitive or designated landscapes (whether statutory or non-statutory designations);
- direct physical changes to a view resulting from visual intrusion and blocking or obstruction of elements of the view ;
- changes to the view and opening of new views as a result of way leave requirements (e.g. removal of a group or groups of trees); and
- changes to the overall visual amenity (i.e. has the change made the view better or worse).

6.2 LEGISLATION, POLICY AND GUIDANCE

Legislative Framework

6.2.1 The assessment has been prepared with reference to the following documents:

- Guidelines for Landscape and Visual Impact Assessment (GLVIA), published by the Landscape Institute and the Institute of Environmental Assessment, 2nd Edition 2002,and
- SNH Landscape Character Assessment (Guidance for England and Scotland), 2002.

- The assessment of impacts on forestry informs the landscape assessment. The Forestry Commissions guidelines regarding the routeing of overhead lines through woodland[3] are taken into account during routeing.
- Scottish Power Transmission (2002) Overhead Transmission Lines - Routeing and Environmental Assessment;
- The Holford Rules: Guidelines for the Routeing of New High Voltage Overhead Transmission Lines with NGC 1992 and SHETL 2003 Notes.

6.2.2 The GLVIA guidelines acknowledge a relationship between the perception of landscape character and the experience of viewers (referred to as receptors - residents, people in their workplace, people using recreational facilities, using and/or travelling through the countryside, etc).

6.2.3 GLVIA relies on an appreciation of the existing landscape, its sensitivity to change, a thorough understanding of the development proposals and the magnitude of change that would result from the construction and ultimately completed proposals and the potential to mitigate any impacts.

6.2.4 The SNH Landscape Character Assessment documents set out the principles and processes of describing the character and characteristics of the landscape and the elements and features that make up the landscape.

6.2.5 The Holford Rules primarily refer to the identification of route alignments, but the recommendations on minimising environmental impacts are equally valid as part of the assessment process.

Planning Policy

6.2.6 Planning policy at the national, regional and local level is identified in Chapter 5.

6.3 ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

Scope of the Assessment

6.3.1 A Scoping Report was issued to the Scottish Government in February 2010 which included a sufficient level of environmental assessment, for both landscape character areas and visual receptors, to identify those environmental effects of the project predicted to be significant and which would therefore receive greatest attention during the detailed EIA.

6.3.2 A number of receptor view points were identified, primarily residential but also road and recreation locations as being representative of the study area. Included within these are the following location points which Dumfries and Galloway Council's Landscape Architect specifically requested to be included:

- By Setthorns (NY 269,809)
- High Stenries access point, spot height 166m (NY 290,773)
- From Solwaybank (NY 307,774)
- From west end of Scot's Dike - Craw's Knowe (NY 335,740)
- Between Cadgillhead and Parkhead -on road looking south (NY 316,756)
- By Cadgillhead Farm (NY 311,754)
- Road junction/Cottage (NY 312,756)

[3] Forest Landscape Design Guidelines 2nd edition (Forestry Commission, 1994) and Forest Design Planning – A Guide to Good Practice (Forestry Authority, 1998)

- B6357 road junction (NY 321, 746)
- B7068 - 185m spot height (NY 273, 811)
- From Little Whitriggs (NY 192,870)
- Water of Milk valley (NY 234,858)
- Pyatshaws Rigg, 231m (NY 215,845)
- Newhall Hill, 272m (NY 249,864)
- Newland Hill, 307m (NY 238,836)
- Whitcastles Hill, 278m (NY 227,876)
- Burnt Hill, 304m (NY 261,843)
- Crawthat Hill, 280m (NY 247,836)

Extent of the Study Area

6.3.3 The first stage in the OHL routeing assessment process was to establish and define the areas of search for the key environmental and technical constraints. For this project, the following two key areas were defined.

6.3.4 Firstly, a study area was defined. This is the area within which it would be feasible to construct the the proposed scheme, and to consider alternative alignments, whilst taking into account major topographical and infrastructure constraints such as high ground, ridgelines, slope gradients, settlements or existing transmission lines.

6.3.5 Secondly, a wider buffer area was identified which represents a distance of 5km from the outside of the study area, in which it was recognised that there is potential for the proposed scheme to indirectly impact upon important designated areas, landscapes and views. This wider buffer area was taken into consideration when defining route corridor options. See Figure 6.1 for extent of study area and wider buffer area.

Method of Baseline Data Collation

Site Visit / Other Assessment

6.3.6 A number of site visits were undertaken during 2008 and 2009 as part of the Landscape and Visual Assessment, with the aim to test out the desk top Zone of Theoretical Visibility, determine whether there were other key view point locations and also to gain an understanding of the landscape character along the proposed route and within the study area.

6.3.7 The other following tasks were also undertaken:

- Identification of a Zone of Theoretical Visibility (ZTV or Visual Envelope). This was based on the Ordnance Survey's 10m digital terrain model. A representative series of viewpoints were established, from the ZTV (including residential, recreation, and transport routes), which were then tested on site.
- Analysis of existing and proposed land use data and policies from the current Dumfries and Galloway Structure Plan, approved in 1999 and the Annandale & Eskdale Local Plan which was approved in 2006;
- Site appraisal of key landscape features. Site recording involved annotation of 1:25,000 OS plans supported by a representative photographic record of the area;
- Analysis of change in character and potential resultant effect on quality and value related to impacts on specific landscape elements and the potential composite change in identity engendered by the development proposals;

- Evaluation of the effects on the SNH landscape types as defined in the Dumfries and Galloway Landscape Character Assessment (Scottish Natural Heritage Review No. 94, Land Use Consultants 1998);
- Further sub-division of the study corridor into Local Landscape Character Areas (LCA), as defined by Gillespies, and evaluation of the effects on these;
- Review of statutory landscape designations.

6.3.8 The ZTV provides a means of identifying potential receptors (viewers) so that impact assessments can be undertaken. Figure 6.2 and 6.3 illustrate the ZTVs for the south and north routes, respectively.

6.3.9 It should be noted that the ZTV is based on a bare ground model i.e. it does not take into account minor topographic variations, screening from built form or vegetation or orientation of a viewer or direction of travel. The ZTV therefore indicates the 'worst case scenario' by over estimating the extent of visibility both in terms of the area from which the proposed scheme is visible and the extent of the development which is visible.

6.3.10 However it is still a valuable tool to test the actual zone of visibility, on site. A series of representative locations covering primarily residential and transport routes were selected and then visited to determine if these locations actually had views of the site. The locations visited are indicated on Figure 6.4: Receptor Locations - South Route and Figure 6.5: Receptor Locations - North Route.

6.3.11 The detailed site visits identified that inter-relationships within the landscape and views to the proposed scheme are very much determined: by local landform; mature woodland features; hedgerows; individual trees; buildings; walls; or similar features, and that many areas within the study area would have no visual inter-relationship with the proposed scheme.

Significance Criteria

6.3.12 The assessment of potential impacts, as a result of the proposed scheme, has taken into account both the construction phases and completion of the development. The significance level attributed to each impact has been assessed based on the magnitude of change due to the proposals, and the sensitivity of the affected receptor / receiving environment to change. Magnitude of change and the sensitivity of the affected receptor / receiving environment are both assessed on a scale of high, medium, low and negligible (as shown in Table 6.1 of this Chapter).

6.3.13 The prime criteria used to evaluate the impact on landscape character comprises:

- The extent to which existing landscape components and features would be lost or modified by the proposals (such as lost woodland, tree belts and hedgerows or significantly altered landform);
- The existence of the proposed form of development within the landscape and its current role as a determinant of existing character;
- The extent to which the development would alter the balance and hence perception of the landscape character of the area; and
- The degree to which views would be altered.

6.3.14 Impact can be detrimental where features or key characteristics such as established planting, old buildings or structures have to be removed. Alternatively, it can prove beneficial where derelict buildings or poorly maintained landscape features are repaired, replaced and maintained or there is the introduction of new tree planting and a landscape structure where none currently exists.

6.3.15 Account is taken of the effect that any mitigation measures, typically planting or landform, are likely to have in minimising potentially detrimental impacts or improving the landscape composition of the area.

6.3.16 The evaluation and impacts on views has involved the consideration of the extent to which the proposals would change the composition of the existing view and the sensitivity of the viewer (receptor) to that change.

Determining Magnitude of Change and Sensitivity of the Landscape and Receptors

6.3.17 The assessment of significance considers the sensitivity of the affected environment and/or receptor, the scenic quality and value and the magnitude of change (from the existing baseline conditions), and the extent to which mitigation and enhancement measures would reduce negative effects.

Sensitivity to Change

6.3.18 Sensitivity to change considers both the extent to which the landscape can accommodate and tolerate the type of proposed change the nature of the receptor, for example a residential dwelling or recreation area is generally more sensitive to change than a factory unit or place of work. And receptors that experience views in passing from road or rail are less sensitive than receptors experiencing a constant view or view for a long period of time.

6.3.19 In this assessment sensitivity is ranked as follows:

- High Sensitivity – where a landscape of particularly distinctive character would be susceptible to relatively small changes by the proposed scheme and/or where the changed landscape is an important element in the view;
- Medium Sensitivity – where a landscape of moderately valued characteristics is reasonably tolerant of changes by the proposed scheme and/or where the changed landscape is a moderately important element in the view;
- Low Sensitivity – where the landscape is relatively unimportant and is potentially tolerant of substantial changes by the proposed scheme and/or where the changed landscape is a less important element in the view.
- Negligible Sensitivity - where the landscape would be little or unaltered by the proposed scheme and/or where any changes would cause little or no change to the existing view.

6.3.20 The importance of the view experienced by the receptor also contributes to an understanding of how sensitive that receptor is to change. Scenic quality and value of the view are therefore also considered.

6.3.21 Scenic Quality relates to the intrinsic aesthetic appeal demonstrated by a character area, zone, feature or component within the landscape. An assessment of Scenic Quality has been carried out based on a five point scale and evaluated against the following criteria:

- Highest Quality - Contributing together to create a stimulating composition which is aesthetically and scenically outstanding; or which is an outstanding example in the area of well cared for “pure” and “undiluted” landscape or set of features;
- Very Attractive - Contributing together to create a composition which is aesthetically and scenically pleasing; or which is a good example in the area of a reasonably well cared for “pure” landscape or set of features;
- Good Landscape - Contributing together to create a composition which is aesthetically and scenically pleasing but unremarkable; or an area or set of features which is neutral or of mixed character;

- Ordinary Landscape - Contributing together to create a composition which is aesthetically and scenically unremarkable or lacking in scenic cohesion; or which is an example of an unstimulating landscape or set of features; or with few related features;
- Poor Landscape - Contributing together to create a composition which is aesthetically and scenically very poor; or which is an example of monotonous unattractive visually conflicting or degraded landscape or set of features.

6.3.22 Value is frequently addressed by reference to international, national, regional and local designations, determined by statutory and planning agencies. Absence of such a designation, however, does not infer a lack of quality or value. Factors such as accessibility and local scarcity can render areas of nationally unremarkable quality highly valuable as a local resource.

6.3.23 Scenic Quality and Value assist in determining the Sensitivity of a landscape type.

Magnitude of Change

6.3.24 Magnitude of change considers the extent of development visible, the percentage of the existing view newly occupied by the development, the influence of the development within the view and viewing distance from the receptor to the development.

6.3.25 In this assessment magnitude is ranked as follows, on a 4-point scale:

- High Magnitude – where there is a notable change in the Landscape Characteristics over an extensive area ranging to a very intensive change over a more limited area and/or where the development causes a very significant change in the existing view;
- Medium Magnitude – where there is a moderate change in a localised area and/or where the development would cause a very noticeable change in the existing view;
- Low Magnitude – where there is a virtually imperceptible change in the landscape components and/or where the development would cause a noticeable change in the existing view; and
- Negligible / No Change - where the development would cause no significant change to the landscape components or to the existing view.

Significance of Effects

6.3.26 Effects may be either beneficial or adverse. Explanation of the effect ratings giving rise to the significance of effects on the receptor or receiving environment is provided below:

<u>Major Adverse (negative) effect:</u>

- The proposals are at considerable variance with the landform, scale and pattern of the landscape;
- The proposals are likely to degrade, diminish or even destroy the integrity of a range of characteristic features and elements or their setting;
- The proposals would be substantially damaging to a high quality or highly vulnerable landscape;
- The proposals are in serious conflict with policy for the protection of nationally recognised countryside;
- The proposals would form a part of the foreground view;
- The proposals would cause a significant deterioration of the existing view.

<u>Moderate Adverse (negative) effect:</u>

- The proposals are out of scale with the landscape, or at odds with the local pattern and landform;

- Mitigation would not prevent the scheme from scarring the landscape in the longer term as some features of interest would be partly destroyed or their setting diminished;
- The proposals are in conflict with policy for the protection of nationally recognised countryside;
- The proposals would form a part of the middle distance view;
- The proposals would cause a noticeable deterioration of the existing view.

Minor Adverse (negative) effect:

- The proposals do not quite fit the landform and scale of the landscape;
- The proposals cannot be substantially mitigated for because of the nature of the proposal itself or the character of the wider landscape;
- The proposals would form a part of the middle to long distance view;
- The proposals would cause a barely perceptible deterioration of the existing view.

No effect (None):

- The proposals would have no effect on the scale, landform and pattern of the landscape;
- The proposals would not conflict with any national policies regarding the protection of the countryside;
- The proposals would have no effect on the existing view.

Minor Beneficial (positive) effect:

- The proposals have the potential to improve the landscape quality, character and views;
- The proposals fit in with the scale, landform and pattern of the landscape;
- The proposals enable the restoration of valued characteristic features partially lost through other land uses;
- The proposals would cause a barely perceptible improvement of the existing view.

Moderate Beneficial (positive) effect:

- The proposals would have the potential to fit very well with the landscape character and improve views;
- The proposals would improve the quality of the landscape through removal of damage caused by existing land uses;
- The proposals would cause a noticeable improvement of the existing view.

6.3.27 With respect to this assessment and the study area:

- the foreground is deemed to be immediate views and up to 1km;
- the middle distance view is 1-3km; and
- the long distance views are 3km and greater.

6.3.28 In terms of ratings for sensitivity, magnitude and effects, the thresholds represent points on a continuum. Where appropriate, intermediate ratings are used to indicate effects at the higher or lower ends of a particular threshold. For example, minor to moderate would represent an effect towards the lower end of the range, whilst moderate to major would represent an effect towards the higher end of the range. Table 6.1 sets out the matrix determining the significance of effects.

Table 6.1 Matrix for Determining the Significance of Effects

Magnitude of Change	Sensitivity of Receptor / Receiving Environment to Change			
	High	Medium	Low	Negligible
High	Major	Moderate to Major	Minor to Moderate	None
Medium	Moderate to Major	Moderate	Minor	None
Low	Minor to Moderate	Minor	Minor	None
Negligible	None	None	None	None

6.3.29 Where residual effects are assessed as being Moderate or Major the result is considered to be Significant. Unless otherwise stated the assessment will conclude that the residual effects would be adverse.

6.4 BASELINE CONDITION

6.4.1 The study area extends from the existing Gretna Sub Station, in the south, to between Mid Hill and Kirkslight Hill, in the north-west, approximately 2.5km southeast of Boreland, as indicated on Figure 3.1.

6.4.2 The southern part of the study area is characterised by flat topography (ranging from approximately 50m AOD to 120m AOD, scattered farmsteads, minor roads network and woodland copses of predominantly mixed deciduous species but also a proportion of coniferous tree groups. Due to its low lying nature the land is of a higher agricultural quality than the rest of the study area and the majority of the land cover is improved grassland with some arable fields. Views around the area, particularly from roads, are fragmented due to the field boundaries which typically consist of managed hedgerows. A striking feature within this landscape is the historic feature of Scots' Dike, a belt of mature native woodland planting, running east west from Scots' Dike to Craw's Knowe, a distance of approximately 5km.

6.4.3 The landscape character gradually changes from the lowland farmland to upland pasture landscape character areas. The topography, through the transitional areas is more undulating in nature and there are numerous small tributaries and watercourses which create localised incised valleys, with the ground rising steadily from the lower, agricultural areas to the lower slopes of the upland pasture areas. In places longer distance views are obtainable; however these are dependant on the topography and woodland cover which can vary greatly within the study area, with striking contrasts between open, panoramic views and contained, short distant and focussed views. Settlements are generally isolated farmsteads with the notable exceptions of the villages of Kirtleton, Waterbeck and Corrie Common.

6.4.4 In the northern part of the study area, the predominant land cover is rough pasture with some semi-improved areas and there has also been significant commercial woodland activity over the years with plantation woodland blocks at varying stages of growth – the area is sparsely settled with predominantly farm steadings. The topography is varied and the landform is undulating with gently rounded summits and rolling valleys with a range of altitudes; the summits including Grange Fell at 319m AOD, Doe's Hill at 334m AOD and Crawthat Hill at 280m AOD. On some of these summits are hill fort features associated with Iron Age settlers, the most notable being the settlement on Newhall Hill (NY237, 837).

6.4.5 Dissecting the upland pasture landscape are two attractive river valleys: the Corrie Water and the Water of Milk, the intimate and more complex nature of the landscapes, of both, contrasting strongly with the wider, open, upland grazing areas. The area is reasonably well

settled due to the sheltered nature of this landscape and views from individual properties are enclosed by the topography and woodland cover creating a sense of isolated intimacy. This landscape character type extends to the south and west, following the river valleys and including the Corrie Water river valley, and acts as a divider between the upland pasture landscape and the area of farmland and forestry: the intimate and more complex nature of the landscapes, of both, contrasting strongly with the wider, open, upland grazing areas. Views are introspective or focussed along the lengths of the valleys.

6.4.6 The most north-westerly part of the study area is characterised by rough upland pasture with some semi-improved areas and there has also been significant commercial woodland activity over the years with plantation woodland blocks at varying stages of growth. Much of the southern part of this woodland, at Corrie Common has been recently felled, with further felling and replanting scheduled. As with the areas of upland pasture, views are more extensive and expansive than the southern agricultural areas and the coniferous plantations around Corrie Common also include some of the few public footpaths and cycle routes. In the main, due to the area being predominantly farmland, there is very little public recreational access, in this area. In places longer distance views are obtainable; however these are dependant on the topography and woodland cover which can vary greatly within the study area, with striking contrasts between open, panoramic views and contained, short distant and focussed views.

6.4.7 Woodland cover is, in the main, limited to small isolated pockets of plantation woodland which provide shelter for sheep, grazing this area, although there is a larger area of coniferous plantation to the north of Corrie Common. Much of the southern part of this woodland has been recently felled, with further felling and replanting scheduled. As with the areas of upland pasture, views are more extensive and expansive than the southern agricultural areas and the coniferous plantations around Corrie Common also include some of the few public footpaths and cycle routes. In the main, due to the area being predominantly farmland, there is very little public recreational access, in this area.

6.4.8 Throughout the study area the road network is a series of minor roads with the key routes being; the B7068 which runs through the northern part of the site connecting the area to Lockerbie, in the west and Langholm in the east; the B725 and B722 which connect from the M74 through Waterbeck to Kirtleton and the B7068; and the B6357, the key road through the southern part of the study area, connecting to the M74 (J21) to the west and the A77(T) to the east. A number of other smaller, unnamed roads connect the smaller, local settlements together.

6.4.9 There are no railway lines through the study area; the nearest railway is the main west coast line from London to Edinburgh/Glasgow which runs roughly consistent with the M74 corridor, approximately 3-4km to the west of the study area, at its nearest point.

6.4.10 There are no Ancient Woodlands or Designed Landscapes within the study area and the proposed scheme does not pass through any statutory designated sites. The Regional Scenic Area around Langholm is approximately 1km to the east of the study area. There are no Designed Landscapes within the study area and the proposed scheme does not pass through any statutory designated sites, although the SSSI at Bell's Flow (NY318, 763) is located within 0.6km to the northeast of the line. The Regional Scenic Area around Langholm is approximately 1km to the east of the study area and just over 8km from the proposed scheme at its nearest point. The proposed scheme also passes through a 100m section of Cadgill Wood, which is recorded on the Ancient Woodland Inventory which requires an 80m wayleave to be felled and skirts around approximately 1km of the northern edge of the wood.

6.4.11 Neither the SSSI nor the Regional Scenic Area will be physically affected and the visual assessment will demonstrate that there will be negligible visual effects due to screening by existing woodland and landform.

6.5 LANDSCAPE ASSESSMENT OF IMPACTS, MITIGATION AND RESIDUAL EFFECTS

Landscape Character Assessment

6.5.1 Scottish Natural Heritage, in conjunction with partner Councils, undertook in the late 1990's a detailed review and classification of various landscape areas and types of Scotland. The Landscape Character Types are covered by the Dumfries and Galloway Landscape Character Assessment. Figure 6.6 shows the locations of the SNH Landscape Character Types.

6.5.2 Within the definitions described under the broader SNH Landscape Character Types (LCT) it is often useful to identify local landscape character zones, as these are more representative of the localised areas. For the purposes of this assessment Gillespie's have sub-divided the study area into six Local Landscape Character Areas (LCA). These are shown on Figure 6.7 and listed in 6.5.20. To avoid repetition, the assessments will be carried out on the LCA's, although a description of each of the LCT's is set out below.

Dumfries and Galloway Landscape Character Assessment

6.5.3 Part 3 of the Dumfries and Galloway Landscape Character Assessment document divides the area into 26 Landscape Character Types (LCT). It provides a description of the specific characteristics and sensitivities relevant to each landscape type and outlines detailed aims, guidance notes and suggestions on how to conserve or enhance the landscape through appropriate sensitive land use, management or development. Within the study area there are six LCTs represented:

- Coastal Flats LCT
- Flow Plateau LCT
- Upland Fringe LCT
- Southern Uplands LCT
- Foothills LCT
- Foothills with Forest LCT

Coastal Flats landscape character type (Type 2)

6.5.4 This landscape character type contains five sub-categories, of which Coastal Plain is found within the study area. The topography is gently undulating between 15 to 100m (AOD) but despite the elevation the land is less exposed than other coastal flat types. Although not always in view, the coastal influence remains apparent in the onshore winds and glimpses of the sea. The landscape is predominantly farmed, mostly pasture with some arable cultivation providing variations in field colours and textures. Fields are medium sized, bounded by hedges or fences, and used for grazing cattle and sheep. Major lines of communication are routed through this landscape type – within the study area this includes 275kv OHL and the M74 and main rail line are within the buffer area, to the west. The vertical structures of the lattice steel towers, other power lines and the large farm buildings break the horizon and are obtrusive in the flattest areas. The key characteristics, relevant to the study area, comprise:

- *gently undulating land;*
- *medium sized fields of improved pasture with some arable cultivation;*
- *hedgerow field boundaries and fence replacements;*
- *cattle and sheep grazing;*
- *major communication routes for road, rail and power lines;*

- *generally sparse settlements.*

6.5.5 The main landscape issues that need to be considered within this landscape type are:

- *loss of hedgerows and hedgerow trees;*
- *additional vertical structures within the landscape.*

Flow Plateau landscape character type (Type 15)

6.5.6 The landscape of the Flow Plateau lacks strong features or visual interest and has a weak character, mainly as a result of the loss of hedgerows and hedgerow trees, which has affected the landscape framework, although where riparian woodland fringes highlight rivers, there is an element of diversity. The lower, waterlogged areas of the flow plateau includes extensive rush infested, marshy pastures due to a network of tributary burns that flow towards the Solway, however, these areas provide valuable habitat for wildlife. Areas of higher ground are characterised by rough and improved pastures with hedgerows, tree lined enclosures and some small scale forestry plantations. The key characteristics, relevant to the study area, comprise:

- *mostly flat and gently rolling topography with an incline towards the Solway;*
- *occasional long views over the Solway;*
- *waterlogged rush infested pastures in colours of ochre, green and brown;*
- *large fields with hedgerows and fences in poor condition;*
- *cattle grazing;*
- *shelterbelts and small informally shaped plantations;*
- *riparian woodlands.*

6.5.7 The main landscape issues that need to be considered within this landscape type are:

- *loss of hedgerows and hedgerow trees;*
- *increasing afforestation.*

Upland Fringe Landscape Character Type (Type 16)

6.5.8 The Upland Fringe Landscape Character Type has an altitude range generally between 120m and 170m AOD and much of the character of this landscape lies in its transitional feel between lowland pastures and upland areas, created in the main by the balance between agriculture and forestry. The landscape is of high, gently rolling pastures and an uneven topography with numerous minor valleys, ridges and hollows. Pasture dominates the land cover with a mix of rough and improved grassland, although block patterns of coniferous plantations, shelter belts and lines of trees are also typical of this landscape. Fields are medium or large, often bounded by walls or hedge banks and the land is grazed by sheep and cattle. This landscape has a feeling of upland exposure but is generally well treed and settled. The Upland Fringe landscape was favoured for defensive sites, during the Iron Age and many forts, duns and other structures are therefore essential features. The road network is extensive and characteristic features include small stone bridges over incised burns. The key characteristics of this landscape character type consists of:

- *elevated rolling pastures;*
- *improved and rough grassland in close proximity;*
- *hedgerow banks and treelines along roads in some lower areas;*
- *drystone dykes;*
- *coniferous forest blocks;*

- *contrast between wide open areas and more intimate landform;*
- *panoramic views over valley lowlands;*
- *small stone bridges over incised burns;*
- *Iron Age fortifications.*

6.5.9 The main landscape issues that need to be considered within this landscape type are:

- *expansion of forestry changing traditional pastoral character;*
- *incremental deterioration of stone dykes;*
- *changes to character of grazing land through improvement or abandonment;*
- *wind power development.*

Foothills landscape character type (Type 18)

6.5.10 The Foothills landscape character type forms the northern part of the study area and the foothills are found at heights between 170m and 250m AOD. They are generally undulating with gently rounded summits and the landscape is dissected by many streams. Views are afforded from the summits, but in the main views within this landscape are not extensive, due to the undulating nature of the landform and the areas of woodland. The land cover is a mix of semi-improved pastures with areas of rough pasture and heath, grazed by sheep and cattle, and large conifer plantations. There are a number of scattered farmsteads and small settlements throughout connected by a network of minor roads. Numerous Iron Age and Roman archaeological sites are contained within this landscape, likely to be defensive monuments, the most notable being the remains of the settlement on Newhall Hill. More modern interventions include wind farm developments, with the development at Minsca being the most local within the study area. The key characteristics, relevant to the study area, comprise:

- *undulating land between 170m and 250m AOD, with rounded summits;*
- *series of incised valleys;*
- *semi-improved pasture enclosed in medium to large fields by stone walls;*
- *rough pasture and heath on higher ground grazed by sheep and cattle;*
- *trees in sheltered pockets;*
- *many scattered farmsteads and small settlements;*
- *network of minor roads;*
- *numerous archaeological sites;*
- *wind farm developments.*

6.5.11 The main landscape issues that need to be considered within this landscape type are:

- *agricultural change related to the marginal nature of hill farming;*
- *potential proposals for large scale forestry development;*
- *wind farm development.*

Foothills with Forest landscape character type (Type 18a)

6.5.12 Similar to the 'Foothills' landscape type, these areas are predominantly forest land cover which creates its forest-dominated character. Dark swathes of uniform, dark green cover many of the rounded peaks and descend onto the lower slopes. The different stages of forest rotation are highly visible; particularly the contrasting scarred effect of clear fell areas adjacent to mature forestry. Open ground is mostly rough or semi-improved pasture with patterns of dry stone walls.

In higher areas the underlying pastures are rougher and often unenclosed. Where there are breaks in tree cover old stone enclosures can be visible. The key characteristics, relevant to the study area, comprise:

- *dark green blanket of forest covering undulating foothills;*
- *various stages of forest rotation;*
- *tall mature conifers at roadside;*
- *semi-improved pasture with walled enclosures on open ground;*
- *some evidence of archaeological remains.*

6.5.13 The main landscape issues that need to be considered within this landscape type are:

- *threat to cultural features through forestry planting;*
- *incremental loss of hill farm land to forestry;*
- wind farm development.

Southern Uplands Landscape Character Type (Type 19)

6.5.14 This landscape is typical of the higher parts of the Southern Upland range characterised by large, smooth domed or slightly conically shaped hills. The hills have a strong relief, dissected by steeply sided clefts and glens. This is a large-scale landscape, although there is some confinement between the peaks. The hills slopes are generally smooth but there are some incised gullies, rock outcrops and screes. The majority of the landscape type is covered by coarse grassland but the highest areas also have heather moorland which is distinctive in appearance. There are few trees which are confined to sheltered areas. The landscape has been subject to mineral extraction for generations and its legacy is an important cultural feature: tunnels, chimneys, spoil heaps and access tracks are all important local features. The key characteristics, relevant to the study area, comprise:

- *large, smooth dome / conical shaped hills, predominantly grass covered;*
- *distinctive colour of heather on some higher areas;*
- *open and exposed character except within incised valleys;*
- *pockets of woodland in incised valleys;*
- *legacy of lead and other mining activity.*

6.5.15 The main landscape issues that need to be considered within this landscape type are:

- *loss or deterioration of heather moorland;*
- *large scale forestry expansion;*
- *demands for wind farms and radio-mast developments*

6.5.16 Within the Dumfries and Galloway Landscape Character Assessment, there are no guidelines for transmission lines, specific to each landscape character type. However, the report does acknowledge that the region is traversed by numerous overhead power lines and that these overhead power lines can be both intrusive and obtrusive structures in the landscape. Siting of any new OHLs can only seek to minimise any physical or visual effects.

6.5.17 The landscape issues relating to OHLs, that require to be addressed in planning policies and strategies are:

- how OHLs might be accommodated and their effects mitigated, through careful alignment and restoration; and

- whether OHLs are acceptable features within the landscape character areas or whether alternative underground solutions should be pursued for the whole or parts of the route(s)

6.5.18 The SNH Landscape Character Assessment also includes General Planning and Management Considerations, which states that, in accordance with the general principles set down in the 'Holford Rules':

- *the proposed route should seek to minimise visual intrusion and simultaneously other types of environmental impact by routing away from settlements and roads and avoiding areas of high designated amenity value. This generally means adopting low-lying routes, avoiding breaking horizons where possible and by traversing remote areas.*

6.5.19 In addition, the key landscape elements that should be taken into consideration, and which could be included within the mitigation measures, with regards to the inclusion of an OHL, are:

- *hedgerow reinstatement;*
- *reinstatement of tree line planting;*
- *reinstatement of stone wall boundaries in the local style;*
- *incorporation of informal patterns of woodland well integrated with open space and valley woods;*
- *preservation of the agricultural character; and*
- *respect for archaeological / cultural features of interest.*

Local Character Areas

6.5.20 Set within the broad pattern of the Landscape Character Types there are a number of finer grain local character zones which are potentially affected by the proposed scheme, where combinations of landform, land cover, water bodies, watercourses and settlement, frame scenes of distinct form and sense. Gillespies have identified 6 Local Character Areas (LCA) within the development area, which overlap in part with the SNH Landscape Character Types. The LCA's are identified on Figure 6.7 with representative site images shown on Figures 6.8 and 6.9.

- Local Character Area 1 – Lowland Farmland LCA
- Local Character Area 2 – Transitional Farmland LCA
- Local Character Area 3 – Upland Heath LCA
- Local Character Area 4 – Plantation Woodland LCA
- Local Character Area 5 – Upland Pasture LCA
- Local Character Area 6 – Intimate River Corridor LCA

6.6 GRETNA SUBSTATION TO EWE HILL SUBSTATION LANDSCAPE CHARACTER ASSESSMENT

6.6.1 The Gretna to Ewe Hill OHL is proposed to be routed from the existing Gretna Sub Station (located approximately 5km east of Junction 21 on the M74, NY328,714) to the proposed Ewe Hill Sub Station at Crawthat Hill (NY250,835), approximately 15.5km in length. It is proposed that an approximately 250m length of underground cable will be required to connect the OHL into the Gretna Sub Station and a 100m length to connect into the Ewe Hill substation.

6.6.2 The route of the OHL, including the undergrounded section, starts in an area characterised by gently undulating, lowland farmland interspersed with groups of mixed deciduous

woodland. The OHL extends in a roughly north-west alignment, passing north of Cadgill Wood, before continuing through an area of open, rough grazing and then through an area of coniferous plantation, east of Kirtleton, before the final 2km of the OHL passes through an upland pasture landscape, close to the Winterhope Reservoir, crossing the Kirtle Valley and arriving at the Ewe Hill sub station on Crawthat Hill.

Local Character Area 1 – Lowland Farmland

Local Character Area 1 (LCA 1) is located to the south of the study area, and correlates closely with the Flow Plateau LCT. This landscape is characterised by its flat topography, scattered farmsteads, minor road network, woodland copses and field boundaries; hedgerows; hedgerow trees; post and wire fencing; and drystone walls. Due to its low lying nature the land is of a higher agricultural quality than the rest of the study area and the majority of the land cover is improved grassland, for grazing cattle, with some arable fields. Lower lying areas are often waterlogged with marshy pastures, due to the network of small water courses. A notable feature within this landscape is the striking, historic feature of Scots' Dike – a 5km belt of mature native woodland planting on an embankment. A network of major overhead transmission lines, also criss-cross the landscape and the Gretna Sub-Station is located within this LCA. Despite the flat topography, views around the area, particularly from roads, are often fragmented or partially screened due to the hedgerow boundaries and tree groups. Where the ground rises and views are not interrupted, long distant and expansive views of the Solway Firth are afforded. The farmsteads, in the main, take advantage of localised higher ground and rises to afford views of the farms, which also means more extensive views across the area.

Principal positive components:

- Scots' Dike;
- Network of hedgerows and hedgerow trees;
- Patchwork of small woodland groups, including an area of Ancient Woodland at Cadgill Wood;
- Long distant views to the Solway Firth;
- Simple landscape of large scale field patterns with hedgerow boundaries.

Principal negative components:

- High voltage OHLs and associated lattice steel towers dominate parts of the area;
- Gretna Sub Station;
- Other smaller scale OHLs.

Sensitivity to Change – Medium – whilst there are long views from areas of higher ground, the patchwork of trees, woodlands and hedgerows generally constrain and fragment views. This LCA includes a network of overhead lines. The proposed scheme would therefore be viewed in the context of existing lines but not visible over a wide area.

Landscape Scenic Quality and Value – Overall: Good – an attractive composition of elements but containing a number of overhead transmission lines.

Magnitude of Change – Medium, locally - immediately adjacent to the OHL, but overall within this landscape character area the magnitude of change would be low due to the proportionately small area that would be affected and the interrelations across this landscape character area reduced through landform and vegetation.

Approximately 5.5km of proposed OHL, including the undergrounded section, would pass through this landscape character area with supports at intervals of approximately 80-90m, including section and angle poles which require stay systems for support. In addition an access track, primarily required for construction, would parallel the line. Some sections of the access track would require

to remain in place for future maintenance requirements. A short section of hedgerow would require to be removed to install the underground cable into the Gretna substation, but this would be replaced as part of the mitigation works.

Local Character Area 2 – Transitional Farmland

Local Character Area 2 (LCA 2) is located within a central band of the study area this landscape is a transitional landscape taking characteristics from the lowland farmland and upland pasture landscape character areas. The topography is more undulating in nature however there are numerous small tributaries and watercourses which create localised incised valleys. Settlements are generally isolated farmsteads with the notable exceptions of the villages of Corrie Common, Kirtleton and Waterbeck. The predominant land cover is rough pasture with some semi-improved areas. There has also been significant commercial woodland activity over the years and plantation woodland blocks at varying stages of growth characterise this area. Due to its upland nature longer distance views are obtainable, however these are dependant on the topography and woodland cover which can vary greatly as one moves around the area.

Principal positive components:

- Bell's Flow SSSI;
- Gently undulating landform;
- Frequent long distant views (including to the Solway Firth).

Principal negative components:

- Blocks of coniferous plantations;
- Lattice steel towers and other smaller overhead transmission lines.

Sensitivity to Change – Medium – the undulating nature of the landform and patchwork of trees reduces views over a wide area meaning that the OHL could be accommodated without being visible over a wide area and would therefore not change the character of this LCA.

Landscape Scenic Quality and Value – Overall: Good – attractive lowland farmland and valleys mixed with poorer quality rough pasture and plantation blocks.

Magnitude of Change – Medium to High, locally - immediately adjacent to the power line corridor (and particularly as it crosses Byre Cleuch in the Kirtle Valley, but overall within this landscape character area the magnitude of change would be low due to the proportionately small area that would be affected and the interrelations across this landscape character area reduced through landform and vegetation.

Approximately 4km of proposed OHL would pass through this landscape character area (in two sections, separated by approximately 1.5km of coniferous plantation), with supports at intervals of approximately 80m, including section and angle poles which require stay systems for support. In addition an access track, primarily required for construction, would parallel the line. Some sections of the access track would require to remain in place for future maintenance requirements.

Local Character Area 3 – Upland Heath

Local Character Area 3 (LCA 3). This landscape character area is located to the northeast of the proposed transmission line and broadly replicates the coverage of the SNH Foothills Landscape Character Type. The landscape is upland and undeveloped and the majority of the land cover is heath with some scattered locations of unimproved grassland. The topography is varied and due to the elevated, undeveloped nature of the area panoramic long distance views are available from the summits and plateaux.

Principal positive components:

- Wooded river valleys contrasting with rounded moorland hilltops;

- Open moorlands, with expansive views;
- Remains of iron-age settlements;
- Variety of colours, textures and open and closed views due to vegetation and landform.

Principal negative components:

- Large coniferous plantation blocks, with large areas recently felled;
- Network of small, OHLs.

Sensitivity to Change – Medium - whilst there are long views from areas of higher ground, the patchwork of trees, woodlands and hedgerows generally constrain and fragment views reducing the effects of any potential change.

Landscape Scenic Quality and Value – Overall: Very Attractive – a landscape with minimal man-made interventions. Farms and other buildings compliment the landscape and are appropriate to the rural character.

Magnitude of Change – None - the proposed OHL does not pass through this local landscape character area and therefore does not directly affect it. The complexity of the landform and frequent tree and hedgerow groups, reducing intervisibility, means that there would be no indirect effects.

Local Character Area 4 – Plantation Woodland

Local Character Area 4 (LCA 4) is located to the north and centre of the study area. These landscape character areas are characterised by a monoculture of commercial woodland. There are access tracks for maintenance and forestry workers. Some recreation access is possibly but a lack of views is likely to reduce the appeal - views are enclosed and limited to the surrounding woodland. Areas of clear felling and replacement planting are currently taking place and will continue on a phased cycle.

Principal positive components:

- Red Squirrel habitat;
- Some recreation available;
- Deciduous woodland edges.

Principal negative components:

- Primarily a monoculture of coniferous tree species;
- Unattractive areas after felling.

Sensitivity to Change – Low – the blocks of coniferous woodland either screen views or would back drop the OHL, thereby reducing views and effects of any potential change.

Landscape Scenic Quality and Value – Overall: Ordinary – the plantation woodlands are non-native blocks of forestry, breaking up the natural landform and landscape character within the wider area.

Magnitude of Change – Overall: Low – Approximately 1.25km of the OHL would pass through the Plantation Woodland and a similar length would pass immediately to the west of the plantation, near Kirtleton. The route does not pass through the northerly part of this local landscape character type.

Where the route passes through the plantation a permanent wayleave of 70m (35m either side of the OHL) would be required. However, this cutting through the trees would only be evident, locally to the north and south. The deciduous woodland fringe would ensure a permanent backdrop to the line as it passes the plantation in the Kirtleton area.

Local Character Area 5 – Upland Pasture

Local Character Area 5 (LCA 5): Two areas are located towards the centre of the study area, separated by the LCA 6: Intimate River Corridor. These landscape character areas are sparsely settled and the majority of the land is characterised by rough pasture. The topography is varied and the landform is undulating with gently rounded summits and rolling valleys. Woodland cover is limited to small isolated pockets of plantation woodland which provide shelter for sheep and cattle, grazing this area. As a result of the topography, limited woodland cover and a lack of development, views from this area are elevated and long distance. However, due to the lack of access most views are not available to the public. Notable features upon the summits within this landscape are the hill forts associated with Iron Age settlers, particularly the settlement on the east slope of Newhall Hill.

Principal positive components:

- Remains of iron-age settlements;
- Rounded moortop hills;-+
- Long and panoramic views.

Principal negative components:

- Minsca Wind Farm;
- Quarry near Crawthat;
- Coniferous plantation blocks, including recently felled areas.

Sensitivity to Change – Medium – whilst there are elevated and long distant views within this landscape character area only a very short section (2km) will physically impact on this area.

Landscape Scenic Quality and Value – Overall: Good – varied composition of landscape elements with good long distant and panoramic views.

Magnitude of Change – Overall: Medium, locally - immediately adjacent to the power line corridor, sub station and access track, but overall within this landscape character area the magnitude of change would be low due to the proportionately small area that would be affected and the interrelations across this landscape character area reduced through landform and vegetation.

Approximately 2km of OHL would pass through this landscape character type. Due to the steeper landform and greater elevation, the woodpoles are likely to need to be spaced at approximately 80m. The Ewe Hill Sub Station is proposed, to the north of Crawthat Hill, and there would need to be a permanent access track to the sub station from the B7068 along the southern slopes of Newhall Hill and Crawthat Hill.

Local Character Area 6 – Intimate River Corridor

Local Character Area 6 (LCA 6) is located towards the northwest of the study area this landscape character area, separating areas of Transitional Farmland and Upland Pasture. This landscape character area is focused around the Water of Milk and Corrie Water river valleys. The landscape is characterised by incised valleys, broadleaf woodlands and meandering watercourses. These areas are reasonably well settled due to the sheltered nature of this landscape and there is a comprehensive minor road network which follows the lower ground within the river floodplains. Views from individual properties are enclosed by the topography and woodland cover creating a sense of isolated intimacy.

Principal positive components:

- Attractive, intimate, river valley landscape;
- Complex landform and variety of colours and textures;
- Variety of closed and open views;

- Drystone walls.

Principal negative components:

- Minsca Wind Farm;
- Network of small, overhead transmission lines and lattice steel towers;
- Large blocks of coniferous plantation.

Sensitivity to Change – Sensitivity to change: Medium – the landscape is reasonably tolerant to change due to views and intervisibility being limited by landform and woodland groups.

Landscape Scenic Quality and Value – Overall: Very Attractive – a scenically pleasing and intricate landscape composition, despite the inclusion of existing man-made elements

Magnitude of Change – Overall: None - the proposed OHL does not pass through this local landscape character area and therefore does not directly affect it. The complexity of the landform and frequent tree and hedgerow groups, reducing intervisibility, means that there would be no indirect effects.

Construction Effects, Operational Effects, Mitigation and Residual Effects

6.6.3 The extent to which the proposed scheme would affect the existing landscape character varies depending on the individual components and the capacity of the existing landscape to absorb these.

6.6.4 The following provides an assessment of the overall effects that the OHL would have on the local landscape areas during construction and also in the longer term.

6.6.5 The impacts and mitigation measures are, in the main, consistent for each of the landscape areas, as the components and method of construction will be the same, therefore the assessment of effects during construction and operation, along with mitigation measures will be set out only once, rather than against each Local Character Area, to avoid unnecessary repetition. The Ewe Hill Sub Station and access track, to this, will mean additional impacts and these have been identified under the Local Character Area 5 – Upland Pasture.

6.6.6 The residual effects, will however, be set out against each Local Character Area and these results carried forward to the summary table and conclusions.

During Construction

6.6.7 The Local Character Areas would be affected during the construction of the OHL as a result of additional construction vehicles on the roads and construction activities visible in the landscape. There would be physical disruption to areas of ground for the construction by foundations for the wood pole supports, stays and sections of access tracks. There would also need to be 2-3 construction compounds.

6.6.8 Effects during construction without the implementation of mitigation measures:

1. Lowland Farmland	Moderate locally but Minor over wider area
2. Transitional Farmland	Moderate to Major locally but Minor over wider area
3. Upland Heath	None
4. Plantation Woodland	Minor
5. Upland Pasture	Moderate locally but Minor over wider area
6. Intimate River Corridor	None

Mitigation during Construction

6.6.9 Mitigation measures, during construction, would be as follows, to reduce physical disturbance and perception of activity in the landscape:

- Prescribed construction routes along roads already capable of accommodating construction traffic;
- Utilising existing tracks and field access points for access track requirements, wherever possible;
- Ensuring construction working areas are kept to a minimum;
- Restricted working hours e.g. no night time working to reduce noise being carried across the landscape;
- Directional, mobile lighting units to avoid light spillage across the landscape.

6.6.10 Mitigation measures will be limited in reducing impacts, therefore the residual effects during construction would be the same, and are summarised as follows:

1. Lowland Farmland	Moderate locally but Minor over wider area
2. Transitional Farmland	Moderate to Major locally but Minor over wider area
3. Upland Heath	None
4. Plantation Woodland	Minor
5. Upland Pasture	Moderate locally but Minor over wider area
6. Intimate River Corridor	None

On Completion

6.6.11 The areas of ground, disrupted during construction, would be reinstated to the original land use, as far as is practically possible, although some access tracks would need to remain permanent, most particularly the track to the Ewe Hill Sub Station. Agriculture, arable, pasture or grazing reinstated and also hedgerows and field boundaries, would be reinstated, wherever possible. Trees lost, along the route of the overhead line could not be replaced in the same locations, due to easement requirements, but new planting to offset the loss could be included in appropriate locations, as agreed with landowners.

Mitigation on Completion

6.6.12 Mitigation measures, on completion, would include:

- Replacement of lost trees, hedgerows and other vegetation;
- Reduction in width of any permanently remaining access tracks.

6.6.13 A number of the mitigation measures are likely to also be applicable for mitigating against visual, noise and land-use impacts. However, the assessments for each of these will be undertaken separately and will include their own recommendations for mitigation, as necessary.

Residual Effects on completion

6.6.14 The mitigation measures are not intended to, nor could, screen the proposed scheme. The intention is to retain the landscape qualities and characteristics of each of the landscape character areas, therefore it would not be appropriate to regrade areas or introduce large areas of new woodland planting, for screening purposes. Whilst it will be possible to virtually eliminate evidence of the majority of the access tracks, the residual effects of the proposals will be the insertion of a heavy duty wood pole transmission line, sub station and a number of permanent access tracks within the landscape.

6.6.15 For all landscape character areas, where the OHL passes through them, the residual effects would be Moderate to Major locally, and Minor over the area as a whole. For those landscape character areas where the OHL does not pass through them, the residual effects would be None to Minor (where there is some intervisibility).

6.6.16 The residual effects can be summarised as follows:

1. Lowland Farmland — Moderate locally but Minor over wider area
2. Transitional Farmland — Moderate locally but Minor over wider area
3. Upland Heath — None
4. Plantation Woodland — Minor
5. Upland Pasture — Moderate locally but Minor over wider area
6. Intimate River Corridor — None

6.7 SUMMARY TABLE OF LANDSCAPE CHARACTER ASSESSMENT GRETNA SUBSTATION TO EWE HILL SUBSTATION

6.7.1 Table 6.2 summarises the order of effects during construction and on completion of the proposed scheme on the local landscape character areas. It should be noted that where an effect has been assessed as being moderate to minor, it has been presented in the summary table as being of moderate effect. Equally, if the effect has been assessed as minor to moderate, an effect of minor has been presented.

TABLE 6.2 Summary of assessment of residual effects on local landscape character areas

LANDSCAPE CHARACTER AREA	CONSTRUCTION				ON COMPLETION			
	None	Minor Adverse	Moderate Adverse	Major Adverse	None	Minor Adverse	Moderate Adverse	Major Adverse
1. Lowland Farmland		◆ general	◆ locally			◆ general	◆ locally	
2. Transitional Farmland		◆ general	◆ locally			◆ general	◆ locally	
3. Upland Heath	◆				◆			
4. Plantation Woodland		◆				◆		
5. Upland Pasture		◆ general	◆ locally			◆ general	◆ locally	
6. Intimate River Corridor	◆				◆			

6.8 VISUAL ASSESSMENT OF IMPACTS, MITIGATION AND RESIDUAL EFFECTS

Change Over Time

6.8.1 The assessment is based on the design proposals detailed in Chapter 3 of this document.

6.8.2 The baseline landscape and its broad visual context are described in Section 6.4. It was not possible or appropriate to undertake an assessment from every individual property that fell within the ZTV. The assessment has selected representative properties or locations where there exists a direct relationship with, or clear views of, the proposed scheme. This does not mean that the remaining properties or locations have no views and therefore no impacts, but that these locations have significantly reduced views of the proposed scheme due to various factors such as

landform, vegetation or other properties in the immediate foreground views. As a result any new elements that would become part of the view would need to be considered in the context of the existing elements that are already contained within the view.

Receptor Locations

6.8.3 Receptor locations (residential, leisure and roads), selected using the ZTV to give a broad range of across the study area, are indicated on Figure 6.4.

6.8.4 A number of key receptor locations were identified and agreed with Dumfries and Galloway Landscape Architect to show representative wire line and photomontage images of the proposed Gretna to Ewe Hill and the Ewe Hill to Newfield OHLs, which are indicated on Figure 6.10: Photomontage Location Plan and Figure 6.11 to Figure 6.14: Wireline and Photomontage Images. With regards to the Gretna to Ewe Hill OHL they are:

- By Setthorns (NY 270,809);
- By access to High Stenries (NY 290,777);
- From Solwaybank looking south (NY 308,773);
- Adjacent to Cadgillhead Farm (NY 309, 753).

6.8.5 The locations of the photomontages for the Ewe Hill to Newfield OHL are indicated on Figure 6.10. They are:

- From Little Whitriggs (NY 192,871);
- Water of Milk valley – near Capelfoot (NY 238,864);

6.8.6 The sensitivity of visual receptors and views, as defined in the 'Guidelines for Landscape and Visual Impact Assessment', will be dependent on:

- The location and context of the viewpoint;
- The expectations and occupation or activity of the receptor;
- The importance of the view (is the view direct or indirect, currently uninterrupted or a main part of the current view); and
- The duration the view is experienced e.g. views whilst travelling by road or rail.

6.8.7 The most sensitive receptors include:

- Occupiers of residential properties with views affected by the proposed scheme;
- Agricultural and farm workers who work the land and who could be working in the immediate vicinity of the overhead line;
- Users of all outdoor recreational facilities including public rights of way, whose attention or interest may be focused on the landscape; and
- Communities where the development results in changes in the landscape setting or valued views enjoyed by the community.

6.8.8 The least sensitive receptors are likely to be people at their place of work whose attention would be focused on their work or activity (in this instance, other than farmers or others working the land) and who are therefore potentially less susceptible to changes in the view.

6.8.9 In this assessment more weight is given to changes in the view or visual amenity which are greater in scale and visible over a wide area. In assessing the effects on the views, consideration has been given to the effectiveness of any mitigation measures.

Views from Buildings

6.8.10 In general buildings within the study area fall within one of two categories:

- Residential properties
- Farm premises

Views from Outdoor Locations

6.8.11 Views from outdoor locations generally fall within one of three categories:

- Views from public rights of way, footpaths, tracks and outdoor sites
- Views from historic locations e.g. Scot's Dike or Iron Age Settlements
- Views from transport corridors i.e. roads

Assessment of Visual Effects

6.8.12 The process of assessment for each receptor, generally, is:

- Name/type of the receptor;
- Sensitivity of Receptor;
- Likely changes to view i.e. anticipated additional elements within an existing view
- Magnitude of change;
- Effects During Construction;
- Mitigation During Construction;
- Residual Effects During Construction;
- Mitigation on Completion;
- Residual Effects on Completion.

6.8.13 However, to avoid repetition the general implications of the proposals are set out below, whilst specific implications will be highlighted in Table 6.3. Locations of receptors, and the effects both during construction and on completion, are indicated on Figure 6.15: Visual Effects - South Route.

Construction Effects and Mitigation

6.8.14 The extent to which the proposed scheme would affect a view varies depending on the elements likely to be seen and the extent of the view affected (the magnitude of change). The following sets out the likely effects that the development would have during construction and also in the longer term on completion of the development.

During Construction

6.8.15 As with the Landscape Character Assessment, receptors would be affected during the construction of the overhead transmission line as a result of additional construction vehicles on the roads and construction activities visible in the landscape, including a number of sites for construction cabins, welfare facilities and material stock piles.

Mitigation during Construction

6.8.16 Mitigation measures are limited but would be as follows, to reduce perception of activity in the landscape:

- Prescribed construction traffic routes to reduce the number of roads affected;
- Ensuring construction working areas are kept to a minimum;

- Directional, mobile lighting units to avoid light spillage across the landscape.

Residual Effects during Construction

6.8.17 These mitigation measures, whilst positive, are likely to only have a small effect and unlikely to change the outcome of the assessment before mitigation. Therefore, to avoid unnecessary repetition, the effects and residual effects during construction will be deemed to be the same.

Mitigation on Completion

6.8.18 The areas of ground, disrupted during construction, would be reinstated to the original land use, as far as is practically possible, although some access tracks would need to remain permanent, most particularly the track to the Ewe Hill Sub Station. Agriculture, arable, pasture or grazing reinstated and also hedgerows and field boundaries, would be reinstated, wherever possible. Trees lost, along the route of the overhead line could not be replaced in the same locations, due to easement requirements, but new planting to offset the loss could be included in appropriate locations, if agreed with landowners. Mitigation measures, on completion would be:

- Replacement of lost trees, hedgerows and other vegetation (where appropriate and as agreed);
- Reduction in width of any permanently remaining access tracks.

Residual Effects on Completion

6.8.19 The mitigation measures are not intended to, nor could, screen the proposed overhead transmission line. Whilst it will be possible to virtually eliminate evidence of the majority of the access tracks, the residual effects of the proposals will be the insertion of a heavy duty wood pole transmission line, new sub station and a number of permanent access tracks within the landscape, which will be visible to a greater or lesser extent, depending on proximity, landform and other existing features within the landscape.

6.9 TABLE OF VISUAL ASSESSMENT GRETNA SUBSTATION TO EWE HILL SUBSTATION

6.9.1 Table 6.3 assesses the impacts during construction and operation of the proposed scheme on the described visual receptors and determines the residual effect. It should be noted that where an effect has been assessed as being moderate to minor, it would be considered a significant effect. Equally, if the effect has been assessed as minor to moderate, it would be considered to be a not significant effect.

TABLE 6.3 Assessment of receptors Gretna Substation to Ewe Hill Substation

RECEPTOR	SENSITIVITY	CHANGES TO VIEW	MAGNITUDE (CONSTRUCTION)	EFFECTS DURING CONSTRUCTION	MAGNITUDE (ON COMPLETION)	RESIDUAL EFFECTS ON COMPLETION (including any possible mitigation measures)	SIGNIFICANT EFFECT
Buildings (Residential and/or Farm Premises)							
B01 Beechwood Farm (NY 315,700)	High	OHL 2km at nearest point at an oblique angle. Existing hedgerows, trees obscure views. Existing OHL in distant view. Unlikely to perceive construction works. Construction traffic likely to use B6357, so no views	None	None	None	None	No
B02 Milligansbush Farm (NY 314,712)	High	OHL 1.5km at nearest point to the E / NE. Existing landform, hedgerows and trees obscure views. Existing OHL in middle and distant views. Unlikely to perceive construction works. Construction traffic likely to use B6357, so no views.	None	None	None	None	No
B03 Milligansbushfield Farm (NY 323,722)	High	OHL 0.5km at nearest point to the E. House on higher ground - panoramic views, but trees and hedgerows would break up views of new OHL. Existing lattice steel towers in middle distant view. Construction traffic may utilise road past property.	Med.	Moderate to Major Negative	Low	Minor to Moderate Negative	No
B04 Staffler Farm (NY 333,719)	High	OHL within 0.25km to the W. Direct, close and uninterrupted views. Existing steel towers and other OHL's in existing view. Construction traffic likely to pass property.	High	Major Negative	High	Major Negative	Yes

RECEPTOR	SENSITIVITY	CHANGES TO VIEW	MAGNITUDE (CONSTRUCTION)	EFFECTS DURING CONSTRUCTION	MAGNITUDE (ON COMPLETION)	RESIDUAL EFFECTS ON COMPLETION (including any possible mitigation measures)	SIGNIFICANT EFFECT
B05 Alderman's Seat Farm (NY 327,709)	High	OHL within 0.75km to the NE. Existing lattice steel towers & Gretna SS in existing foreground views. Trees & hedgerows provide good screening of OHL's & construction traffic.	Low	Minor to Moderate Negative	Low	Minor to Moderate Negative	No
B06 Cottage by Gretna SS (NY 327,713)	High	OHL within 0.5km to the NE. Existing lattice steel towers & Gretna SS in existing foreground views, but existing trees & hedgerows provide some screening of OHL's & construction traffic.	Low	Minor to Moderate Negative	Low	Minor to Moderate Negative	No
B07 Greenwrae Farm (NY 326,729)	High	OHL within 0.5km to the W. Existing lattice steel towers & other OHL's in middle distant views (behind proposed OHL). Some hedgerows & trees reduce visual impacts. Construction traffic & activity will be visible.	High	Major Negative	Med.	Moderate to Major Negative	Yes
B08 Cadgillfoot Farm (NY 327,735)	High	OHL within 0.5km to the W. Main views SE over river valley (with 11kv line). Trees & hedgerows obscure views to W. Possibly views NNW of some construction activity.	Med	Moderate to Major Negative	Low	Minor to Moderate Negative	No
B09 Bungalow (nr Sarkhall) (NY 345,721)	High	OHL 1.75km to the W. Open, panoramic views across fields. Trees, hedgerows & gently rolling landscape break up views. Lattice steel towers visible in middle views. Some construction activity possible but limited.	Low	Minor to Moderate Negative	Low	Minor to Moderate Negative	No

RECEPTOR	SENSITIVITY	CHANGES TO VIEW	MAGNITUDE (CONSTRUCTION)	EFFECTS DURING CONSTRUCTION	MAGNITUDE (ON COMPLETION)	RESIDUAL EFFECTS ON COMPLETION (including any possible mitigation measures)	SIGNIFICANT EFFECT
B10 Englishtown (NY 335,732)	High	OHL within 1.5km to the W. Property on low rise overlooking undulating pasture landscape with mature hedgerows & tree planting. Steel towers in distant views. Trees & landform likely to obscure construction activities.	Low	Minor to Moderate Negative	Low	Minor to Moderate Negative	No
B11 Milltown (NY 333,754)	High	Small group of cottages set in local dip at road junction. Surrounding landform & trees would obscure all views of proposed OHL and construction works. Construction traffic not expected to use this stretch of the road.	None	None	None	None	No
B12 Evertown (NY 357,762)	High	Group of cottages & houses set in natural dip in the landscape at road junction with no views (towards proposed OHL).	None	None	None	None	No
B13 Fauldie (NY 362,752)	High	OHL 4km to W. Property enjoys expansive views to W across gently undulating landscape. Existing pylons in distant view almost completely obscured by trees would also obscure proposed line and construction activity.	None	None	None	None	No
B14 Tomshielburn (NY 345,779)	High	OHL 4km to SW. Property nestles in amongst mature trees. Undulating landform & coniferous plantation in middle distance obscure any long distant views. Therefore, no views of new OHL or construction activities.	None	None	None	None	No

RECEPTOR	SENSITIVITY	CHANGES TO VIEW	MAGNITUDE (CONSTRUCTION)	EFFECTS DURING CONSTRUCTION	MAGNITUDE (ON COMPLETION)	RESIDUAL EFFECTS ON COMPLETION (including any possible mitigation measures)	SIGNIFICANT EFFECT
B15 Barnglieshead (NY324,786)	High	OHL within 3km to SSW. Property in elevated position looking over rolling landscape, to south, with many groups of mature trees. Proposed line & construction traffic would be obscured by landform and vegetation.	None	None	None	None	No
B16 Solwaybank (bungalow) (NY 307,774)	High	OHL passes 2km S & 1.5km W. Main view south between avenue of mature, broadleaved trees. Direct views S but no views of line S or W as obscured by trees & landform. Some construction activity might be visible on roads.	Low	Minor to Moderate Negative	None	None	No
B17 Allfornought Farm (NY 293,778)	High	OHL within 0.5km to S and W. Views W filtered by mature line of trees. Some screening S but generally views over rough grazing land of both the OHL and construction activities.	Med	Moderate to Major Negative	Med	Moderate to Major Negative	Yes
B18 High Stenries Farm (NY 290,770)	High	OHL approx 0.5km to N around to SE. Farm on elevated ground but house surrounded by farm outbuildings. Views from house mostly to N, but from property generally there would be expansive views of line & construction activities.	High	Major Negative	High	Major Negative	Yes
B19 Wallacehall (NY 286,772)	High	OHL between 0.5km & 1km from NNE to E. Views S & E obscured by landform & views N filtered by garden boundary planting. Construction likely to pass cottage. Views NNE of short section of OHL as rises over local high point.	High	Major Negative	Med	Moderate to Major Negative	Yes

RECEPTOR	SENSITIVITY	CHANGES TO VIEW	MAGNITUDE (CONSTRUCTION)	EFFECTS DURING CONSTRUCTION	MAGNITUDE (ON COMPLETION)	RESIDUAL EFFECTS ON COMPLETION (including any possible mitigation measures)	SIGNIFICANT EFFECT
B20 Snab (NY 278,768)	High	OHL within 1.5km to NE. Property in elevated position with plantation in foreground view to N. Framed, but oblique views of short section of line to NE. Construction traffic likely to pass house & visible in middle distance.	Med	Moderate to Major Negative	Low	Minor to Moderate Negative	No
B21 Burnfoot (NY 252,745)	High	OHL approx 5km to NE. Property set in amongst mature tree planting. No views of OHL. Possible that construction traffic may pass by the house.	Low	Minor to Moderate Negative	None	None	No
B22 Eaglesfield (NY 235,745)	High	Small linear settlement on B722. Substantial amount of mature planting between settlement & proposed OHL. This, plus landform would obscure all views. However, construction traffic likely to use B722.	Low	Minor to Moderate Negative	None	None	No
B23 Raeburnhead (NY 288, 711)	High	OHL approx 4km to ENE. Property enjoys panoramic views S to Solway Firth, but views N obscured by landform & E by woodland block. Construction traffic may utilise B6357.	Neg	None	None	None	No
B24 Raeburn (NY 295,711)	High	OHL approx 3.5km to ENE. Property enjoys panoramic views, including to Solway Firth & existing lattice steel towers. Existing hedgerows & trees assist in obscuring, screening OHL's. Views of construction activities unlikely.	None	None	None	None	No

RECEPTOR	SENSITIVITY	CHANGES TO VIEW	MAGNITUDE (CONSTRUCTION)	EFFECTS DURING CONSTRUCTION	MAGNITUDE (ON COMPLETION)	RESIDUAL EFFECTS ON COMPLETION (including any possible mitigation measures)	SIGNIFICANT EFFECT
B25 Loganhouse (NY 302,732)	High	OHL approx 2.25km to E / NE. Property set in open farmland with boundary of mature trees/hedges. Existing lattice steel towers in middle view. Views of proposed line limited or unlikely due to existing trees & landform.	None	None	None	None	No
B26 Chapelknowe (NY 312,734)	High	Small settlement at cross roads & in a localised low point in the landscape. OHL approx 1km E. Most main views S & W. Landform and tree groups obscure views. Likely to be some construction traffic disruption as it passes through.	Low	Minor to Moderate Negative	None	None	No
B27 Tympanheck (NY 322,743)	High	OHL within 0.25km E. Property set into localised dip and surrounded by maturing hedgerows, so views from within house well screened, but locally highly visible. Construction traffic disruption & activities visible	Med to High	Moderate to Major Negative	Med	Moderate to Major Negative	Yes
B28 Tympanheck Church (NY 320,745)	High	OHL within 0.25km E. Open expansive views E & NE to hills in E. Number of 11kV cables in fore & mid views. New OHL would be in foreground view & large % of view. Construction traffic & activities highly visible	High	Major Negative	High	Major Negative	Yes
B29 Cadgillhead Farm (NY 311,755)	High	OHL passes immediately to S of property. Main views E, but side view to OHL. Highly visible when working / out in the fields. Construction traffic & activities in close proximity to the property.	High	Major Negative	High	Major Negative	Yes

RECEPTOR	SENSITIVITY	CHANGES TO VIEW	MAGNITUDE (CONSTRUCTION)	EFFECTS DURING CONSTRUCTION	MAGNITUDE (ON COMPLETION)	RESIDUAL EFFECTS ON COMPLETION (including any possible mitigation measures)	SIGNIFICANT EFFECT
B30 Cottage by Cadgillhead (NY 312,756)	High	OHL approx 0.25km S. Some filtered views SE through trees hedges in foreground. Construction traffic & activities visible.	Med	Moderate to Major Negative	Low	Minor Moderate Negative	No
B31 Hillhead Farm (NY 297,746)	High	OHL approx 1.5km NE. Existing lattice steel towers pass within 0.25km of property, to S. Undulating land & numerous tree groups to N & E would likely obscure all views. No visible construction activities or traffic.	None	None	None	None	No
B32 Berclees (NY 295,759)	High	OHL approx 0.5km to the E. Farm on rise overlooking open views of agricultural land giving rise to direct views of OHL to the north & passing the property to the E, including views of construction traffic.	High	Major Negative	Med	Major Negative	Yes
B33 Craigshaws (NY 259,764)	High	OHL 3.5km to NE & E. Property in local dip. Existing views include rolling landform, trees & hedgerows, lattice steel pylons. Landform & vegetation will preclude any views of proposed line.	None	None	None	None	No
B34 New house, Craigshaws (NY 258, 765)	High	OHL approx 3km to NE. Expansive views to N & E of rolling landscape with trees & hedgerows. Lattice steel towers in foreground view. May experience partial/glimpsed views ENE.	Low	Minor to Moderate Negative	Low	Minor to Moderate Negative	No

RECEPTOR	SENSITIVITY	CHANGES TO VIEW	MAGNITUDE (CONSTRUCTION)	EFFECTS DURING CONSTRUCTION	MAGNITUDE (ON COMPLETION)	RESIDUAL EFFECTS ON COMPLETION (including any possible mitigation measures)	SIGNIFICANT EFFECT
B35 Waterbeck (NY 248,777)	High	Group of properties in local dip on B725 & B722. OHL approx 4km to E & NE. Landform, coniferous plantations, woodland groups & hedgerows would screen all views. Construction traffic likely to pass through settlement.	Low	Minor to Moderate Negative	None	None	No
B36 Torbeckhill (NY 236,790)	High	OHL 4-4.5km E & NE. Property tucked into mature mixed woodland. No views of proposed line or construction traffic	None	None	None	None	No
B37 Craigs (NY 263,785)	High	Group of properties in local dip & surrounded by mature woodland & tree groups. No views of proposed line, but likely to experience construction traffic in passing	Low	Minor to Moderate Negative	None	None	No
B38 Conhess	High	OHL 0.75km SE round to NE. All views obscured by trees in foreground, landform or coniferous plantation. No construction traffic issues.	None	None	None	None	No
B39 West Linbridgeford (NY 267,794)	High	OHL within 1.25km NE round to SE, although most of line passing through coniferous plantations – so no views. Possible glimpsed views through trees & hedgerows to N, including construction activity.	Low	Minor to Moderate Negative	Low	Minor to Moderate Negative	No

RECEPTOR	SENSITIVITY	CHANGES TO VIEW	MAGNITUDE (CONSTRUCTION)	EFFECTS DURING CONSTRUCTION	MAGNITUDE (ON COMPLETION)	RESIDUAL EFFECTS ON COMPLETION (including any possible mitigation measures)	SIGNIFICANT EFFECT
B40 Lauriesclose (NY 267,799)	High	OHL within 1km ENE round to ESE. Glimpsed views through field trees, directly E (back-dropped by trees). Trees to NE preclude views. Line passes through woods to SE. Will experience construction activity & traffic	Med	Moderate to Major Negative	Low	Minor to Moderate Negative	No
B41 Kirtleton (NY 268,803)	High	OHL within 0.75km NE to SE. Direct views but line backdropped by mature woodland. Existing line of trees breaks up view as line passes behind. Construction activity will be visible.	Med	Moderate to Major Negative	Low	Minor to Moderate Negative	No
B42 Fallford (NY 267,806)	High	OHL within 0.75km NE round to ESE, backdropped by mature trees. Property in localised dip with woodland groups to E. Views, glimpsed (if any). Likely to experience some construction traffic, in passing.	Low	Minor to Moderate Negative	Low	Minor to Moderate Negative	No
B43 Setthorns (NY 269,809)	High	OHL within 0.5km to N round to SSE. Views of open, moorland to N & E. Line would be backdropped by plantation to SSE. Construction traffic & activity clearly visible.	High	Major Negative	High	Major Negative	Yes
B44 Megsfield (NY 276, 289)	High	OHL within 0.5km to W, extending round to NW. Property tucked up against coniferous plantation, views limited but open & uninterrupted to NW. Some construction activity likely to be visible.	Med	Moderate to Major Negative	Med	Moderate to Major Negative	Yes

RECEPTOR	SENSITIVITY	CHANGES TO VIEW	MAGNITUDE (CONSTRUCTION)	EFFECTS DURING CONSTRUCTION	MAGNITUDE (ON COMPLETION)	RESIDUAL EFFECTS ON COMPLETION (including any possible mitigation measures)	SIGNIFICANT EFFECT
B45 Callisterhall (NY 289,816)	High	OHL within 2km to W. Property faces south towards coniferous plantation & existing OHL. Felling taken place to west but rise in land precludes views of OHL & construction activities.	None	None	None	None	No
B46 Winterhope (NY 272,822)	High	OHL within 1km S round to NW. Property tucked in behind mature trees, but wider landscape is enclosed valley of rolling grazing land & framed views down valley. Construction activities would be visible within valley.	Med	Moderate to Major Negative	Med	Moderate to Major Negative	Yes
B47 – Kirtlehead Farm (NY 269,824)	High	OHL within 1km S round to NW. Property tucked in behind mature trees, but wider landscape is enclosed valley of rolling grazing land & framed views down valley. Construction activities would be visible within valley.	Med	Moderate to Major Negative	Med	Moderate to Major Negative	Yes
B48 – Dunnabie Farm (NY 256,811)	High	OHL within 1.5km to E. Property nestles in amongst mature trees. Trees & landform to E would screen all views of proposed line. Likely to experience construction traffic in passing.	Low	Minor to Moderate Negative	None	None	No
B49 – Crawthat (NY 252,824)	High	OHL approx 1km to N, extending round to SE. Ewe Hill Sub Station 1.25km to N. Property tucked in amongst trees & steep valley sides. No views of OHL or sub station. Likely to experience construction traffic in passing.	Low	Minor to Moderate Negative	None	None	No

RECEPTOR	SENSITIVITY	CHANGES TO VIEW	MAGNITUDE (CONSTRUCTION)	EFFECTS DURING CONSTRUCTION	MAGNITUDE (ON COMPLETION)	RESIDUAL EFFECTS ON COMPLETION (including any possible mitigation measures)	SIGNIFICANT EFFECT
B50 – Crossbankhead (NY 255,801)	High	OHL within 2.25km NE round to E. Views of rolling agricultural land with hedgerows & tree lines. Coniferous plantation in distance would backdrop the new line. Construction activity may be visible, in passing.	Low	Minor to Moderate Negative	Low	Minor to Moderate Negative	No
B51 – Whiteleys (NY 249,789)	High	OHL within 3km to NE. Views of rolling agricultural land with hedgerows & tree lines. Coniferous plantation in distance would backdrop the new line or screen entirely. Distant views of line NE & construction activity.	Low	Minor to Moderate Negative	Neg	None	No
Outdoor Locations							
L01 – Scots' Dike (Craw's Knowe) (NY 335,740)	Med	OHL within 1km to W. Undulating landscape with hedges & field trees. Distant views of lattice steel towers. New OHL in middle distant, views broken up by vegetation & backdropped by landform. Construction activity visible.	Med	Moderate Negative	Low	Minor Negative	No
L02 – Grange Fell / Birrens Hill Settlement (NY 244,819)	Med	Grange Fell is the highest point within the study area at 319m AOD & Birrens Hill settlement is approx 1km S at 250m AOD. Both locations would have panoramic views NE to SE over the valley to OHL – distance approx 2 to 3km. Landform & trees would break up views but overall likely to see approx 4km length plus construction activity.	Med	Moderate Negative	Med	Moderate Negative	Yes

RECEPTOR	SENSITIVITY	CHANGES TO VIEW	MAGNITUDE (CONSTRUCTION)	EFFECTS DURING CONSTRUCTION	MAGNITUDE (ON COMPLETION)	RESIDUAL EFFECTS ON COMPLETION (including any possible mitigation measures)	SIGNIFICANT EFFECT
L03 – Newhall Hill Settlements (NY 237,838)	Med	Sub Station 1 km E. OHL 1.5km E. SS access track 0.75km SE. Crawthat Hill screens SS & majority of OHL – top of line visible. Landform & plantation groups would screen majority of access track. Access track construction would be visible.	Med	Moderate Negative	Low	Minor Negative	No
L04 – Craighousesteads Hill Settlement (NY 237,853)	Med	Proposed Ewe Hill SS & OHL approx 2km SE. SS set down within E slopes of Crawthat Hill, which would screen views of SS & OHL. Any visibility would be minimal, over a short length & seen over a distance of 2km with slopes of Kirtlehead Hill backdropping the line. Construction activity: limited views.	Low	Minor Negative	Low	Minor Negative	No
L05 – Burnt Hill, 304m (NY 261,843)	Med	OHL & SS within 1km to SW with views SW round to SSE for approx 3km. Beyond this, views (including construction activity) are extremely oblique & rolling landform and forestry at Kirtleton would likely screen any longer distant views. Foreground views look down on OHL which is in valley.	Med	Moderate Negative	Med	Moderate Negative	Yes
L06 - Crawthat Hill, 280m (NY 247,836)	Med	SS on E slope of hill with OHL extending SE. Access track leads from SS round S of hill. Views direct & immediate within foreground, including construction activity. Approx 2.5km of OHL likely to be visible before landform and blocks of woodland would screen remainder.	Med	Moderate Negative	Med	Moderate Negative	Yes

RECEPTOR	SENSITIVITY	CHANGES TO VIEW	MAGNITUDE (CONSTRUCTION)	EFFECTS DURING CONSTRUCTION	MAGNITUDE (ON COMPLETION)	RESIDUAL EFFECTS ON COMPLETION (including any possible mitigation measures)	SIGNIFICANT EFFECT
L07 – Pyatshaws Rigg, 231m (NY 215,845)	Med	OHL & Ewe Hill SS approx 4km to the SE. There may be glimpsed views of the top parts of the OHL & short section of the access track, but Newhall Hill & Crawthat Hill will screen the majority of the line & the track. No views of the SS as screened by Crawthat Hill.	Low	Minor Negative	Low	Minor Negative	**No**
L08 – SAM nr Tympanheck (NY 318,745)	Med	This SAM is well screened by existing vegetation & there would be no intervisibility with the proposed OHL.	None	None	None	None	No
Transport Corridors							
T01 – B6357	Low	Passes through southern part of study area approx 3km north of Gretna SS (not visible). Landform & hedgerows would screen majority of views. Most would be glimpsed, partial & in passing. Line crosses road near Tympanheck at road junction. Highest visual impacts between church & Waughslea (approx 0.75km E). Construction activity visible.	Low to High	Minor Negative generally. Locally (1 short section) Minor to Moderate Negative	Low to High	Minor Negative generally. Locally (1 short section) Minor to Moderate Negative	**No**
T02 – B722	Low	Passes through central part of study area in NE direction from Waterbeck, joining B7068 at Fallford. In the main, no views of OHL due to landform, hedges, plantation woodland & properties. Any views would be glimpsed & in passing. May encounter construction traffic accessing the route.	Low to Neg	Minor Negative to None	Low to Neg	Minor Negative to None	**No**

RECEPTOR	SENSITIVITY	CHANGES TO VIEW	MAGNITUDE (CONSTRUCTION)	EFFECTS DURING CONSTRUCTION	MAGNITUDE (ON COMPLETION)	RESIDUAL EFFECTS ON COMPLETION (including any possible mitigation measures)	SIGNIFICANT EFFECT
T03 – B7068	Low	Passes through central part of study area. Mostly no views of OHL due to landform, hedges, plantation woodland & trees. Passes under line, near Setthorns with views N & S. Line backdropped by trees to S but more open views N. Access road to Sub Station visible for short section by the Grange Quarry. No views of the SS.	Low to High	Minor Negative generally. Locally (2 short sections) Minor to Moderate Negative	Low to High	Minor Negative generally. Locally (2 short sections) Minor to Moderate Negative	No
T04 – road from Waterbeck north to B7068	Low	Road passes north / south through central part of the study area. OHL within 2-3km to NE. Views of rolling agricultural land with hedgerows, tree lines & farm buildings. Coniferous plantation in distance would backdrop the new line or screen entirely. Distant views of line NE & construction activity.	Low	Minor Negative	Low	Minor Negative	No
T05 – road from Eaglesfield (passing through Solwaybank)	Low	Passes through southern part of study area. Landform & hedges & trees would screen majority of views. Mostly views would be partial, glimpsed & in passing from a distance. OHL & construction activity would be clearly visible between Snab (NY 278,767) & Solwaybank (NY 307,774). Views from further east largely screened by landform & vegetation.	Low to High	Minor Negative generally. Locally (3km section) Minor to Moderate Negative	Low to High	Minor Negative generally. Locally (3km section) Minor to Moderate Negative	No
T06 – road from Solwaybank south to B6357	Low	Passes through southern part of the site between Solwaybank & B6357 (near Tympanheck church). Views between Cadgillhead and B6357, but indirect, in passing and filtered by trees / hedgerows. Construction activity would be visible & construction vehicles would be using this road.	High	Minor to Moderate Negative	Low	Minor Negative	No

RECEPTOR	SENSITIVITY	CHANGES TO VIEW	MAGNITUDE (CONSTRUCTION)	EFFECTS DURING CONSTRUCTION	MAGNITUDE (ON COMPLETION)	RESIDUAL EFFECTS ON COMPLETION (including any possible mitigation measures)	SIGNIFICANT EFFECT
T07 – road from Milltown to Sarkhall (passing west end of Scot's Dyke)	Low	The road roughly parallels the line, at approx 1-1.5km to the E. Undulating landscape with hedges & field trees. Distant views of lattice steel towers. New OHL in middle distant, views broken up by vegetation & backdropped by landform. Construction activity would be visible. Any views brief & in passing.	Med	Minor Negative	Low	Minor Negative	No

Limitations of the Assessment

6.9.2 The assessment of visual effects has been undertaken from outside properties or groups of properties and assumptions have been made about the types and importance of views obtained from these properties. The assessment is made on an experienced judgement and on the basis of what elements of the proposed scheme might be seen from these properties, taking into account their orientation and elevation. The assessment primarily considers views from within the property but has also taken into account those views enjoyed from gardens or the immediate vicinity of the property.

6.9.3 Assessments could not be taken from every single property within the study /wider buffer area, but those selected give a broad cross section of locations, from across the study area, based on the likelihood of visibility as suggested by the ZTV.

Monitoring and Follow Up

6.9.4 Mitigation of impacts will be limited. Attempting to completely screen visual impacts of the line may not be appropriate to the character of the area, particularly in the Upland Heath and Upland Pasture LCA's, and a long corridor of woodland planting would in itself become a dominant feature. In addition, much of the land use is agricultural (either arable or grazing) and mitigation would mean further loss of agricultural land.

6.9.5 There are, however, a number of locations where mitigation, in the form of new planting, could be considered to reduce visual implications, although it will require landowner agreement. These locations are as follows:

- By Tympanheck church;
- At junction of B6357 with road north to Solwaybank;
- Between Setthorns and Megsfield;
- At junction of new access road to Ewe Hill Substation.

6.9.6 Planting takes a number of years to establish and fulfil its role as a visual screen. Monitoring, of any implemented planting, would be required for a 5 year period to ensure successful establishment. During this time, any plants that fail to thrive or a damaged would require to be replaced. It should be recognised that it will be approximately 5 years before the planting reaches a sufficient height to begin reducing the visual implications of the proposed overhead line.

6.9.7 However, it should be recognised that the primary means of mitigation has been through the careful consideration of the route alignment, selecting the best fit within the landscape to reduce the visual impacts.

6.10 SUMMARY OF LANDSCAPE CHARACTER AND VISUAL ASSESSMENTS GRETNA SUBSTATION TO EWE HILL SUBSTATION

6.10.1 The Gretna to Ewe Hill OHL, which includes two short sections of undergrounded cable, is proposed to be routed from the existing Gretna Sub Station (located approximately 5km east of Junction 21 on the M74, NY328,714) to the proposed Ewe Hill Sub Station at Crawthat Hill (NY250,835) a distance of approximately 15.5km.The southern half of the route is characterised by flat topography with scattered farmsteads, minor roads network and woodland copses of predominantly mixed deciduous species. Due to its low lying nature the land is of a higher agricultural quality than the rest of the study area and the majority of the land cover is improved grassland with some arable fields. Views around the area, particularly from roads, are fragmented due to the field boundaries which typically consist of managed hedgerows. A striking feature within this landscape is the historic feature of Scots' Dike, a belt of mature native woodland planting approximately 5km in length.

6.10.2 The landscape character gradually changes from the lowland farmland to upland pasture landscape character areas, the topography is more undulating in nature and there are numerous small tributaries and watercourses which create localised incised valleys. Settlements are generally isolated

farmsteads with the notable exceptions of the villages of Kirtleton and Waterbeck.The predominant land cover is rough pasture with some semi-improved areas and there has also been significant commercial woodland activity over the years with plantation woodland blocks at varying stages of growth. In places longer distance views are obtainable; however these are dependant on the topography and woodland cover, with striking contrasts between open, panoramic views and contained, short distant and focussed views.

6.10.3 The final 2km of the proposed OHL passes through an upland pasture landscape, close to the Winterhope Reservoir, crossing the Kirtle Valley and culminating at the proposed Ewe Hill Sub Station, at Crawthat Hill. The majority of the land is characterised by rough pasture and the area is sparsely settled. The topography is varied and the landform is undulating with gently rounded summits and rolling valleys.

6.10.4 Within the study area, as a whole the landscape character is reasonably complex with a variety of features and characteristics, panoramic views, framed views and enclosed spaces and places with limited or short views, which effectively reduces the extent of the line visible from any one location and as a result the overall effects on the various Landscape Character Types are assessed as being not significant, although locally, where the poles actually physically affect these areas, the effects would be greater.

6.10.5 With regards to visual receptors, proximity to the proposed line, as demonstrated in the assessment, does not automatically result in the most adverse effects, however, it is expected that those receptors closest to the line would experience the most adverse effects, being able to see the full height of the line, over short distances, but only for a relatively short length - in the main approximately 2km.

6.10.6 Views from hilltops, again, do not automatically result in significant adverse affects and many higher ground locations to the north and east do not experience any intervisibility. Views that are experienced are often interrupted by other areas of high ground or plantation woodland. However, the views from the hilltops to the east and south would be the most significantly affected, but are no defined public access routes to these locations, so the effects experienced by the public would be limited.

6.10.7 Views from roads are generally restricted by landform and hedgerows. Any views would be glimpsed and in passing. However, where the OHL passes over or alongside the road, the effects would be more adverse, but experienced only briefly. The road likely to be most affected is the un-named route between Solwaybank and the B6357 as the OHL parallels approximately 0.25km of the road, and their would be views, for a short distance, as the line heads west.

6.11 EWE HILL SUBSTATION TO NEWFIELD SUBSTATION ASSESSMENT

Local Character Area 1 – Lowland Farmland

6.11.1 Local Character Area 1 (LCA 1) is located to the south of the study area, and correlates closely with the Flow Plateau LCT. This landscape is characterised by its flat topography, scattered farmsteads, minor road network, woodland copses and field boundaries; hedgerows; hedgerow trees; post and wire fencing; and drystone walls. Due to its low lying nature the land is of a higher agricultural quality than the rest of the study area and the majority of the land cover is improved grassland, for grazing cattle, with some arable fields. Lower lying areas are often waterlogged with marshy pastures, due to the network of small water courses. A notable feature within this landscape is the striking, historic feature of Scots' Dike – a 5km belt of mature native woodland planting on an embankment. A network of major overhead transmission lines, also criss-cross the landscape and the Gretna Sub-Station is located within this LCA. Despite the flat topography, views around the area, particularly from roads, are often fragmented or partially screened due to the hedgerow boundaries and tree groups. Where the ground rises and views are not interrupted, long distant and expansive views of the Solway Firth are afforded. The farmsteads, in the main, take advantage of localised higher ground and rises to afford views of the farms, which also means more extensive views across the area.

Principal positive components:

- Scots' Dike;
- Network of hedgerows and hedgerow trees;
- Long distant views to the Solway Firth;

- Simple landscape of large scale field patterns with hedgerow boundaries.

Principal negative components:

- High voltage overhead lines and associated lattice steel towers dominate parts of the area;
- Gretna Sub Station;
- Other smaller scale overhead lines.

Sensitivity to Change – Medium – whilst there are long views from areas of higher ground, the patchwork of trees, woodlands and hedgerows generally constrain and fragment views. This LCA includes a network of overhead lines. The proposed scheme would therefore be viewed in the context of existing lines but not visible over a wide area.

Landscape Scenic Quality and Value – Overall: Good – an attractive composition of elements but containing a number of overhead transmission lines.

Magnitude of Change – None - the proposed OHL does not pass through this local landscape character area and therefore does not directly affect it. The distance of the proposed line from this LCA also means there would be no intervisibility and therefore no indirect impacts.

Local Character Area 2 – Transitional Farmland

Local Character Area 2 (LCA 2) is located within a central band of the study area this landscape is a transitional landscape taking characteristics from the lowland farmland and upland pasture landscape character areas. The topography is more undulating in nature however there are numerous small tributaries and watercourses which create localised incised valleys. Settlements are generally isolated farmsteads with the notable exceptions of the villages of Corrie Common, Kirtleton and Waterbeck. The predominant land cover is rough pasture with some semi-improved areas. There has also been significant commercial woodland activity over the years and plantation woodland blocks at varying stages of growth characterise this area. Due to its upland nature longer distance views are obtainable, however these are dependant on the topography and woodland cover which can vary greatly as one moves around the area.

Principal positive components:

- Bell's Flow SSSI;
- Gently undulating landform;
- Frequent long distant views (including to the Solway Firth – southern part of the LCA).

Principal negative components:

- Blocks of coniferous plantations;
- Lattice steel towers and other smaller overhead transmission lines.

Sensitivity to Change – Medium – the undulating nature of the landform and patchwork of trees reduces views over a wide area meaning that the OHL could be accommodated without being visible over a wide area and would therefore not change the character of this LCA.

Landscape Scenic Quality and Value – Overall: Good – attractive lowland farmland and valleys mixed with poorer quality rough pasture and plantation blocks.

Magnitude of Change – Medium to High, locally - immediately adjacent to the power line corridor (particularly as it crosses the Corrie Water) and the proposed Newfield Sub Station. Overall within this landscape character area the magnitude of change would be medium as despite the relatively small area that would be affected, intervisibility is possible from a number of places due to the open nature in the northern part of the study area.

Approximately 4.25km in total, of proposed OHL would pass through this landscape character area, separated by a short section where the line passes through the Plantation Woodland LCA, with supports at intervals of approximately 80-90m, including section and angle poles which require stay systems for support. In addition, there would be the proposed Newfield Sub Station, at Hogg Hill, the permanent access track to this, and access tracks to for the line, although these would only be required during construction.

Local Character Area 3 – Upland Heath

Local Character Area 3 (LCA 3). This landscape character area is located to the northeast of the proposed transmission line and broadly replicates the coverage of the SNH Foothills Landscape Character Type. The landscape is upland and undeveloped and the majority of the land cover is heath with some scattered locations of unimproved grassland. The topography is varied and due to the elevated, undeveloped nature of the area panoramic long distance views are available from the summits and plateaux.

Principal positive components:

- Wooded river valleys contrasting with rounded moorland hilltops;
- Open moorlands, with expansive views;
- Remains of iron-age settlements;
- Variety of colours, textures and open and closed views due to vegetation and landform.

Principal negative components:

- Large coniferous plantation blocks, with large areas recently felled;
- Network of small, overhead transmission lines.

Sensitivity to Change – Medium - whilst there are long views from areas of higher ground, the patchwork of trees, woodlands and hedgerows generally constrain and fragment views reducing the effects of any potential change.

Landscape Scenic Quality and Value – Overall: Very Attractive – a landscape with minimal man-made interventions. Farms and other buildings compliment the landscape and are appropriate to the rural character.

Magnitude of Change – None - the proposed OHL does not pass through this local landscape character area and therefore does not directly affect it. The complexity of the landform and frequent tree and hedgerow groups, reducing intervisibility, means that there would also be no indirect effects.

Local Character Area 4 – Plantation Woodland

Local Character Area 4 (LCA 4) is located to the north and centre of the study area. These landscape character areas are characterised by a monoculture of commercial woodland. There are access tracks for maintenance and forestry workers. Some recreation access is possibly but a lack of views is likely to reduce the appeal - views are enclosed and limited to the surrounding woodland. Areas of clear felling and replacement planting are currently taking place and will continue on a phased cycle.

Principal positive components:

- Red Squirrel habitat;
- Some recreation available;
- Deciduous woodland edges.

Principal negative components:

- Primarily a monoculture of coniferous tree species;
- Unattractive areas after felling.

Sensitivity to Change – Low – the blocks of coniferous woodland either screen views or would back drop the OHL, thereby reducing views and effects of any potential change.

Landscape Scenic Quality and Value – Overall: Ordinary – the plantation woodlands are non-native blocks of forestry, breaking up the natural landform and landscape character within the wider area.

Magnitude of Change – Overall: Low – Approximately 1km of the OHL would pass through the lower edge of the Plantation Woodland, to the north of Corrie Common. The OHL does not pass through the other area of this local landscape character type (at Kirtleton).

Where the route passes through the Corrie Common plantation a permanent easement of 70m would be required. However, this cutting through the trees would only be evident, very locally to the east and west.

Local Character Area 5 – Upland Pasture

Local Character Area 5 (LCA 5): Two areas are located towards the centre of the study area, separated by the LCA 6: Intimate River Corridor. These landscape character areas are sparsely settled and the majority of the land is characterised by rough pasture. The topography is varied and the landform is undulating with gently rounded summits and rolling valleys. Woodland cover is limited to small isolated pockets of plantation woodland which provide shelter for sheep and cattle, grazing this area. As a result of the topography, limited woodland cover and a lack of development, views from this area are elevated and long distance. However, due to the lack of access most views are not available to the public. Notable features upon the summits within this landscape are the hill forts associated with Iron Age settlers, particularly the settlement on the east slope of Newhall Hill.

Principal positive components:

- Remains of iron-age settlements;
- Rounded moortop hills;
- Long and panoramic views.

Principal negative components:

- Minsca Wind Farm;
- Quarry near Crawthat;
- Coniferous plantation blocks, including recently felled areas.

Sensitivity to Change – Medium – whilst there are elevated and long distant views within this landscape character area only a very short section (2km) will physically impact on this area.

Landscape Scenic Quality and Value – Overall: Good – varied composition of landscape elements with good long distant and panoramic views.

Magnitude of Change – Overall: Medium – the greatest impacts would be immediately adjacent to the OHL corridor, proposed Ewe Hill sub station and access track, but the elevation of the line and the open nature of the landscape as the line crosses from Crawthat Hill to Craighousesteads Hill means that intervisibility would be likely from the north. The sub station is proposed to be located, such that it would be screened by local landform and would not be visible within the wider landscape.

Approximately 2km of OHL would pass through this landscape character type. Due to the steeper landform and greater elevation, the woodpoles are likely to need to be spaced at approximately 80m. The Ewe Hill Sub Station is proposed, to the north of Crawthat Hill, and there would need to be a permanent access track to the sub station from the B7068 along the southern slopes of Newhall Hill and Crawthat Hill.

Local Character Area 6 – Intimate River Corridor

Local Character Area 6 (LCA 6) is located towards the northwest of the study area this landscape character area, separating areas of Transitional Farmland and Upland Pasture. This landscape character area is focused around the Water of Milk and Corrie Water river valleys. The landscape is characterised by incised valleys, broadleaf woodlands and meandering watercourses. These areas are reasonably well settled due to the sheltered nature of this landscape and there is a comprehensive minor road network which follows the lower ground within the river floodplains. Views from individual properties are enclosed by the topography and woodland cover creating a sense of isolated intimacy.

Principal positive components:

- Attractive, intimate, river valley landscape;

- Complex landform and variety of colours and textures;
- Variety of closed and open views;
- Drystone walls.

Principal negative components:

- Minsca Wind Farm;
- Network of small, overhead transmission lines and lattice steel towers;
- Large blocks of coniferous plantation.

Sensitivity to Change – Sensitivity to change: Medium – the landscape is reasonably tolerant to change due to views and intervisibility being limited by landform and woodland groups.

Landscape Scenic Quality and Value – Overall: Very Attractive – a scenically pleasing and intricate landscape composition, despite the inclusion of existing man-made elements

Magnitude of Change – Overall: Low, but Medium locally - the proposed OHL would pass directly over both river valleys. Although the line is technically within the Transitional Farmland LCA as it crosses the Corrie Water, it is within 0.25km of the Intimate River Corridor LCA. The complexity of the landform and frequent tree and hedgerow groups, do reduce intervisibility overall, and the proportion of the LCA that is affected is low, but the fact that the line passes across the Water of Milk and Corrie Water at locations of greater intervisibility means the magnitude of change is medium, locally.

Construction Effects, Operational Effects, Mitigation and Residual Effects

6.11.2 The extent to which the proposed scheme would affect the existing landscape character varies depending on the individual components and the capacity of the existing landscape to absorb these.

6.11.3 The following provides an assessment of the overall effects that the OHL would have on the local landscape areas during construction and also in the longer term.

6.11.4 The impacts and mitigation measures are, in the main, consistent for each of the landscape areas, as the type of development and method of construction will be the same, therefore the assessment of effects during construction and operation, along with mitigation measures will be set out only once, rather than against each Local Charater Area, to avoid unnecessary repetition. Both the Newfield and the Ewe Hill Sub Station and the access tracks to the latter, will mean additional impacts and these have been identified under the Local Character Areas 2 and 5 – Transitional Farmland and Upland Pasture. The impacts and effects of the access track to the Newfield Sub Station will be set out within the ES for the Newfield Wind Farm.

6.11.5 The residual effects, will however, be set out against each Local Character Area and these results carried forward to the summary table and conclusions.

During Construction

6.11.6 The Local Character Areas would be affected during the construction of the overhead transmission line as a result of additional construction vehicles on the roads and construction activities visible in the landscape. There would be physical disruption to areas of ground for the construction of foundations for the wood pole supports, stays, sections of access tracks and the two proposed sub stations. There would also need to be number of sites for construction cabins, welfare facilities and material stock piles.

6.11.7 Effects during construction without the implementation of mitigation measures:

1. Lowland Farmland	None
2. Transitional Farmland	Moderate (higher locally, where it crosses the Corrie Water)
3. Upland Heath	None
4. Plantation Woodland	Minor
5. Upland Pasture	Moderate
6. Intimate River Corridor	Moderate locally, Minor in wider area

Mitigation during Construction

6.11.8 Mitigation measures, during construction, would be as follows, to reduce physical disturbance and perception of activity in the landscape:

- Prescribed construction routes along roads already capable of accommodating construction traffic;
- Utilising existing tracks and field access points for access track requirements, wherever possible;
- Ensuring construction working areas are kept to a minimum;
- Restricted working hours e.g. no night time working to reduce noise being carried across the landscape;
- Directional, mobile lighting units to avoid light spillage across the landscape.

6.11.9 Mitigation measures will be limited in reducing impacts, therefore the residual effects during construction would be the same, and are summarised as follows:

1. Lowland Farmland	None
2. Transitional Farmland	Moderate (higher locally, where it crosses the Corrie Water)
3. Upland Heath	None
4. Plantation Woodland	Minor
5. Upland Pasture	Moderate
6. Intimate River Corridor	Moderate locally, Minor in wider area

On Completion

6.11.10 The areas of ground, disrupted during construction, would be reinstated to the original land use, as far as is practically possible, although some access tracks would need to remain permanent, most particularly the track to the Ewe Hill Sub Station. Agriculture, arable, pasture or grazing reinstated and also hedgerows and field boundaries, would be reinstated, wherever possible. Trees lost, along the route of the OHL could not be replaced in the same locations, due to easement requirements, but new planting to offset the loss could be included in appropriate locations, as agreed with landowners. However, the opportunities to include new planting would be limited due to the often open character of the landscape, particularly within the Upland Heath LCA where it would be inappropriate to attempt to include sporadic groups of new woodland.

Mitigation on Completion

6.11.11 Mitigation measures, on completion, would include:

- Replacement of lost trees, hedgerows and other vegetation (however, limited opportunities);
- Reduction in width of any permanently remaining access tracks.

6.11.12 A number of the mitigation measures are likely to also be applicable for mitigating against visual, noise and land-use impacts. However, the assessments for each of these will be undertaken separately and will include their own recommendations for mitigation, as necessary.

Residual Effects on completion

6.11.13 The mitigation measures are not intended to, nor could, screen the proposed overhead transmission line. The intention is to retain the landscape qualities and characteristics of each of the landscape character areas, therefore it would not be appropriate to regrade areas or introduce large areas of new woodland planting, for screening purposes. Whilst it will be possible to virtually eliminate evidence of the majority of the access tracks, the residual effects of the proposals will be the insertion of a heavy duty wood pole transmission line, two sub stations and a number of permanent access tracks within the landscape, including the two to access the sub stations.

6.11.14 For all landscape character areas, where the line passes through them, the residual effects would be Moderate to Major locally, and Minor over the area as a whole. For those landscape character areas where the OHL does not pass through them, the residual effects would be None to Minor (where there is some intervisibility).

6.11.15 The residual effects can be summarised as follows:

1. Lowland Farmland — None
2. Transitional Farmland — Moderate (higher locally, where it crosses the Corrie Water)
3. Upland Heath — None
4. Plantation Woodland — Minor
5. Upland Pasture — Moderate
6. Intimate River Corridor — Moderate locally, Minor in wider area

6.12 SUMMARY TABLE OF LANDSCAPE CHARACTER ASSESSMENT EWE HILL SUBSTATION TO NEWFIELD SUBSTATION

6.12.1 Table 6.5 summarises the order of impacts during construction and on completion of the scheme between Ewe Hill and Newfield on the local landscape character areas. It should be noted that where an impact has been assessed as being moderate to minor, it has been presented in the summary table as being of moderate impact. Equally, if the impact has been assessed as minor to moderate, an impact of minor has been presented.

TABLE 6.5 Summary of assessment of residual effects on local landscape character areas

LANDSCAPE CHARACTER AREA	CONSTRUCTION				ON COMPLETION			
	None	Minor Adverse	Moderate Adverse	Major Adverse	None	Minor Adverse	Moderate Adverse	Major Adverse
1. Lowland Farmland	◆				◆			
2. Transitional Farmland			◆				◆	
3. Upland Heath	◆				◆			
4. Plantation Woodland		◆				◆		
5. Upland Pasture			◆				◆	
6. Intimate River Corridor		◆ general	◆ locally			◆ general	◆ locally	

6.13 VISUAL ASSESSMENT OF IMPACTS, MITIGATION AND RESIDUAL EFFECTS

Change Over Time

6.13.1 The assessment is based on the design proposals detailed in Chapter 3 of this document.

6.13.2 The baseline landscape and its broad visual context are described in Section 6.4. It was not possible or appropriate to undertake an assessment from every individual property that fell within the ZTV. The assessment has selected representative properties or locations where there exists a direct relationship with, or clear views of, the proposed overhead transmission line. This does not mean that the remaining properties or locations have no views and therefore no impacts, but that these locations have significantly reduced views of the proposed scheme due to various factors such as landform, vegetation or other properties in the immediate foreground views. As a result any new elements that would become part of the view would need to be considered in the context of the existing elements that are already contained within the view.

Receptor Locations

6.13.3 Receptor locations (residential, leisure and roads), selected using the ZTV to give a broad range of across the study area, are indicated on Figure 6.5.

6.13.4 Key receptor locations were identified and agreed with Dumfries and Galloway Landscape Architect to show representative wire line and photomontage images of the proposed overhead line, which are indicated on Figures 6.16 and 6.17. The locations of the photomontages for the north route are indicated on Figure 6.10. They are:

- From Little Whitriggs (NY 192,871);
- Water of Milk valley – near Capelfoot (NY 238,864);

6.13.5 The sensitivity of visual receptors and views, as defined in the 'Guidelines for Landscape and Visual Impact Assessment', will be dependent on:

- The location and context of the viewpoint;
- The expectations and occupation or activity of the receptor;
- The importance of the view (is the view direct or indirect, currently uninterrupted or a main part of the current view); and
- The duration the view is experienced e.g. views whilst travelling by road or rail.

6.13.6 The most sensitive receptors include:

- Occupiers of residential properties with views affected by the proposed scheme;
- Agricultural and farm workers who work the land and who could be working in the immediate vicinity of the overhead line;
- Users of all outdoor recreational facilities including public rights of way, whose attention or interest may be focused on the landscape; and
- Communities where the development results in changes in the landscape setting or valued views enjoyed by the community.

6.13.7 The least sensitive receptors are likely to be people at their place of work whose attention would be focused on their work or activity (in this instance, other than farmers or others working the land) and who are therefore potentially less susceptible to changes in the view.

6.13.8 In this assessment more weight is given to changes in the view or visual amenity which are greater in scale and visible over a wide area. In assessing the effects on the views, consideration has been given to the effectiveness of any mitigation measures.

Views from Buildings

6.13.9 In general buildings within the study area fall within one of two categories:

- Residential properties
- Farm premises

Views from Outdoor Locations

6.13.10 Views from outdoor locations generally fall within one of three categories:

- Views from public rights of way, footpaths, tracks and outdoor sites
- Views from historic locations e.g. Scot's Dike or Iron Age Settlements
- Views from transport corridors i.e. roads

Assessment of Visual Effects

6.13.11 The process of assessment for each receptor, generally, is:

- Name/type of the receptor;
- Sensitivity of Receptor;
- Likely changes to view i.e. anticipated additional elements within an existing view
- Magnitude of change;
- Effects During Construction;
- Mitigation During Construction;
- Residual Effects During Construction;
- Mitigation on Completion;
- Residual Effects on Completion.

6.13.12 However, to avoid repetition the general implications of the proposals are set out below, whilst specific implications will be highlighted in the summary table 6.6: Construction Effects and Mitigation.

6.13.13 The extent to which the proposed scheme would affect a view varies depending on the elements likely to be seen and the extent of the view affected (the magnitude of change). The following sets out the likely effects that the development would have during construction and also in the longer term on completion of the development.

During Construction

6.13.14 As with the Landscape Character Assessment, receptors would be affected during the construction of the overhead transmission line as a result of additional construction vehicles on the roads and construction activities visible in the landscape, including a number of sites for construction cabins, welfare facilities and material stock piles.

Mitigation during Construction

6.13.15 Mitigation measures are limited but would be as follows, to reduce perception of activity in the landscape:

- Prescribed construction traffic routes to reduce the number of roads affected;
- Ensuring construction working areas are kept to a minimum;
- Directional, mobile lighting units to avoid light spillage across the landscape.

Residual Effects during Construction

6.13.16 These mitigation measures, whilst positive, are likely to only have a small effect and unlikely to change the outcome of the assessment before mitigation. Therefore, to avoid unnecessary repetition, the effects and residual effects during construction will be deemed to be the same.

Mitigation on Completion

6.13.17 The areas of ground, disrupted during construction, would be reinstated to the original land use, as far as is practically possible, although some access tracks would need to remain permanent, most particularly the track to the Ewe Hill Sub Station. Agriculture, arable, pasture or grazing reinstated and also hedgerows and field boundaries, would be reinstated, wherever possible. Trees lost, along the route of the overhead line could not be replaced in the same locations, due to easement requirements, but new planting to offset the loss could be included in appropriate locations, if agreed with landowners. Mitigation measures, on completion would be:

- Replacement of lost trees, hedgerows and other vegetation (where appropriate and as agreed);
- Reduction in width of any permanently remaining access tracks.

Residual Effects on Completion

6.13.18 The mitigation measures are not intended to, nor could, screen the proposed overhead transmission line. Whilst it will be possible to virtually eliminate evidence of the majority of the access tracks, the residual effects of the proposals will be the insertion of a heavy duty wood pole transmission line, new sub station and a number of permanent access tracks within the landscape, which will be visible to a greater or lesser extent, depending on proximity, landform and other existing features within the landscape.

6.14 TABLE OF VISUAL ASSESSMENT EWE HILL SUBSTATION TO NEWFIELD SUBSTATION

6.14.1 Table 6.6 assesses the impacts during construction and operation of the proposed Ewe Hill to Newfield section of the schemeon the described receptors and determines the residual effect. It should be noted that where an effect has been assessed as being moderate to minor, it would be considered a significant effect. Equally, if the effect has been assessed as minor to moderate, it would be considered to be a not significant effect. Figure 6.18 indicates the likely residual effects.

TABLE 6.6 Summary of assessment of receptors Ewe Hill Substation to Newfield Substation

RECEPTOR	SENSITIVITY	CHANGES TO VIEW	MAGNITUDE (CONSTRUCTION)	EFFECTS DURING CONSTRUCTION	MAGNITUDE (ON COMPLETION)	RESIDUAL EFFECTS ON COMPLETION (including any possible mitigation measures)	SIGNIFICANT EFFECT (Yes or No)
Buildings (Residential and/or Farm Premises)							
B01 – North Corrielaw (NY 173,847)	High	OHL 2.5 to3.5km to NE. Property overlooks Corrie Water valley. Lattice steel towers in foreground & Minsca windfarm in distant view to SE. Landform & trees obscure Newfield SS. Construction activity visible in distance.	Low	Minor to Moderate Negative	Low	Minor to Moderate Negative	No
B02 – Yellow cottage at 3-way junction (NY 180,848)	High	OHL within 2.5km to NE. Views from property are S, including lattice steel towers in foreground view. Views to OHL completely obscured by landform & trees. Construction traffic likely to pass the house.	Low	Minor to Moderate Negative	None	None	No
B03 – House (un-named) (NY 185,857)	High	OHL within 1.25km NNE. Views from property are SE. Oblique views of approx 2km of line in middle distance, but back-dropped by trees. Construction traffic likely to pass house & activity visible in middle distance.	Med	Moderate to Major Negative	Low	Minor to Moderate Negative	No
B04 – Cumstone (NY 185,862)	High	OHL & Newfield SS within 1.5km NW round to 2km NE. Main views to the south west. Views towards line largely screened by landform. No views of SS. Foreground views of existing OHL. Some construction activity visible.	Low	Minor to Moderate Negative	Low	Minor to Moderate Negative	No
B05 – un-named white cottage (NY 187,885)	High	OHL 1.75km to S, SS 1.5km to SW. Property set into trees, main views SW. Almost all views to OHL screened by trees, maybe glimpses during winter. SS screened by landform. Existing views include Minsca wind farm.	Neg	None	Neg	None	No

RECEPTOR	SENSITIVITY	CHANGES TO VIEW	MAGNITUDE (CONSTRUCTION)	EFFECTS DURING CONSTRUCTION	MAGNITUDE (ON COMPLETION)	RESIDUAL EFFECTS ON COMPLETION (including any possible mitigation measures)	SIGNIFICANT EFFECT (Yes or No)
B06 – Stobohill Farm (NY 187,878)	High	OHL within 1km to SE & Newfield SS 1km to SW. Property enjoys panoramic views to E & SE. Approx 2km of line visible in middle distance. SS likely to be screened by Hogg Hill. Construction activity would be visible.	High	Major Negative	Med	Moderate to Major Negative	Yes
B07 – Heithat (NY 193,880)	High	OHL within 1.25km to S. Property elevated with main views S. Views to line currently framed/screened to S by trees on property boundary & woodland. Possible partial view of tops of OHL to SE. Partial views of construction activity.	Low	Minor to Moderate Negative	Low	Minor to Moderate Negative	No
B08 – Wynholm (NY 197,882)	High	OHL within 1.5km to S. Main views S but most views of line obscured by landform & trees. Approx 0.5km of OHL & construction activity visible to SW in middle distance. No views of Newfield SS.	Low	Minor to Moderate Negative	Low	Minor to Moderate Negative	No
B09 – Burnfoot Cottage (NY 203,887)	High	OHL approx 2.25km to S. Views framed by landform & trees, focussing S. Current views include existing OHL. May get short, glimpsed view of top of line in middle view. Unlikely to see construction activity.	Low	Minor to Moderate Negative	Low	Minor to Moderate Negative	No
B10 – 2 cottages north of Little Whitriggs (NY 194,875)	High	OHL approx 0.75km to S & SE. Views broken by trees & landform at Little Whitriggs Would see 2 sections each 0.75km but backdropped by landform. Construction activities visible & may pass house. No views of SS.	Med	Moderate to Major Negative	Low	Minor to Moderate Negative	No

RECEPTOR	SENSITIVITY	CHANGES TO VIEW	MAGNITUDE (CONSTRUCTION)	EFFECTS DURING CONSTRUCTION	MAGNITUDE (ON COMPLETION)	RESIDUAL EFFECTS ON COMPLETION (including any possible mitigation measures)	SIGNIFICANT EFFECT (Yes or No)
B11 – Little Whitriggs (NY 193,872)	High	OHL in direct view to S round to ESE within 0.5-1km. Some localised screening by trees on property boundary, but generally direct & close views of approx 2km of line & construction activities.	High	Major Negative	High	Major Negative	Yes
B12 - Mirren Hill (NY 198,869)	High	OHL between 0.25 & 1km extending from SE round to SW in foreground view with much of OHL on skyline. Views open & panoramic of both the OHL & construction activities. No view of sub station.	High	Major Negative	High	Major Negative	Yes
B13 – Corrie Common (NY 205,860)	High	Group of cottages most on north side of road, facing SW. OHL to N within 0.5km currently back-dropped by or passing through plantation. Approx 4km would be visible within the view. Landform partially screens so full height not visible. Main views to S unaffected. Construction activity visible both in front & behind.	High	Major Negative	Med	Moderate to Major Negative	Yes
B14 – Single storey cottage (NY 207,855)	High	OHL approx 1km to N. May obtain views of top of line from upper rooms if/when plantation felled. Currently views obscured by trees. Unaffected by construction traffic.	Neg	None	None	None	No
B15 – Corriehalls (NY 201,853)	High	OHL within 1.25km to N. Property on high ground with panoramic views, including to Minsca wind farm. Views to line would be largely screened by woodlands, so partial /glimpsed. Unlikely to be affected by construction activity.	Low	Minor to Moderate Negative	Low	Minor to Moderate Negative	No

RECEPTOR	SENSITIVITY	CHANGES TO VIEW	MAGNITUDE (CONSTRUCTION)	EFFECTS DURING CONSTRUCTION	MAGNITUDE (ON COMPLETION)	RESIDUAL EFFECTS ON COMPLETION (including any possible mitigation measures)	SIGNIFICANT EFFECT (Yes or No)
B16 – Penlaw (NY 190,856)	High	OHL 1.2km to N. Property is tucked in between 2 groups of woodland. Views to line & construction works broken up by trees in fore & mid distance. Unlikely to see Newfield SS due to landform.	Med	Moderate to Major Negative	Low	Minor to Moderate Negative	No
B17 – Corriehills (NY 197,844)	High	OHL 2.5km to N & 5.5km to E. Panoramic views to E & S, taking in views of Minsca windfarm. Views N & W obscured by trees around property. Unlikely to see OHL or construction activity.	Neg	None	Neg	None	No
B18 – Tundergarth Mains (NY 176,807)	High	OHL approx 6km to N. Property would have no views of the OHL due to landform & landscape features. Construction traffic very likely to use the B7068 so construction vehicles would pass by the property.	Low	Minor to Moderate Negative	None	None	No
B19 – Paddockhole (NY 229,334)	High	OHL within 2.5km to N round to E (incl Sub Station). OHL & SS would be obscured by landform (Newhall, Crawthat & Craighousesteads Hills). Any views, would be glimpsed & just the top of OHL. Construction traffic in passing	Low	Minor to Moderate Negative	Neg	None	No
B20 – Pearsby Hall (NY 236,846)	High	OHL within 1-1.5km N round to SE (incl Sub Station). Property in localised dip surrounded by hills & tree group to E. Any views would be very short section & top of OHL. May experience some construction activity.	Low	Minor to Moderate Negative	Neg	None	No

RECEPTOR	SENSITIVITY	CHANGES TO VIEW	MAGNITUDE (CONSTRUCTION)	EFFECTS DURING CONSTRUCTION	MAGNITUDE (ON COMPLETION)	RESIDUAL EFFECTS ON COMPLETION (including any possible mitigation measures)	SIGNIFICANT EFFECT (Yes or No)
B21 – Birsca (NY 225,843)	High	OHL within 2km N round to E. Main views to S, but panoramic views to N, curtailed E by Craighousesteads Hill. Approx 1.5km of line would be clearly visible as would construction traffic in middle distant view.	High	Major Negative	Med	Moderate to Major Negative	Yes
B22 – Stridrigg (NY 222,853)	High	OHL within 1km N round to E. Property has open & panoramic views. Line & construction activity would be clearly visible within foreground views. Craighousestead Hill & other hilltops would obscure most views to E. Forestry	High	Major Negative	Med	Moderate to Major Negative	Yes
B23 – Craighousesteads (NY 235,355)	High	OHL within 0.25km N of house. Primary views to S, including Minsca windfarm. Line would come round hill behind the house. Tree group within garden screens most immediate views. Line & construction activity visible to W.	High	Major Negative	Med	Moderate to Major Negative	Yes
B24 – Capelfoot (NY 239,862)	High	OHL within 1km SW round to SE. Main views SW & W. Views SE partially screened by small woodland. Construction activity visible in foreground views.	High	Major Negative	Med	Moderate to Major Negative	Yes
B25 – Upper Whitcastles (NY 237,866)	High	OHL within 1.5km SW round to SE. Main views S. Property in local dip, views to E partially screened. OHL comes down hill in foreground view. Line & construction activity clearly visible for approx 2.5km.	High	Major Negative	Med	Moderate to Major Negative	Yes

RECEPTOR	SENSITIVITY	CHANGES TO VIEW	MAGNITUDE (CONSTRUCTION)	EFFECTS DURING CONSTRUCTION	MAGNITUDE (ON COMPLETION)	RESIDUAL EFFECTS ON COMPLETION (including any possible mitigation measures)	SIGNIFICANT EFFECT (Yes or No)
B26 – Whitcastles (NY 234,872)	High	OHL within 1.25-2km SSW round to SSE. Main views S with some localised screening by planting/trees adjacent to property. OHL & construction activity clearly visible in middle distant view for approx 2km.	High	Major Negative	Med	Moderate to Major Negative	Yes
B27 – Crawthat (NY 252,824)	High	OHL & Ewe Hill SS within 1.25kmto the N. Property tucked in amongst trees & steep valley sides. No views of OHL or sub station. Likely to experience construction traffic in passing.	Low	Minor to Moderate Negative	None	None	No
B28 – Dunnabie Farm (NY 256,811)	High	OHL & Ewe Hill SS within 2.5km to N. Property nestles in amongst mature trees with views N up valley. Crawthat Hill will screen almost all – possibly glimpsed views of very tops of a few poles. Would experience some construction traffic	Low	Minor to Moderate Negative	Neg	None	No
B29 – Crossbankhead (NY 255,801)	High	OHL & Ewe Hill SS within 3.5km to N. Crawthat Hill will screen almost all – possibly glimpsed views of very tops of a few poles. Would likely experience some construction traffic	Low	Minor to Moderate Negative	Neg	None	No

RECEPTOR	SENSITIVITY	CHANGES TO VIEW	MAGNITUDE (CONSTRUCTION)	EFFECTS DURING CONSTRUCTION	MAGNITUDE (ON COMPLETION)	RESIDUAL EFFECTS ON COMPLETION (including any possible mitigation measures)	SIGNIFICANT EFFECT (Yes or No)
Outdoor Locations							
L01 - Pyatshaws Rigg, 231m (NY 215,845)	Med	OHL within 1.75-2km N round to E. Open & panoramic views & iron-age settlement just below summit. Line & construction activity would be clearly visible within middle distance views for approx 1.5km. Craighousestead Hill & other hilltops would obscure most remaining views to E. Forestry & settlement at Corrie Common screens to NW.	Med	Moderate Negative	Med	Moderate Negative	Yes
L02 - Newhall Hill, 272m (NY 249,864)	Med	OHL approx 1km to E & extends round N to NW over 3km. Iron-age settlement on SW slope just below summit. Crawthat Hill (280m), Mid Hill (271m) & Craighousesteads Hill (261m) will screen much of SS & OHL, however access track to SS clearly visible in foreground. Views to NW over 3km. Construction activity will be visible.	Med	Moderate Negative	Low	Minor Negative	No
L03 - Newland Hill, 307m (NY 238,836)	Med	OHL within 1.5km to S with views extending from SE round to W. Pike Knowe (289m) will partially screen some views of OHL to SSE & forestry at Corrie Common screens views beyond 2.5km. Remaining views of construction activity, SS & OHL within fore to distant views.	Med	Moderate Negative	Med	Moderate Negative	Yes

RECEPTOR	SENSITIVITY	CHANGES TO VIEW	MAGNITUDE (CONSTRUCTION)	EFFECTS DURING CONSTRUCTION	MAGNITUDE (ON COMPLETION)	RESIDUAL EFFECTS ON COMPLETION (including any possible mitigation measures)	SIGNIFICANT EFFECT (Yes or No)
L04 - Whitcastles Hill, 278m (NY 227,876)	Med	OHL within 1.5km to S with views extending round to SE up to 4.5km. Forestry screens views from S round to W. Likely to experience views in fore to distance of approx 3.5km of OHL & construction activity. Unlikely to have views of Ewe Hill SS due to rolling land form.	Med	Moderate Negative	Med	Moderate Negative	Yes
L05 - Burnt Hill, 304m (NY 261,843)	Med	OHL & SS within 1km to W with direct views & foreground views SSW round to NW for approx 1.5km. Beyond this views, including construction activity are extremely oblique & rolling landform will screen majority of the OHL. Forestry at Corrie Common would screen any views over 4km.	Med	Moderate Negative	Low	Minor Negative	No
L06 - Crawthat Hill, 280m (NY 247,836)	Med	SS on W slope of hill with OHL extending N before continuing NW & W. Access track leads from SS round S of hill. Views direct & immediate within foreground, including construction activity. Mid Hill (271m) would partially screen OHL as would other landform. Glimpsed views NW. Forestry screens views beyond 3.5km.	Med	Moderate Negative	Med	Moderate Negative	Yes
L07 - Picnic Site (NY 214,873)	Med	Picnic site set within former quarry site with primary views to W & N. OHL within 1km from SE round to SW. Views obscured to E by plantation woodland & by woodland groups & landform to SW. Construction activity & OHL visible in foreground views, to SW, for approx 1km.	Low	Minor Negative	Low	Minor Negative	No

RECEPTOR	SENSITIVITY	CHANGES TO VIEW	MAGNITUDE (CONSTRUCTION)	EFFECTS DURING CONSTRUCTION	MAGNITUDE (ON COMPLETION)	RESIDUAL EFFECTS ON COMPLETION (including any possible mitigation measures)	SIGNIFICANT EFFECT (Yes or No)
L08 – Craighousesteads Hill Settlement (NY 237,853)	Med	The OHL would pass within 0.5km to the N of the summit / settlement round the lower northern slopes of the hill (but would not physically affect the SAM). The SAM is located within a field grazed by sheep & cattle. A radio mast is located within 0.25km to the SW. OHL & construction traffic visible in foreground views.	Med	Moderate Negative	Low	Minor Negative	**No**
Transport Corridors							
Receptor T01 – B7068	Low	Passes through the site, to the south of the OHL. Mostly no views of OHL due to landform, hedges, plantation woodland & trees. Access road to Ewe Hill Sub Station visible for short section by the Grange Quarry. No views of either SS. May encounter some construction traffic, in passing.	Low	Minor Negative	Neg	None	No
Receptor T02 – Lockerbie to Boreland (un-named)	Med-in valley	Passes through the NW part of the study area, through the Corrie Water valley. In the main only short length (max 2km) of the OHL in view, on approach from N or S, but views would be focused within the valley. Line passes under OHL near Little Whitriggs, at NY 188,168. No views of Newfield SS due to landform. Construction activity visible.	Low to Med	Minor Negative generally. Locally Moderate Negative	Low to Med	Minor Negative generally. Locally Moderate Negative	**No**
Receptor T03 – Boreland to Paddockhole / B7068 (un-named)	Low	Passes through NW part of the study area, through Corrie Common & meets B7068 at Paddockhole. In the main, views restricted due to landform, settlements & forestry. Passes under line W of Corrie Common with views along line W & E for approx 2.5km. Possible glimpsed views of top of line E of Corrie Common. Construction traffic also visible in places.	Low to High	Minor Negative generally. Locally (1 section) Minor to Moderate Negative	Low to High	Minor Negative generally. Locally (1 section) Minor to Moderate Negative	**No**

RECEPTOR	SENSITIVITY	CHANGES TO VIEW	MAGNITUDE (CONSTRUCTION)	EFFECTS DURING CONSTRUCTION	MAGNITUDE (ON COMPLETION)	RESIDUAL EFFECTS ON COMPLETION (including any possible mitigation measures)	SIGNIFICANT EFFECT (Yes or No)
Receptor T04 – Lockerbie to Corrie Common (un-named)	Low	Passes through NW part of the study area between 3-way junction (NY 180,848) & Corrie Common, south of OHL. Glimpsed view of line at junction & possible on approach to Corrie Common. Landform, woodland groups & roadside hedgerows will screen majority of views. Minimal construction activity visible.	Low	Minor Negative	Neg	None	No
Receptor T05 – Paddockhole to B709 (un-named)	Med-in valley	Passes through NW part of the study area between B7068, at Paddockhole through Water of Milk valley. Views will be intermittent due to landform & vegetation, but where visible will be open, panoramic & on occasions overlooking the line. Greater length of OHL visible when heading south. Passes under line near Craighousesteads (NY 235,858).	Low to High	Minor Negative generally. Locally Moderate to Major Negative	Med to High	Minor Negative generally. Locally Moderate to Major Negative	No

Limitations of the Assessment

6.14.2 The assessment of visual effects has been undertaken from outside properties or groups of properties and assumptions have been made about the types and importance of views obtained from these properties. The assessment is made on an experienced judgement and on the basis of what elements of the proposed scheme might be seen from these properties, taking into account their orientation and elevation. The assessment primarily considers views from within the property but has also taken into account those views enjoyed from gardens or the immediate vicinity of the property.

6.14.3 Assessments could not be taken from every single property within the study /wider buffer area, but those selected give a broad cross section of locations, from across the study area, based on the likelihood of visibility as suggested by the ZTV.

Monitoring and Follow Up

6.14.4 Mitigation of impacts will be limited. Attempting to completely screen visual impacts of the line may not be appropriate to the character of the area, particularly in the Upland Pasture LCA, and a long corridor of woodland planting would in itself become a dominant feature. In addition, much of the land use is agricultural (either arable or grazing) and mitigation would mean further loss of agricultural land.

6.14.5 There are, however, some locations where mitigation, through planting, should be considered to reduce visual implications, although it will require landowner agreement. These locations are as follows:

- At junction of new access road to Ewe Hill Substation;
- At junction of new access road to Newfield Substation.

6.14.6 Planting takes a number of years to establish and fulfil its role as a visual screen. Monitoring, of any implemented planting, would be required for a 5 year period to ensure successful establishment. During this time, any plants that fail to thrive or a damaged would require to be replaced. It should be recognised that it will be approximately 5 years before the planting reaches a sufficient height to begin reducing the visual implications of the proposed overhead line.

6.14.7 However, it should be recognised that the primary means of mitigation has been through the careful consideration of the route alignment, selecting the best fit within the landscape to reduce the visual impacts.

6.15 SUMMARY OF LANDSCAPE CHARACTER AND VISUAL ASSESSMENTS EWE HILL SUBSTATION TO NEWFIELD SUBSTATION

6.15.1 The OHL is proposed to be routed from the proposed Ewe Hill Sub Station at Crawthat Hill (NY 250,835) to the proposed Newfield Sub Station, at Hogg Hill (NY 177,874) a distance of approximately 9km.

6.15.2 From Ewe Hill Sub Station, heading west, the landscape is first characterised by rough pasture and the area is sparsely settled. The topography is varied and the landform is undulating with gently rounded summits and rolling valleys with a range of altitudes. On a number of these summits are hill fort features associated with Iron Age settlers. Woodland cover is limited to small isolated pockets of plantation woodland which provide shelter for sheep, grazing this area. As a result of the topography, limited woodland cover and a lack of development, views from this area are elevated and long distance. However, due to the lack of access most views are not readily available to the public.

6.15.3 The proposed OHL then crosses, the Water of Milk, river valley. This area is reasonably well settled due to the sheltered nature of this landscape and views from individual properties are enclosed by the topography and woodland cover creating a sense of isolated intimacy. This landscape character type extends to the south and west, following the river valleys and including the Corrie Water river valley, and acts as a divider between the upland pasture landscape and the area of farmland and forestry: the intimate and more complex nature of the landscapes, of both, contrasting strongly with the wider, open, upland grazing areas. Views are introspective or focussed along the lengths of the valleys.

6.15.4 The OHL continues through an area of rough upland pasture with some semi-improved areas and there has also been significant commercial woodland activity over the years with plantation woodland blocks at varying stages of growth. The OHL would pass through the southern part of the woodland around Whitcastles and Corrie Common. Much of the southern part of this woodland has been recently felled, with further felling and replanting scheduled. As with the areas of upland pasture, views are more extensive and areas and the coniferous plantations around Corrie Common also include some of the few public footpaths and cycle routes. In the main, due to the area being predominantly farmland, there is very little public recreational access, in this area. In places, longer distance views are obtainable; however these are dependant on the topography and woodland cover which can vary greatly within the study area, with striking contrasts between open, panoramic views and contained, short distant and focussed views.

6.15.5 The OHL culminates at the proposed Newfield Sub Station, at Hogg Hill, having crossed the Corrie Water and passing between a number of small stands of coniferous and mixed broadleaved woodland groups.

6.15.6 Within the study area, as a whole the landscape character is not particularly complex, comprising mainly of simple, rolling landform and simple landscape features. The river valleys of the Corrie Water and Water of Milk contrast quite dramatically with this, providing much more complex landscape forms, in localised areas. Overall, from residential areas and roads, views are limited due to the landform with limited or short views, which effectively reduces the extent of the line visible from any one location. The hilltops do experience long distance and, panoramic views, but there are no defined public access routes to these locations.

6.15.7 Proximity to the proposed scheme, as demonstrated in the assessment, does not automatically result in the most adverse effects, however, it is expected that those receptors closest to the line would experience the most adverse effects, being able to see the full height of the line, but due to landform and features, for only relatively short lengths - maximum approximately 2km.

6.15.8 Views from roads are generally restricted by landform and hedgerows. Any views would be glimpsed and in passing. However, where the line passes over the roads, the effects would be more adverse and this applies particularly within the Corrie Water valley and the Water of Milk valley where views are focussed along the river valleys.

The effects on the Landscape Character Types are greatest for the Upland Pasture and Transitional Farmland Landscapes as it is within these character types that there is the greatest intervisibility of the proposed line. There would also be the loss of the existing semi-rural, agricultural landscape and a significant change in character of the area. Locally, there would also be moderate adverse effects within the Intimate River Corridor LCT, particularly where the proposed line would cross the main rivers. Elsewhere, the more complex landform and landscape features restrict intervisibility.

7 Ecology and Ornithology

7.1 INTRODUCTION

7.1.1 This chapter provides an assessment of the effects of the proposed scheme, as described in Chapter 3, on ecology, ornithology and nature conservation. The presence and location of any protected species, ecologically valuable areas and any habitat types which may support protected species have been identified. The study will identify ecological constraints and any potential mitigation measures (where required) which could reduce the ecological effects of the proposed scheme.

7.2 LEGISLATION, POLICY AND GUIDANCE

Legislative Framework

7.2.1 The applicable legislative framework is as follows:

- The Bern Convention 1982;
- Bonn Convention 1979;
- The Convention of Biological Diversity 1992;
- Habitats Directive 1992;
- The Conservation (Natural Habitats &c.) Regulations 1994 (as amended in 2007);
- Protection of Badgers Act, 1992 (and subsequent amendment through The Nature Conservation (Scotland) Act 2004);
- Wild Mammals (Protection) Act, 1996;
- Wildlife & Countryside Act 1981 (as amended);
- The Nature Conservation (Scotland) Act 2004 (as amended);
- The UK Biodiversity Action Plan (BAP), revised priority list 2007;
- The Dumfries & Galloway Local Biodiversity Action Plan; and
- The Scottish Biodiversity List 2007.

International Conventions and Directives

7.2.2 The *Bern Convention 1982* imposes legal obligations to protect over 500 wild plant species and more than 1,000 wild animal species. These requirements are implemented in UK law through the *Wildlife and Countryside Act 1981*, as amended (see 1.2.6).

7.2.3 The Convention on the Conservation of Migratory Species of Wild Animals, also known as CMS or Bonn Convention 1979, aims to conserve terrestrial, marine and avian migratory species throughout their range. Migratory species threatened with extinction are listed on Appendix 1 of the Convention, whilst migratory species that need or would significantly benefit from international co-operation are listed in Appendix 2 of the Convention.

7.2.4 The *Convention on Biological Diversity* (CBD) was adopted in 1992 and entered into force in 1993. The CBD has three main goals:

- The conservation of biological diversity;
- The sustainable use of its components; and
- The fair and equitable sharing of the benefits arising from the use of genetic resources.

7.2.5 Contracting Parties are required to create and enforce national strategies and action plans to conserve, protect and enhance biological diversity. The UK government ratified the Convention and published the UK Biodiversity Action Plan (BAP) in 1994.

7.2.6 Natura 2000 series consists of a network of ecologically valuable designated areas in Europe. This network is established under the terms of the EU Directive 92/43/EECC Conservation of Natural Habitats and of Wild Fauna and Flora (Anon.1992), known as the *Habitats Directive 1992*. The main aim of the Habitats Directive is "*to promote the maintenance of biodiversity*" through the protection of habitats or species. Annex 1 of the Directive lists habitats and Annex 2 lists species for which sites are designated. The network comprises Special Areas of Conservation (SAC) designated under the Habitats Directive, and Special Protection Areas (SPA) designated under EU Directive 79/409/EEC 'Conservation of Wild Birds' (*The Birds Directive; Anon., 1979*).

National Legislation

7.2.7 The *Wildlife and Countryside Act (WCA), 1981*, as amended, is the principal mechanism for wildlife protection in the UK, originally aimed at consolidating and amending previous legislation to implement the requirements of the Bern Convention and the Birds Directive. Of particular relevance are Schedule 1, which lists bird species afforded special protection, Schedules 4-6, which protect various wild animal species from injury, killing or disturbance, and Schedule 8, which confers protection to certain plant species. The statutory designation of Sites of Special Scientific Interest (SSSI) is the main site protection measure in the UK established under the WCA.

7.2.8 The *Conservation (Natural Habitats &c.) Regulations 1994 (as amended in 2007),* place a duty on planning authorities to meet the requirements of the Habitats Directive, and to provide protection for priority habitats and species listed in the Habitats Directive outside of protected areas.

7.2.9 The *Nature Conservation (Scotland) Act 2004* gives greater protection to SSSI's (for example, Bell's Flow lowland raised mire), a greater power for the police with regard to wildlife crime and increased protection for wildlife.

7.2.10 Legislation providing protection for the key species along the proposed route corridors of the OHLs is covered below. Key species included:

- Otter (*Lutra lutra*);
- Badger (*Meles meles*);
- Water vole (*Arvicola terrestris*);
- Breeding Birds (including Black Grouse - *Tetrao tetrix*);
- Schedule 1 Breeding Birds (in this case; raptors, kingfisher, crossbill and barn owl- *Tyto alba*); and
- A watching brief was in place for red squirrel (*Sciurus vulgaris*), and anecdotal observations were taken for common lizards (*Lacerta vivipara*) and any notable butterfly species.

Otter (Lutra lutra)

7.2.11 Otter and their habitats are protected under The Conservation (Natural Habitats &c.) Regulations 1994 amended 2007. It is an offence to:

- To capture, injure or kill an otter;
- To harass a wild otter or group of otters;
- To disturb such an otter while it is occupying a structure or place which it uses for shelter or protection;
- To disturb such an otter while it is rearing or otherwise caring for its young;
- To obstruct access to a breeding site or resting place of an otter, or otherwise to deny the otter use of the breeding site or resting place;
- To disturb such an otter in a manner that is, or in circumstances which are, likely to significantly affect the local distribution or abundance of the species to which it belongs;

- To disturb such an otter in a manner that is, or in circumstances which are, likely to impair its ability to survive, breed or reproduce, or rear or otherwise care for its young; or
- To damage or destroy a breeding site or resting place of an otter.
- Note: this legislation also applies to bats, for which no specific survey work was done but rather a due regard was taken for potential presence.

Badger

7.2.12 Badgers and their setts are protected under the Protection of Badgers Act 1992. It therefore makes it an offence to intentionally or recklessly:

- Kill or attempt to kill, injure or take a badger;
- Interfere with a badger sett;
- Damage a badger sett or any part of it;
- Destroy a badger sett;
- Obstruct access to, or any entrance of a badger sett;
- Disturb a badger when it is occupying a sett; or,
- Cause a dog to enter a badger sett

Water Vole

7.2.13 Water Vole is protected under Schedule 5 of the *Wildlife and Countryside Act 1981* (as amended). This Act protects the water vole's place of shelter or protection, but does not protect the animal itself and makes it an offence to:

- Intentionally or recklessly damage, destroy, or obstruct access to, any structure or place that water voles use for shelter or protection; and
- Intentionally or recklessly disturb water voles while they are using such a place.

Birds

7.2.14 All species of wild bird and their nests are protected under the *Wildlife and Countryside Act 1981* (as amended). It is an offence to:

- Intentionally kill, injure or take any wild bird;
- Intentionally damage or destroy the nest (whilst being built or in use) or eggs;
- Intentionally disturb the habitat of any breeding bird; and
- Possess, transport or sell any wild birds.

7.2.15 Certain species are given further protection by Schedule 1 of the Act (as amended by the Nature Conservation (Scotland) Act 2004) which prohibits intentional or reckless disturbance to these species at all times.

Red squirrels

7.2.16 Protected under Schedule 5 of the *Wildlife and Countryside Act 1981* (as amended). Subject to certain exceptions, it is now an offence to intentionally or recklessly:

- Kill, injure or take a red squirrel;
- Damage, destroy or obstruct access to any structure or place which a red squirrel uses for shelter or protection; or to
- Disturb a red squirrel while it is occupying a structure or place which it uses for that purpose.

Common lizard

7.2.17 Protected under Schedule 9(1) and 9(5) of the Wildlife and Countryside Act 1981 (as amended). This legislation makes it an offence to:

- Intentionally kill or injure a common reptile (note the provision in section 9(1) of Wildlife & Countryside Act 1981 prohibiting "taking" does not apply to reptiles);
- Sell, offer or expose for sale, or have in possession or transport for the purpose of sale, any live or dead wild animal or any part of, or anything derived from, such an animal; or
- publishing or causing to be published any advertisement likely to be understood as conveying buying or selling, or intending to buy or sell, any of those things.

Note: The legislation relates only to 'wild animals', but in any proceedings the animal in question shall be presumed to have been a wild animal unless the contrary is shown.

Non-Statutory Policies

7.2.18 The UK Biodiversity Action Plan (2001) was established in response to the *Global Convention on Biological Diversity, 1992*. Individual Action Plans define actions and measures to meet the objectives defined in the strategy and specify measurable targets. They determine the broad habitats and species that are of value to the natural environment of the UK and identify actions and projects that could be undertaken to help protect or enhance the national biodiversity.

7.2.19 Local Biodiversity Action Plans (LBAPs) are implemented through local planning policy, identifying habitats and species of particular value or that are endangered at the local or regional level. BAPs in the UK have no statutory status, but provide a framework for implementing conservation requirements. The study area for this assessment is covered by the Dumfries & Galloway LBAP 2000 and subsequent amendments.

7.2.20 Locally Important Sites are sites of local conservation interest designated by local planning authorities and non-governmental organisations, and include designations as Sites of Nature Conservation Importance (SNCIs), Sites of Importance for Nature Conservation (SINCs), and Wildlife Sites (Scottish Wildlife Trust). Such sites are afforded a measure of protection in local development plans.

Planning Policy

7.2.21 Planning policy at the national, regional and local level is identified in Chapter 5 Policies and Plans. A summary of the proposed scheme's compliance with legislation and planning policy is included in Section 7.7 of this Chapter.

7.2.22 The Scottish Planning Policy provides guidance on policies for the conservation and enhancement of Scotland's natural heritage with regard to land use planning. Scotland's natural heritage is defined as, all plants and animals, its geology and landforms and its overall natural beauty and amenity. The document may be viewed in its entirety at http://www.scotland.gov.uk/Resource/Doc/300760/0093908.pdf. Amongst its guidance the key relevant statements in relation to this Environmental Statement include:

- To set out national planning policy considerations in relation to Scotland's natural heritage;
- Summarise the main statutory obligations in relation to the conservation of natural heritage;
- Explain, as part of a wider framework for conservation and development, how natural heritage objectives should be reflected in the development plans;
- Describe the role of the planning system in safeguarding sites of national and international importance;
- Provide guidance on the approach to be adopted in relation to local and non-statutory designations; and
- Draw attention to the importance of safeguarding natural heritage beyond the confines of designated areas.

PAN 60 Planning for the Natural Heritage Scotland (2000)

7.2.23 This Planning Advice Note furthers statements originally made in National Planning Policy Guidance (NPPG) 14: Natural Heritage (now superseded by the Scottish Planning Policy, February 2010) by stating that "Safeguarding and enhancing landscape character is an important planning objective." It goes on to state how the

National Landscape Character Assessment programme covers the whole of Scotland and how different planning authorities are making use of the information. "*Planning authorities are finding landscape character assessment to be of value in informing development plan policies; preparing locational strategies for mineral extraction, renewable energy developments and forestry; determining environmental settlement capacity; reviewing Green Belt boundaries; designing land renewal schemes; determining individual planning applications; and responding to Woodland Grant Scheme consultations*."

Local Planning Policy

7.2.24 The Dumfries & Galloway Structure Plan, Section 4 Caring for the Environment contains a section on Nature Conservation (Policies E4-E6 and Proposal EP1).

- Planning policy E4: Development proposals likely to have a significant effect on an existing or potential Special Protection Area (SPA), candidate Special Area of Conservation (SAC) or proposed Ramsar Site, including developments outwith the site, will require an appropriate assessment and will only be permitted where:-

  1. The development does not adversely affect the integrity of the particular habitats or species being protected; or
  2. There are no alternative solutions and there are imperative reasons of overriding public interest including those of a socio-economic nature".

- Planning Policy E5: "Development affecting Sites of Special Scientific Interest (SSSIs) not designated as International Sites will only be permitted where it can be adequately demonstrated that:-

  1. It will not compromise the underlying objectives and overall integrity of the site; or
  2. There is a proven national interest in allowing the development to take place which cannot be met at another more suitable location.

  Where it is proposed to grant planning permission for a development which could affect an SSSI the Council will consider the use of planning conditions or a Section 75 agreement to conserve, as far as possible, the site's scientific interest or to create new or replacement habitats where possible".

- Planning Policy E6: "When assessing development proposals, the Council will seek to ensure that the effect on any habitat which is valued for its nature conservation interests is fully considered. Particular attention will be given to those habitats and species which are identified in Circular 6/1995, but which do not fall within the boundaries of national or international nature conservation designations.

  Where important nature conservation interests would be adversely affected, the Council will consider the use of Section 75 agreements to maintain existing interests or in exceptional circumstances encourage the creation of new or replacement habitats where possible."; and

- Proposal EP1: "The Council will support the preparation and implementation of a Local Biodiversity Action Plan in partnership with Scottish Natural Heritage (SNH), RSPB and other agencies and organisations."

7.2.1 The study areas lie within the adopted Annandale & Eskdale Local Plan (2006). Nature Conservation is covered by General Policies 43-46, Section 5.of the Local Plan: General Policies and Proposals:

- General Policy 43: Areas of Local Environmental Importance: There will normally be a presumption against development having a materially adverse effect on areas of local environmental importance defined on the Inset Maps.

- General Policy 44: Nature Conservation Sites of International Importance: The Planning Authority will assess development proposals which may affect the nature conservation sites defined on the Proposals Map against the criteria set out in Structure Plan Policy E4.

- General Policy 45: Nature Conservation Sites of National Importance: The Planning Authority will assess development proposals which may affect the nature conservation sites of national importance defined on the Proposals Map against the criteria set out in Structure Plan Policy E5.

- General Policy 46: Nature Conservation Sites of Local Importance: Development proposals which are likely to affect the sites identified by the Council as Nature Conservation Sites of Local Importance will be considered against Structure Plan Policy E6.

7.2.2 A single Dumfries & Galloway Local Development Plan is currently being produced during 2010, and will replace the four currently adopted Local Plans.

Dumfries & Galloway Local Biodiversity Action Plan (LBAP)

7.2.3 Coordinated by the Local Authority and underpinning nature conservation policies in new local plans such as the Structure Plan and Local Development Plan (currently in preparation) LBAPs contain plans to protect and enhance natural habitats (Habitat Action Plans), and conserve species (Species Action Plans) with targets against which progress can be measured.

7.2.4 Habitat Action Plans potentially relevant to the proposed route of the OHLs include: raised bog, purple moor-grass and rush pasture, rivers & streams, native woodland, planted coniferous woodland, farmland, acid grassland, and standing open water.

7.2.5 Species Action Plans (SAPs) potentially relevant to the proposed route include: Black Grouse, Skylark, Linnet, Reed Bunting, and Large Heath Butterfly. A number of other species are classed as 'key species' and given consideration in the LBAP, for example, Kestrel, Barn Owl and Curlew.

Guidance

7.2.6 This assessment has been undertaken with reference to the Guidelines for Ecological Effect Assessment in the United Kingdom (IEEM, 2006) and IEMA's Guidelines for Baseline Ecological Assessment (1997). Best practice guidance is available for survey techniques and mitigation measures for a number of species and habitats, and the following guidance has been adhered to in the preparation of this assessment:

- Bang, P. & DahlstrØm, P. (2001). Animal Tracks and Signs. Oxford University Press, Oxford;
- Bibby, C.J., Burgess, N.D. & Hill, D.A. & Mustoe, S. (2000). Bird Census Techniques (Second edition). Academic Press, London;
- Black Grouse UK. (2007). http://www.blackgrouse.info/research/monitoring.htm. Published in support of the UK Black Grouse Biodiversity Action Plan;
- Brown, A.F., & Shepherd, K.B. (1993). A method for censusing upland breeding waders. Bird Study 40: 189-195;
- Elkington, T., Dayton, N., Jackson, D.L., and Strachan, I.M. (2001). National Vegetation Classification: Field Guide to Mires & Heaths. JNCC, Peterborough;
- Gilbert, G., Gibbons, D.W. & Evans, J. (1998) Bird Monitoring Methods. RSPB, Sandy;
- Gregory, R.D., Wilkinson, N.I., Noble, D,G., Robinson, J.A., Brown, A.F., Hughes, J., Procter, D.A., Gibbons, D.W., Galbraith, C.A. (2002). The population status of birds in the United Kingdom, Channel Islands and Isle of Man. British Birds 95: 410-450;
- Gurnell, J., Lurz, P. & Pepper, H. (2001). Practical Techniques for Surveying and Monitoring Squirrels. Forestry Commission Practice Note 11, HMSO, London;
- Hardy, J., Crick, H.Q.P., Wernham, C.V., Riley, H.T., Etheridge, B., & Thompson, D.B.A. (2006). Raptors: a field guide to survey and monitoring. The Stationary Office, Edinburgh;
- Harris, S., Cresswell, P. and Jefferies, D. (1989). Surveying Badgers. The Mammal Society, Occasional Publication No.9. Published by the Mammal Society;
- Joint Nature Conservation Committee (JNCC). (2005). Field manual for Phase 1 habitat survey - a technique for environmental audit., Revised reprint 2003, reprinted 2005, 62 pages A5 softback, ISBN 0 86139 637 5;
- JNCC. (2007). Handbook for Phase 1 habitat survey - a technique for environmental audit, Revised reprint 2003, reprinted 2007, 78 pages A4 softback, ISBN 0 86139 636 7;
- Marchant, J.H. (1983). BTO Common Birds Census Instructions BTO Thetford;
- National Rivers Authority. (1993). Otters and river habitat management. Conservation Technical Handbook 3 (subsequently reissued by the Environment Agency);

- Neal, E .& Cheeseman, C. (1996). Badgers. Poyser Natural History, London;
- R.S.P.B, N.R.A & R.S.N.C. (1994). The new rivers and wildlife handbook. (Eds. D. Ward, N. Holmes & P. José). RSPB, Bedfordshire;
- Sargent G. & Morris, P. (2003). How to Find & Identify Mammals. The Mammal Society, London;
- Scottish Natural Heritage (2001). Scotland's Wildlife: Badgers and Development. SNH, Battleby;
- SNH Otters and Development (http://www.snh.org.uk/publications/on-line/wildlife/otters/reading.asp);
- Scottish Natural Heritage. (2004). Badgers and Development. Environment & Heritage Service Publishing Unit; and
- Strachan, R. & Moorhouse, T. (2006). Water Vole Conservation Handbook. 2nd edition: Wildlife Conservation Research Unit, University of Oxford;

7.3 ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

Scope of the Assessment

7.3.1 Based on habitats known to be present along the proposed route of the OHLs, cable routes, substation, access road and associated study area, surveys carried out in 2007 & 2009 by a suitably qualified ecologist included:

- Phase 1 Habitat Survey;
- National Vegetation Classification (lowland mires);
- Otter;
- Badger;
- Water Vole;
- Breeding Birds;
- Breeding Raptors;
- Black Grouse;
- Migrating/wintering wildfowl, waders, and raptors; and
- Note: A watching brief noted the presence of Red Squirrel (*Sciurus vulgaris*), Common Lizard (*Lacerta vivipara*) and any notable invertebrate species into consideration.

Extent of the Study Areas

7.3.2 The extent of the study area depends on the study species:

- Habitats: a Phase I habitat survey was completed for a 400m wide corridor centred along the proposed OHL routes;
- National Vegetation Classification (NVC) survey of lowland mires was completed for any peatland within a 1km-wide study area centred along the proposed routes;
- Mammals: the study area was a corridor up to 600m wide centred along the proposed routes. Width dependent on the species to be surveyed and in line with best practice;
- Birds: a 1km wide corridor centred along the proposed routes was surveyed for general breeding bird interest and for migrating and wintering wildfowl, waders, and raptors. For notable raptors and Black Grouse a 4km-wide study area corridor was surveyed along the proposed routes;
- Bird surveys for non-breeding migrating and wintering birds were completed for a 1km-wide study area centred along the proposed routes; and

- Any other species of note that were observed within the 1km-wide study area used for the bird survey work along the proposed routes were also noted;
- Note: for any area where the proposed routes were potentially subject to deviation, the potential alternative routes were also surveyed.

Zone of Influence

7.3.3 The zone of influence is an area defined by the assessment in which there may be receptors subject to effects as part of the construction and/or operation of the proposed scheme. Such receptors are likely to include designated sites, notable habitats and protected species and these could be affected directly, *e.g.* works affecting a receptor within the study area such as removal of trees used by breeding birds, or indirectly, *e.g.* a designated site being affected by sediment deposition downstream of a development.

7.3.4 The zone of influence is ascertained through the desk study from an examination of mapped data, responses from consultees and records of protected species and from the findings of the site survey work.

Method of Baseline Data Collation (including Consultation)

Desk Study

7.3.5 The purpose of the desk study was to review existing information available in the public domain and to obtain information held by statutory and non-statutory consultees.

- Scottish Natural Heritage (SNH);
- Dumfries & Galloway Council via Local Biodiversity Partnership;
- Dumfries & Galloway Environmental Resources Centre;
- British Trust for Ornithology (BTO);
- Scottish Wildlife Trust (SWT);
- Royal Society for the Protection of Birds (RSPB);
- Dumfries & Galloway Raptor Study Group; and
- Local landowners.

7.3.6 In addition to the consultation process, the following were reviewed:

- Newfield Wind Farm Environmental Effect Assessment bird data;
- Ewe Hill Wind Farm Environmental Statement; and
- National Biodiversity Network (NBN);

Field Assessment

7.3.7 As part of the assessment, the following detailed ecological surveys centred along the proposed OHL routes were carried out in 2007, 2009 and 2010. The detailed findings of the field surveys are presented in Appendices 7.1 to 7.5.

Phase 1 Habitat Survey

7.3.8 A Phase I habitat survey was carried out in March 2007, with additional information collected during July & August 2009 and September 2010 on sections of the proposed OHL routes that had been altered since the first surveys were completed, or that may subsequently be amended. This survey of the 400m wide survey corridor (Figure 7.1 and 7.2) details the habitats present based on plant species composition and classified according to the standard Phase 1 methodology developed by the Nature Conservancy Council (now Joint Nature Conservancy Council, JNCC 2005/2007).

7.3.9 Any plants scheduled under the Wildlife & Countryside Act 1981 as invasive plant species were also noted.

7.3.10 During the Phase 1 habitat survey, any signs of key mammalian species were noted for later follow-up during species-specific surveys.

7.3.11 The Phase I survey in conjunction with the desk study also highlighted areas of key peatland (lowland raised mires and intermediate mires) where additional detailed habitat survey work was required at the NVC level. NVC surveys of peatland areas was completed in 2007 and repeated in 2009. The peatland areas covered by NVC survey are shown in Figures 7.1& 7.2 and the detailed NVC reporting is presented in Appendix 7.2.

7.3.12 Following the completion of the Phase 1 habitat survey, dedicated protected species surveys were undertaken for otter, badger, water vole and birds. No dedicated surveys were completed for red squirrels, common lizards, invertebrates or bats but anecdotal information was collected on their presence and potential for presence during the other surveys.

Otter

7.3.13 Riparian corridors and scrub vegetation along all watercourses passing within 300m (appropriate buffer zone) of the proposed routes of the OHLs were searched for field signs of otter in June 2007 and May-July 2009. A section of the Ned's Beck watercourse was also surveyed in September 2010 due to route realignment of a small section of the Gretna to Ewe Hill OHL. The survey area is shown in Figures 7.3 and 7.4. In addition, pond margins were also checked for signs of use by otters. Otter field signs are described in Bang and Dahlstrøm 2001 and Sargent & Morris 2003, and include:

- Holts - below ground resting places;
- Couches - above ground resting places;
- Prey remains – such as frog skins,, partially eaten fish etc;
- Prints; and
- Spraints – faeces used as territorial markers.

7.3.14 Any of the above signs are diagnostic of the presence of otter but it is often not possible to identify couches with confidence unless other field signs are also present. Spraints and prints are the most reliably identifiable evidence of the presence of this species. The surveys were carried out during good weather, with no heavy rain for several days preceding the surveys in both years.

Badger

7.3.15 A 600m–wide study area centred on the proposed OHL routes was specifically surveyed for field signs of badger by suitably experienced ecologists between May-June 2007 and May-July 2009, when setts found during 2007 were also re-assessed for status. A section of the route was also surveyed in September 2010 due to a realignment since the the ecology surveys in 2009. The badger survey area lay within the 1km-wide breeding bird study area along the proposed route and all evidence of badger within the 1km-wide bird survey area outwith the 600m wide main badger survey area were also noted. The surveys were conducted during variable weather conditions but generally on dry days. The survey area is shown in Figures 7.3 and 7.4.

7.3.16 Field signs of badger are described in the following references: Neal & Cheeseman (1996), Bang & Dahlstrøm (2001) and SNH (2001).

7.3.17 Field evidence searched for included:

- Holes (i.e. setts:, single/groups of burrows);
- Prints;
- Latrines (and single dung pits used as territorial markers);
- Hairs;
- Claw marks;
- Feeding signs (e.g. snuffle holes); and

- Paths.

7.3.18 The walkover survey for these field signs identified presence/absence of badger along the routes of the OHLs, and also were an indication of the type and intensity of activity the importance of the area for badger.

7.3.19 As a guide to classifying each sett the following criteria apply:

- Main – normally the focal sett for a badger social group. Generally always occupied, main setts usually have several well used holes with radiating tracks, latrines and other signs of activity. The actual number of holes can vary greatly, depending on social group size and soil conditions;
- Annex – a secondary sett, close to the main sett. Will normally be connected to the main sett by very obvious tracks. Annexes may not be occupied continually, even when the main sett is very active;
- Subsidiary – occurring at a greater distance from the main sett, and not as clearly linked to it as an annex. These setts will clearly fall within the territory of a social group and may be seasonally used by badgers; and
- Outlier – less frequently used, these setts may be colonised by other species, such as rabbit (*Oryctolagus cuniculus*) and fox (*Vulpes vulpes*), when not in use by badgers. Outliers may represent a sett used when foraging far from the main setts used by the social group or a temporary habitation for migrating individuals, or for those excluded from a social group.

7.3.20 SNH regards any badger sett within an occupied badger territory as potentially in use if it has been used within the last two years. Therefore a sett in an occupied territory is classified as active if in current use or disused (if it is only used seasonally or occasionally by badgers) but not as abandoned until it has not been used in a two year period. All active and disused setts are afforded the same protection by law. However, it is still important to classify each sett and determine its use by the social group. This involves counting the number of entrances per sett and assessing sett use based on the following criteria:

- Well-used: entrances being clear of any debris or vegetation, sometimes with fresh bedding evident, hairs, and prints common so they are obviously in regular use;
- Partially-used: not in regular use and have debris such as leaves and twigs in the entrance, or have moss and/or other plants growing in or around the entrance. Partially-used holes could be in regular use after a minimal amount of clearance; and
- Disused: not been in use for some time, are partially or completely blocked and could not be used without considerable amount of clearance. If the hole has been disused for some time, all that may be visible is a depression in the ground where the hole used to be, and the remains of the spoil heap, which may be covered in moss or plants.

Water Vole

7.3.21 A detailed search of all watercourses within the study area was carried out in July 2008 and July 2009 in order to search for field signs of water vole following the methodology prescribed in Strachan, 2006. A section of the Ned's Beck watercourse was also assessed for suitability for water vole in September 2010 due to route realignment of a small section of the Gretna to Ewe Hill OHL. The survey area is shown in Figures 7.3 and 7.4. This involved searching the watercourses and wetland areas within the study area for the following field signs:

- Faeces – recognisable by their size, shape, and content, and (if not too dried-out) also distinguishable from rat droppings by their lack of odour;
- Latrines – faeces are often deposited at discrete locations known as latrines;
- Feeding stations – food items are often brought to feeding stations along pathways and haul out platforms, recognisable by neat piles of chewed vegetation up to 10cm long;
- Burrows – appear as a series of holes along the waters edge distinguishable from rat burrows by size and position;
- Lawns – may appear as grazed areas around land holes;
- Nests – where the water table is high, above ground woven nests may be found;

- Footprints – tracks may occur at the waters edge and lead into vegetation cover, may be distinguishable from rat footprints by size but not 100% reliable as a field sign without other supporting evidence; and
- Runways in vegetation – low tunnels pushed through vegetation near the waters edge, less obvious than rat runs.

Ornithology

7.3.22 The ornithological assessment included a series of breeding bird surveys covering a 1km wide study corridor centred along the proposed routes of the OHLs, providing a 500m surveyed buffer area either side of the proposed routes, as illustrated in Figures 7.5 and 7.6 a to d. The daytime surveys included all diurnal bird species. There were no specific field surveys for night-flying species such as owls (desk study only).

- Breeding Notable Raptor Survey: The rationale behind Vantage Point watches was to observe displaying and foraging raptors to locate territories as part of the assessment. Raptors not listed on Schedule 1 were also recorded. This followed species-specific guidance on survey methodology in Hardy et al 2006. Surveys were undertaken between March and August 2009. Vantage Point surveys for notable raptors listed on Schedule 1 were conducted from a set of seven vantage points established at key locations outwith the 1km breeding bird study area with views across the 1km breeding bird study area, with a total visibility at most locations in excess of 2km. Vantage point watches were 3 hours per visit in weather conditions with good visibility. Each vantage point had:
  - March 2009 – three visits of three hours to observe for displaying adults;
  - April 2009 – two visits of three hours to observe for displaying adults;
  - July 2009 – two visits of three hours to observe for juveniles and adults; and
  - August 2009 – one visit of three hours to observe for juveniles and adults.

  This level of effort was considered sufficient to detect any notable raptors when considered in conjunction with the amount of time spent surveying on the ground as part of the other ecological surveys including standard Breeding Bird Surveys.
- Breeding Bird Survey (excluding raptors and grouse): This work was comprised of two different survey techniques:

  1. Standard British Trust for Ornithology (BTO) territory mapping methodology based on a 'scaled down' four visit version of the Common Bird Census (CBC) technique (Marchant 1983), and undertaken between April and July 2009. This method was the most appropriate for many species in the lowlands and upland rush pasture habitats. Brown & Shepherd methodology (1993) was not required due to the extremely low density of breeding waders throughout the study area. Note: The new BTO Breeding Bird Survey (BBS) method is not appropriate for site assessment studies as it is designed for survey of large areas (Gilbert et al 1998) and does not necessarily produce the type of detailed site-specific information required for Environmental Assessment: " *The BBS is a lower-intensity survey that aims to cover a much wider area of the UK (and thus more habitats and species), focusing more on the "what" and "how many" questions, rather than exact territory location and occupancy (go to: http://www.bto.org/bbs/ for more information).*" Species specific surveys for Birds of Conservation Concern (BoCC) red-listed passerines should only be undertaken when the generic territory mapping method is not deemed suitable (Gilbert et al 1998).
  2. Woodland point counts were used for extensive conifer plantation forest areas, where the habitat was largely inaccessible other than from forestry rides. In the older commercial forests encountered, the density and height of closely-packed trees made it impossible to access randomly selected points and to record bird activity and distance with confidence as would be recommended for younger forestry (Bibby et al 2000). Therefore, a simplified inventory of species present was a more realistic objective using selected accessible points on forestry roads and rides. Each count point was visited four times (once in April, May, June, and July 2009). Surveys were done in the first six hours after sunrise but not in conditions which may affect bird detection rates e.g. strong winds (>Beaufort 4), rain, snow or mist. The April visit was used to detect resident species, while the second to fourth visits were used to detect residents and migrants. On arrival at the point count location, the count was delayed for a few minutes to minimise any disturbance effects. Thereafter, the

observer recorded all birds seen and heard during a 5 minute period. Woodland point counts were also used to try to detect Goshawk. Figures 7.7 and 7.8 illustrate the locations of woodland blocks.

- Black Grouse: Undertaken during March (three survey visits) and April (two survey visits) in 2007 & 2009 within a 2km radius of the proposed OHL routes from an hour before dawn until two hours after dawn. Note: although the route was changed in the Capelfoot Farm area in 2009 and lek sites were then further than 2km from the new proposed route alignment the same lek sites were still surveyed to provide consistent data. The surveys involved a combination of observations at known historical lek sites following standard methodology (Black Grouse UK 2007) and observations were also made in suitable habitat along the entire route (three visits). In addition, the CBC walkovers between April and July were also used as an opportunity to record Black Grouse.
- Barn Owl distribution survey: desk study completed by consultation with landowners to determine which farms had breeding and/or roosting Barn Owls.

7.3.23 The ornithological assessment also included specific survey work for migrating and wintering wildfowl, waders, and raptors:

- Vantage Point surveys were conducted between mid September 2008 until the end of February 2009 from a set of 3 vantage points established at key locations outwith the 1km wide breeding bird study area, as illustrated on Figures 7.9 and 7.10. The rationale behind these Vantage Point watches was to observe passage of migrants and foraging use of key areas to determine if high levels of use by any of these species could be classed as an ecological constraint for the timing of works in those areas. It also allowed an assessment of the typical height that any of these species flew at when crossing through the OHLs, and which species may be at some risk of collision with lines. For example; In January 2009, the ecologist found an adult Whooper Swan freshly dead from a collision with a 132kV transmission line on 18m poles within 40 miles of the study area. This was in a field where the birds had been foraging, so even low lines may pose a threat if placed in an area where a pattern of foraging by a key species has already been established. The three vantage points provided views across key potential migrating and foraging areas of the 1km breeding bird study area, with a visibility in excess of 2km in good weather conditions. Vantage point watches were 2 hours per visit in weather conditions with good visibility. Total hours of observations per month are presented below:
  - September 2008 – 18 hours;
  - October 2008 – 40 hours (peak goose passage, with high numbers detected so additional effort made);
  - November 2008 – 36 hours;
  - December 2008 (no counts due to adverse weather- snow and poor visibility)
  - January 2009 – 36 hours; and
  - February 2009 – 36 hours.

  Observations were split between the two proposed routes as follows:

  Study Area 1: Gretna – Ewe Hill

  - September 2008 – 12 hours;
  - October 2008 – 28 hours (peak goose passage, with high numbers detected so additional effort made);
  - November 2008 – 24 hours;
  - December 2008 (no counts due to adverse weather- snow and poor visibility)
  - January 2009 – 24 hours; and
  - February 2009 – 24 hours.

  Study Area 2: Ewe Hill - Newfield

  - September 2008 – 6 hours;
  - October 2008 – 12 hours (peak goose passage, with high numbers detected so additional effort made);

- November 2008 – 12 hours;
- December 2008 (no counts due to adverse weather- snow and poor visibility)
- January 2009 – 12 hours; and
- February 2009 – 12 hours.

Ecological Effect Assessment Criteria

7.3.24 The results of the desk study and field surveys were used in conjunction with the responses from consultees and information on the scheme design to assess the possible significant ecological effects that the proposed scheme could have both at the construction and operational phases. Ecological Effect Assessment (EcIA) was undertaken in accordance with IEEM (2007) using assessment methodology as suggested in the IEEM EcIA Guidelines (2007).

Evaluation of Receptor

7.3.25 There are many components considered when evaluating an ecological receptor. A review of legislation, policy and sensitivity of the receptor was undertaken including reference to the following documents, *Wildlife and Countryside Act 1981* (as amended), the *Habitat Regulations 1994*, UK BAP and LBAP. The value of the receptor was given within a geographical context (itemised below).

7.3.26 Table 7.1 Criteria for Evaluation of Ecological Receptors outlines the factors taken into consideration for both habitats and species, as adapted from Ratcliffe (1977).

- International;
- UK;
- National;
- Regional;
- Local Authority Area (Dumfries & Galloway);
- Local or Parish; and
- Less than local, within the zone of influence only.

Table 7.1 Criteria for Evaluation of Ecological Receptors

Value/ Importance	Criteria
International (European)	**Habitats** An internationally designated site or candidate site (Special Protection Area (SPA), provisional SPA (pSPA), Special Areas of Conservation (SAC), candidate SAC (cSAC), Ramsar Site, Biogenetic/Biosphere Reserve, World Heritage Site or an area that would meet the published selection criteria for designation. A viable area of a habitat type listed in Annex I of the Habitats Directive, or smaller areas of such habitat, which are essential to maintain the viability of a larger whole. Any river classified as excellent A1 and likely to support a substantial salmonid population. Any river with a Habitat Modification Score indicating that it is Pristine or Semi-Natural. **Species** Any regularly occurring population of internationally important species, threatened or rare in the UK (i.e. a UK Red Data Book species categories 1 & 2 of UK BAP) or of uncertain conservation status or of global conservation concern in the UK BAP. A regularly occurring, nationally significant population/number of an internationally important species.
National	**Habitats** A nationally designated site (Site of Special Scientific Interest (SSSI)), National Nature Reserve (NNR), Marine Nature Reserve (MNR)) or a discrete area, which would meet the published selection criteria for national designation (e.g. SSSI selection guidelines). A viable area of a priority habitat identified in the UK BAP, or of smaller areas of such habitat essential to maintain wider viability. Any river classified as excellent A1 and likely to support a substantial salmonid population. Any river with a Habitat Modification Score indicating that it is Pristine or Semi-Natural or Obviously Modified.

Value/ Importance	Criteria
	Species A regularly occurring, regionally or local authority area significant population/number of an internationally/nationally important species. Any regularly occurring population of a nationally important species, threatened or rare in the region or county (see local BAP). A feature identified as of critical importance in the UK BAP.
Regional	**Habitats** Sites that exceed the Authority Area-level designations, but fall short of SSSI selection criteria. Any river classified as excellent A1 or good A2 and capable of supporting salmonid population. Any river with a Habitat Modification Score indicating that it is significantly modified or above. **Species** Any regularly occurring, locally significant population of a species listed as being nationally scarce, which occurs in 16 of 100 10km^2 squares in the UK or in a Regional BAP. A regularly occurring, locally significant population/number of a regionally important species. Sites maintaining populations of internationally/nationally important species that are not threatened or rare in the region or local authority area.
Authority Area (Dumfries & Galloway Council)	**Habitats** Sites recognised by local authorities, e.g. Site of Importance for Nature Conservation (SINC) or other sites that the designating authority has determined meet the published ecological selection criteria for designation, including Local Nature Reserves (LNR). A viable area of habitat identified in Local Planning Authority BAP. A diverse and/or ecologically valuable hedgerow network. Semi-natural ancient woodland greater than 0.25ha. Any river classified as good A2 or fair B and likely to support coarse fishery. Any river with a Habitat Modification Score indicating that it is significantly modified or above. **Species** Any regularly occurring, locally significant population of a species listed in a Local Planning Authority BAP due to regional rarity or localisation. A regularly occurring, locally significant population of a Local Authority Area important species. Sites supporting populations of internationally/nationally/regionally important species that are not threatened or rare in the region or county, and not integral to maintaining those populations. Sites/features scarce in the Local Authority Area or that appreciably enrich the habitat resource.
Local (immediate local area)	**Habitats** Areas of habitat that appreciably enrich the local habitat resource (e.g. species-rich hedgerows, ponds etc). Sites that retain other elements of semi-natural vegetation that due to their size, quality or the wide distribution within the local area are not considered for the above classifications. Semi-natural ancient woodland smaller than 0.25 ha. Any river classified as fair B or poor C and unlikely to support coarse fishery. River with a Habitat Modification Score indicating that it is severely modified or above. **Species** Populations/assemblages of species that appreciably enrich the biodiversity resource within the local context. Sites supporting populations of county/district important species that are not threatened or rare in the region or county, and are not integral to maintaining those populations.
Less than Local (limited ecological importance)	Sites that retain habitats and/or species of limited ecological importance due to their size, species composition or other factors. Any river classified as impoverished D and/or with a Habitat Modification Score indicating that it is severely modified.

7.3.27 In addition to the above criteria, for breeding birds, the JNCC (2002) traffic light system of highlighting species of nature conservation concern is also considered. This system was derived from the review of the population status of 247 bird species that are regularly found breeding within the UK, using data from national monitoring schemes by the leading governmental and non-governmental conservation organisations in the UK. A brief outline of the JNCC criteria is given below in Table 7.2 JNCC Bird Population Status in the UK.

Table 7.2 JNCC Bird Population Status in the UK

JNCC criteria	Status
Red list criteria	Globally threatened Historical population decline in UK during 1800–1995 Rapid (> or =50%) decline in UK breeding population over last 25 years Rapid (> or =50%) contraction of UK breeding range over last 25 years
Amber list criteria	Historical population decline during 1800–1995, but recovering; population size has more than doubled over last 25 years Moderate (25-49%) decline in UK breeding population over last 25 years Moderate (25-49%) contraction of UK breeding range over last 25 years Moderate (25-49%) decline in UK non-breeding population over last 25 years Species with unfavourable conservation status in Europe (SPEC = Species of European Conservation Concern) Five-year mean of 1–300 breeding pairs in UK > or =50% of UK breeding population in 10 or fewer sites, but not rare breeders > or =50% of UK non-breeding population in 10 or fewer sites > or =20% of European breeding population in UK > or =20% of NW European (wildfowl), East Atlantic Flyway (waders) or European (others) non-breeding populations in UK
Green list	No identified threat to the population's status

Assigning a threshold value

7.3.28 In the process of EcIA it is important to select the appropriate features for inclusion in the assessment. A threshold value of local or parish value has been set and all ecological receptors within the zone of influence that are of local value or higher have been included for consideration within the EcIA.

Characterising the potential effect

7.3.29 Based on an understanding of the baseline conditions and of the scheme proposals, potential effects on to valuable receptors have been considered, taking into account both the construction and operational phases. Effects have been assessed against the current value of the receptor, as described in the baseline conditions in Section 7.4, versus the predicted future baseline. The effects have been characterised with reference to the ecological structure and function of the feature in question, for instance the fragility/stability of an ecosystem and its connectivity to other features or resources.

7.3.30 The following parameters have been referred to when assessing effects on ecological structure and function (should any of these parameters be unknown, this has been clearly stated):

- Whether the effect is positive or negative on the conservation status of the habitat or species;
- Magnitude (Major, Moderate, Minor, and None);
- extent;
- duration;
- reversibility; and
- timing and frequency.

Assigning Significance

7.3.31 For the purposes of this assessment, an ecologically significant effect is defined as a negative or positive effect on the conservation status of the habitat or species on a scale of major, moderate, minor or none within a given geographical area. If an effect is found not to be significant at the level at which the resource or feature has been valued, it may however still be significant at a smaller geographical scale. Any effects that are significant at a level

below a local level, or are deemed to be not-significant, have been scoped out of the assessment, unless there are legal implications associated with the effect, in which case these will be clearly stated.

Confidence in Prediction of Effect on Sensitive Receptor

7.3.32 The following four-point scale has been adopted to describe the degree of confidence in the assessment of the effect on ecological structure and function. This confidence level relates to the likelihood that a construction or operational event or activity will lead to the described ecological effect on a sensitive receptor.

- Certain/near-certain – probability estimated at 95% chance or higher;
- Probable – probability estimated above 50% but below 95%;
- Unlikely – probability estimated above 5% but below 50%; or
- Extremely unlikely – probability estimated at less than 5%.

7.4 BASELINE CONDITIONS

Limitations to Assessment

7.4.1 The data provided from consultees and meta-databases is based on existing records but does not necessarily constitute a comprehensive list of protected and notable species records. These records are not exhaustive, as there is currently no national or regional policy for systematic data gathering. Therefore, absence of data does not constitute evidence of absence (i.e. it may be that the site has not previously been surveyed). It is also possible that other data exist within this area that has not been made available to inform this assessment.

Desk Study

Consultation Summary

7.4.2 Table 7.3 provides a summary of the key issues raised in consultation response relating to Ecology and Ornithology.

Table 7.3 Summary of Consultation Responses

Consultee	Response
Scottish Natural Heritage (SNH)	Data on ancient woodlands, peatlands, Wildlife Sites, and red squirrel
Royal Society for the Protection of Birds (RSPB)	Reply referring contact to local raptor group
British Trust for Ornithology (BTO)	Reply but no relevant data
Dumfries & Galloway Environmental Resources Centre	Data on red squirrels
Dumfries & Galloway Raptor Study Group (DGRSG)	Data provided on Schedule 1 breeding birds and Black Grouse lek locations and numbers of males
Scottish Wildlife Trust (SWT)/Local Biodiversity Partnership (LBAP)	Lowland mire survey reports, Wildlife Site data, and red squirrel data
Local Landowners (LL)	Information on badgers, Black Grouse, Goshawk, and Barn Owl

Designated Sites for Nature Conservation

Study Area 1: Gretna – Ewe Hill

7.4.3 Sites of Special Scientific Interest (SSSI): Only one SSSI lies within 1km of the proposed route of the OHL: Bells Flow lowland raised mire, is situated within 600m of the route, and is listed on the Scottish Natural Heritage Lowland Raised Bog Inventory (SNH). It is also recognised in the adopted Annandale & Eskdale Local Plan as a Nature Conservation Site of National Importance.

Study Area 2: Ewe Hill - Newfield

7.4.4 No nationally or locally designated sites are present within 1km of the proposed route (SNH).

Protected and Notable Habitats and Species Records

Study Area 1: Gretna – Ewe Hill

Habitats

7.4.5 Three lowland raised mires have been identified with nature conservation value within 500m of the proposed route: Cowgarth Flow, Greenwrae Flow, and Cadgill Flow. They are recognised as:

- 'Wildlife Sites' (WS) by Scottish Wildlife Trust;
- 'Other Sites of Nature Conservation Importance' or SNCIs in the Dumfries & Galloway Council adopted Annandale & Eskdale Local Plan; and
- Listed on the Scottish Natural Heritage Lowland Raised Bog Inventory (SNH).

7.4.6 Ancient Woodland Inventory (SNH): Ned's Beck and Cadgill Wood is the most significant extent of ancient woodland identified within 500m of the proposed route. Several smaller un-named pockets of ancient woodland or long-standing woodland of plantation origin are also present within 500m of the proposed route.

Species

Breeding birds

7.4.7 A record of a breeding attempt by a pair of Goshawk (*Accipiter nisus*) within 500m of the proposed route was found for 2005 when three young were raised – site confidential (DGRSG).

7.4.8 In 2006, a pair of Goshawk attempted to breed in the same locality but failed due to addled eggs.

Black Grouse

7.4.9 Greenwrae/Staffler Flow was the only known lekking site at NY 33535 72205, used by up to 5 males historically in 2005 (DGRSG).

Barn Owl

7.4.10 The species is known to be a regular breeder within the survey area, with a number of nest sites found at local farms where a nest box scheme run by BTO members used to be in operation (now defunct) [LL].

Study Area 2: Ewe Hill – Newfield

Habitats

7.4.11 There are no records of notable habitats within the study area but one record of a Nationally Scarce plant species *Euphrasia rostkoviana* (subsp. Montana) at NY 244 836 on the western side of Crawthat Hill, approx. 500-600m from the proposed Ewe Hill substation location.

Species

Black Grouse

7.4.12 Newland Hill area: DGRSG provided data from the Ewe Hill Wind Farm project (2005) indicating three Black Grouse leks in the Newland Hill area at NY 258 863, NY 267 862 and NY 264 862. These involved up to 4 males, which are presumed to be the same individuals given the proximity of the lek sites. All three locations are more than 1.5km from the proposed route. The landowner indicated that he and his staff had not observed any lekking males since 2006 and added that the birds often used to lek at NY 263 856 on nearby Papert Hill, and that occasional non-lekking Black Grouse were seen in the Blackstan –Kirtlehead Hill area within 1-1.5km of the lekking sites (LL).

7.4.13 Hogg Hill-Firtree Hill: The landowner provided information on a lek last known to be used 25 years ago by two males in the Hogg Hill-Firtree Hill area NY 180 874 north of the proposed Newfield substation. This lek site was within 0.5km of the proposed Newfield substation (LL).

Barn Owl

7.4.14 The species is known to be a regular breeder within the survey area, with a number of nest sites found at local farms where a nest box scheme run by BTO members used to be in operation (now defunct) [LL].

Other Species

Red Squirrel

7.4.15 SWT provided a copy of the 'Red Squirrel Priority Woodland' map for southwestern Scotland (SNH). This indicates that the plantation forest north of Corrie Common is classed as red squirrel priority woodland by SNH.

Site Survey

Phase I habitat survey

Study Area 1: Gretna – Ewe Hill

7.4.16 A total of 15 Phase I habitat types were found. All are extensive and common in Scotland, although ancient woodland and lowland raised mire/intermediate mire are of regional/national importance.

7.4.17 In addition, one stand of Japanese knotweed (*Fallopia japonica*) was found by the track at the edge of Conhess Forest (NY 27601 79366) within 200m of the proposed route.

7.4.18 No nationally or regionally important plant species were found, although mire habitat in particular contained species important at the Local Authority level.

7.4.19 A total of 221 species of plant were recorded but no nationally or regionally notable species were found.

7.4.20 The principal habitats on site were:

- A1.1. Broad-leaved woodland: - downy birch dominated mature woodland, with goat willow rowan, and occasional beech seedlings and saplings;
- A1.2.2. Conifer Plantation: - vast tracts of commercial forestry and also some small shelter belts/woodland areas on open farmland;
- A1.3.2. Mixed Plantation Woodland:
- A2.1. Dense scrub: - downy birch dominated scrub thickets, with goat willow and rowan, with alder/oak woodland/tree lines dominant along watercourses;
- A2.2. Scattered scrub: - downy birch dominated scrub thickets, with goat willow and rowan;
- A3.1. Broad-leaved scattered trees: stunted beech, rowan, willow, hawthorn along field boundaries;
- B4. Improved grassland: – typical species poor improved neutral grassland grazed by livestock, with perennial ryegrass dominant, some meadow foxtail and other grass sp., spear thistle, white clover, buttercups, and broad-leaved dock;
- B5. Marshy grassland: – dominated by coarse grasses such as tufted hair-grass and soft rush;
- D6. Wet heath/acid grassland mosaic: - degraded raised/intermediate mire peatlands, from very dry, where Sphagnum mosses minimal, some heather and cross-leaved heath and acid grassland elements include purple moor-grass, tormentil, lousewort, heath bedstraw, and heath rush;
- E1. Bogs: – lowland raised mires and intermediate mires in various conditions (E1.2. Raised bog, E1.7 Wet modified bog and E1.8 Dry modified bog): Full NVC details and species for the peatland areas are provided in Appendix 7.2. There were few changes in habitat quality between 2007 and 2009 for most peatland areas, although some showed an increase in purple moor-grass and so had degraded further.
- F1/2. Swamp/Marginal and Inundation areas: – along watercourses and on waterlogged ground with poor drainage, particularly around pond margins;
- G1. Standing Water: – several ponds, all man-made and associated with fire prevention in forestry areas or as flight ponds for waterfowl. Not mapped but present in forestry east of Berclees and in Conhess Forest;

- G2. Watercourse: – several rivers, burns, and minor field drainages present;
- J1.1. Arable land: – some re-sown grass pastures and cereal crops; and
- J2. Boundaries: – including intact hedges and defunct hedges, generally species-poor usually hawthorn dominated with occasional dog rose, and often with trees, some dry stone walls, and many stock fences. – Not mapped.

Study Area 2: Ewe Hill – Newfield

7.4.21 A total of 14 Phase I habitat types were found. All are extensive and common in Scotland, although ancient woodland and lowland raised mire/intermediate mire are of regional/national importance.

7.4.22 No scheduled invasive plant species were found within the study area.

7.4.23 No nationally or regionally important plant species were found, although mire habitat in particular contained species important at the Local Authority level.

7.4.24 A total of 207 species of plant were recorded but no nationally or regionally notable species were found.

7.4.25 The principal habitats on site were:

- A1.1. Broad-leaved woodland: - downy birch dominated mature woodland, with goat willow rowan, and occasional beech seedlings and saplings;
- A1.2.2. Conifer Plantation: - vast tracts of commercial forestry and also some small shelter belts/woodland areas on open farmland;
- A1.3.2. Mixed Plantation Woodland:
- A2.1. Dense scrub: - downy birch dominated scrub thickets, with goat willow and rowan, with alder/oak woodland/tree lines dominant along watercourses;
- A2.2. Scattered scrub: - downy birch dominated scrub thickets, with goat willow and rowan;
- A3.1. Broad-leaved scattered trees: stunted beech, rowan, willow, hawthorn along field boundaries;
- B4. Improved grassland: – typical species poor improved neutral grassland grazed by livestock, with perennial ryegrass dominant, some meadow foxtail and other grass sp., spear thistle, white clover, buttercups, and broad-leaved dock;
- B5. Marshy grassland: – dominated by coarse grasses such as tufted hair-grass and soft rush;
- D6. Wet heath/acid grassland mosaic: - degraded raised/intermediate mire peatlands, from very dry, where Sphagnum mosses minimal, some heather and cross-leaved heath and acid grassland elements include purple moor-grass, tormentil, lousewort, heath bedstraw, and heath rush;
- F1/2. Swamp/Marginal and Inundation areas: – along watercourses and on waterlogged ground with poor drainage, particularly around pond margins;
- G1. Standing Water: – several ponds, all man-made and associated with fire prevention in forestry areas or as flight ponds for waterfowl. Not mapped but present in forestry east of Berclees and in Conhess Forest;
- G2. Watercourse: – several rivers, burns, and minor field drainages present;
- J1.1. Arable land: – some re-sown grass pastures and cereal crops; and
- J2. Boundaries: – including intact hedges and defunct hedges, generally species-poor usually hawthorn dominated with occasional dog rose, and often with trees, some dry stone walls, and many stock fences. – Not mapped.

Otter Survey

Study Area 1: Gretna – Ewe Hill

7.4.26 Otters were found to be present on many of the watercourses running through the study area. No holts or other resting places were found. The survey results are confidential and are presented in Appendix 7.3.

Study Area 2: Ewe Hill – Newfield

7.4.27 Otters were found to be present on many of the watercourses running through the study area. No holts or other resting places were found. The survey results are confidential and are presented in Appendix 7.3.

Badger Survey

Study Area 1: Gretna – Ewe Hill

7.4.28 Badgers were very common in the survey corridor and wider area. Thirty-four setts were found within an approximately 1km-wide survey corridor covered for the breeding bird surveys. The results are confidential and are presented in Appendix 7.3.

Study Area 2: Ewe Hill – Newfield

7.4.29 Badgers were very common in the survey corridor and wider area. Forty-one setts were found within an approximately 1km-wide survey corridor covered for the breeding bird surveys. The results are confidential and are presented in Appendix 7.3.

Water Vole Survey

Study Area 1: Gretna – Ewe Hill

7.4.30 No Water vole field signs were recorded in the study area. The species is therefore believed absent between Gretna and Ewe Hill and is not considered further in this assessment.

Study Area 2: Ewe Hill – Newfield

7.4.31 Water voles were only found in one location, a single burrow and fresh droppings were found on the Corrie Water, near Little Whitriggs (NY 19059 86987).

Breeding Bird Survey

Breeding Notable Raptors

Study Area 1: Gretna – Ewe Hill

7.4.32 Other than breeding Barn Owl commonly present at many steadings in the Study area and in the wider area, no other species of raptor listed on Schedule One of the Wildlife & Countryside Act 1981 were found to be breeding within the survey area using a combination of vantage point watches (four vantage points and 98 hours total observations) and walkover surveys. Raptors found to be commonly breeding in the study area included Kestrel, Sparrowhawk, Buzzard, and Tawny Owl.

Study Area 2: Ewe Hill – Newfield

7.4.33 Other than breeding Barn Owl commonly present at many steadings in the Study area and in the wider area, no other species of raptor listed on Schedule One of the Wildlife & Countryside Act 1981 were found to be breeding within the survey area using a combination of vantage point watches (three vantage points and 72 hours total observations) and walkover surveys. Raptors found to be commonly breeding in the study area included Kestrel, Sparrowhawk, Buzzard, and Tawny Owl.

Breeding Bird Survey

Study Area 1: Gretna – Ewe Hill

7.4.34 A number of species considered as UK species of conservation concern (red or amber-listed) were found to be present during the bird surveys completed in 2009. Schedule 1 species (Barn Owl only) denoted by # in Table 7.5.

Table 7.4 Red-listed species (10 Total)

Common Name	Scientific Name	Common Name	Scientific Name
Bullfinch	*Pyrrhula pyrrhula*	Skylark	*Alauda arvensis*
Grasshopper Warbler	*Locustella naevia*	Song Thrush	*Turdus philomelos*
House Sparrow	*Passer domesticus*	Starling	*Sturnus vulgaris*

Common Name	Scientific Name	Common Name	Scientific Name
Linnet	*Carduelis cannabina*	Tree Sparrow	*Passer montanus*
Reed Bunting	*Emberiza schoeniclus*	Yellowhammer	*Emberiza citronella*

Table 7.5 Amber-listed species (22 Total)

Common Name	Scientific Name	Common Name	Scientific Name
Barn Owl #	*Tyto alba*	Meadow Pipit	*Anthus pratensis*
Black-headed Gull	*Larus ridibundus*	Mistle Thrush	*Turdus viscivorus*
Cuckoo	*Cuculus canorus*	Oystercatcher	*Haematopus ostralegus*
Curlew	*Numenius arquata*	Redstart	*Phoenicurus phoenicurus*
Dunnock	*Prunella modularis*	Sand Martin	*Riparia riparia*
Goldcrest	*Regulus regulus*	Snipe	*Gallinago gallinago*
Grey Wagtail	*Motacilla cinerea*	Stock Dove	*Columba oenas*
House Martin	*Delichon urbica*	Stonechat	*Saxicola torquata*
Kestrel	*Falco tinnunculus*	Swallow	*Hirundo rustica*
Lapwing	*Vanellus vanellus*	Tree Pipit	*Anthus trivialis*
Lesser Redpoll	*Carduelis cabaret*	Willow Warbler	*Phylloscopus trochilus*

Study Area 2: Ewe Hill – Newfield

7.4.35 A number of species considered as UK species of conservation concern (red or amber-listed) were found to be present during the bird surveys completed in 2009. Schedule 1 species (Barn Owl only) denoted by a # in Table 7.7.

Table 7.6 Red-listed species (10 Total)

Common Name	Scientific Name	Common Name	Scientific Name
Bullfinch	*Pyrrhula pyrrhula*	Skylark	*Alauda arvensis*
Grasshopper Warbler	*Locustella naevia*	Song Thrush	*Turdus philomelos*
House Sparrow	*Passer domesticus*	Starling	*Sturnus vulgaris*
Linnet	*Carduelis cannabina*	Tree Sparrow	*Passer montanus*
Reed Bunting	*Emberiza schoeniclus*	Yellowhammer	*Emberiza citronella*

Table 7.7 Amber-listed species (22 Total)

Common Name	Scientific Name	Common Name	Scientific Name
Barn Owl #	*Tyto alba*	Meadow Pipit	*Anthus pratensis*
Black-headed Gull	*Larus ridibundus*	Mistle Thrush	*Turdus viscivorus*
Cuckoo	*Cuculus canorus*	Oystercatcher	*Haematopus ostralegus*
Curlew	*Numenius arquata*	Redstart	*Phoenicurus phoenicurus*
Dunnock	*Prunella modularis*	Sand Martin	*Riparia riparia*
Goldcrest	*Regulus regulus*	Snipe	*Gallinago gallinago*
Grey Wagtail	*Motacilla cinerea*	Stock Dove	*Columba oenas*
House Martin	*Delichon urbica*	Stonechat	*Saxicola torquata*
Kestrel	*Falco tinnunculus*	Swallow	*Hirundo rustica*
Lapwing	*Vanellus vanellus*	Tree Pipit	*Anthus trivialis*
Lesser Redpoll	*Carduelis cabaret*	Willow Warbler	*Phylloscopus trochilus*

Black Grouse

Study Area 1: Gretna – Ewe Hill

7.4.36 Only one lek site had previously been identified in the study area. No Black Grouse were observed at the site (now improved pasture) by Greenwrae Flow in either 2007 or 2009. The lek site is therefore considered abandoned, and as no sightings of the species were recorded during other survey work the species is not considered an ecological constraint for the proposed scheme.

Study Area 2: Ewe Hill – Newfield

7.4.37 In 2007 and 2009 no Black Grouse were observed at any of the five known lek sites previously identified by the desk study. The lek sites are therefore considered abandoned, and as no sightings of the species were recorded during other survey work the species is not considered an ecological constraint for the proposed scheme.

Migrating and wintering wildfowl, waders, and raptors

Study Area 1: Gretna – Ewe Hill

Table 7.8 Results of 122 hours of Vantage Point watches

Month	Total # Hours Observations /month	Key species recorded	# Birds	# Flights	# Flights crossing Proposed Route	# Birds crossing Proposed Route	# Birds crossing Proposed Route close to line height	Flight height above ground level (m)
Sep 2008	12	Nil	Nil	Nil	Nil	Nil		Nil
Oct 2008	28	Hen Harrier	1	1	1	1	1	2
Oct 2008		Golden Plover	9	1	1	9	9	10
Oct 2008		Heron	1	1	1	1	1	20
Oct 2008		Pinkfooted Goose	4294	23	4	543		50-300
Nov 2008	24	Heron	2	1	1	2	2	2
Nov 2008		Pinkfooted Goose	961	13	9	821		80-200
Dec 2008	0	Nil	Nil	Nil	Nil	Nil		Nil
Jan 2009	24	Nil	Nil	Nil	Nil	Nil		Nil
Feb 2009	24	Pinkfooted Goose	390	4	2	307		100-600
Total	**112**		**5658**	**44**	**19**	**1684**	**13**	**2-600**

7.4.38 Target species activity was clearly focused in two main areas:

1. Stubbyknowe-Greenwrae

7.4.39 Land east of Stubbyknowe Farm (NY 31560 72535): where Pinkfooted Geese, Golden Plover, and Herons were using pasture fields for foraging in the study area including those lying on the proposed route. Goose activity in this area was relatively intensive over a four to five week period during the autumn migration (October and November 2008). Construction works in this area during October-November could cause temporary high levels of disturbance to foraging flocks of this migratory species. All goose flights observed actually crossing the proposed route were greater than 50m agl (above ground level) despite the high levels of foraging activity in close proximity to the proposed route. This species was therefore not found to be at risk of collision with new OHLs.

7.4.40 Nine Golden Plover had been foraging on the wet pastures just to the west of the proposed route on one occasion only. Construction works in this area are not assessed to be a significant disturbance issue to foraging flocks of this migratory species. The birds flew eastwards across the proposed route at 10m height above ground level (agl),

which was lower than the 13.5m proposed height for the OHLs and therefore would be classed as being at risk of collision with new OHLs. The number of flights at risk however is not seen as a significant risk to the conservation status of the species in Dumfries & Galloway.

7.4.41 Three Herons observed were all low flying when crossing the proposed route and thus this species could potentially be at risk of collision with new OHLs. The number of flights at risk however is not seen as a significant risk to the conservation status of the species in Dumfries & Galloway.

2. Solwaybank

7.4.42 Pinkfooted Geese were observed flying in the study area from the Solwaybank Vantage Point on two occasions in February 2009. Goose activity was however, greater in this area than the observations would indicate, with foraging centred on pastures in the Kennedy's Corner area approximately 1km west of the proposed route of the OHLs. Construction works in this area are not assessed to be a significant disturbance issue to foraging flocks of this migratory species.

7.4.43 A single foraging flight by a male Hen Harrier (2m agl) on 20.10.08 that passed across the proposed route west of Allfornought Farm was the only record of a notable raptor species. It is unlikely that construction works in this area would be a significant disturbance to this species. As the species is diurnal it is also highly unlikely that a new transmission line would create a significant collision hazard for this species.

Study Area 2: Ewe Hill – Newfield

7.4.44 A total of 54 hours of observations at one Vantage Point location found no target species migrating, wintering, or foraging in the observed study area. Migrating and wintering waterfowl, waders, and notable raptors are therefore not considered a significant ecological constraint for the proposed route.

Other Species

Red squirrel

Study Area 1: Gretna – Ewe Hill

7.4.45 Not observed in this area during survey work but suitable habitat present.

Study Area 2: Ewe Hill – Newfield

7.4.46 Recorded on several occasions in mixed woodland near to the Newfield substation end of the proposed route:

- NY 18835 86748
- NY 18785 86953
- NY 18830 86508

Common lizard (*Lacerta vivipara*)

Study Area 1: Gretna – Ewe Hill

7.4.47 Casual records from four areas are perhaps indicative of a much more widespread distribution given the habitats present although it is surmised the density is not particularly high at any location. NY 30300 75838 east of Berclees Farm is the main area where the species was recorded, with several individuals observed, and lizards found on more than one occasion.

- NY 28585 77985
- NY 28715 77985
- NY 28563 78645
- NY 30300 75838

Study Area 2: Ewe Hill – Newfield

7.4.48 A casual record from one area is perhaps indicative of a much more widespread distribution given the habitats present although it is surmised the density is not particularly high at any location.

- NY 20150 86980 west of Cockplay Hill

Butterflies

Study Area 1: Gretna – Ewe Hill

Small Pearl-bordered Fritillary (*Boloria selene*):

7.4.49 A small colony (<20 individuals) was found by the access track into Conhess Forest (NY 27655 79375) in both 2007 and 2009.

Large Heath (*Coenymphula tullia*)

7.4.50 Surveyed in 2007, and found to be present on all peatland areas surveyed within the study area. Weather in 2009 was poor for survey and few butterflies were observed anywhere in the study area. Survey results from 2007 are presented below:

- Un-named Blanket Bog One NY 286 777 West of Allfornaught Farm
- Un-named Blanket Bog Two NY 290 773 North of High Stenries Farm
- Un-named Blanket Bog Three NY 300 766 Southwest of Solwaybank Cottage
- Bell's Flow NY 319 758
- Cadgill Flow NY 318 736
- Greenwrae Flow NY 331 724
- Cowgarth Flow NY 322 716

Study Area 2: Ewe Hill – Newfield

Large Heath

7.4.51 Found on only one peatland area during survey work: Blackstan Moss NY 252 849.

Bats

Study Area 1: Gretna – Ewe Hill

7.4.52 No specific survey completed. Suitable trees for roosting noted in woodland in Cadgill Wood from NY 306 750 to NY 315 750, riparian woodland strip area NY 324 739, Ned's Beck NY 316 753, mature oak and ash field boundary NY 31577 75107 and at NY 28670 78308 and NY 28580 78458 in particular. The majority of these areas lie in proximity to the proposed route but are not close enough for any roost potentially present to be a significant issue. However tree removal may be required in the vicinity of Cadgill Wood.

Study Area 2: Ewe Hill – Newfield

7.4.53 No specific survey completed. Several mature woodland areas lie in proximity to the proposed route but are not close enough for any roost potentially present to be a significant issue.

Future Baseline

Evaluation of Receptors

7.4.54 The receptors have been evaluated according to IEEM 2007 guidelines and criteria described in the methods section 7.3. Where there is not sufficient information to confidently evaluate a receptor, this has been stated and a precautionary value has been assigned, that is, the greatest potential value given the knowledge of the species and habitats to date from previous records and Site survey.

7.5 ASSESSMENT OF EFFECTS, MITIGATION AND RESIDUAL EFFECTS: STUDY AREA 1: GRETNA – EWE HILL

Zone of Influence

Construction

Assessment of Effects

7.5.1 Construction of the proposed scheme is assessed to have potential ecological effects ranging from negligible to moderate depending on the ecological receptor and the time of year of works in the area where the receptor occurs. The level of potential effect is therefore governed by the time of year that it will be necessary to carry out the work. This assessment provides an indication of the potential effect based on the worst case scenario of a time of year when effect would be most significant.

Protected Sites

Habitats

7.5.2 Direct/indirect effect on any site with statutory nature conservation designations: **None**.

7.5.3 Direct/indirect effect on any site with a non-statutory nature conservation designation: **None**.

7.5.4 There are some potential **minor negative** effects on habitats classed as key habitats in the Local Biodiversity Action Plan, including lowland/intermediate/blanket mire, and wet heath areas in the area between Cadgillhead Farm and Conhess Farm. Such areas are already significantly degraded. **Minor negative** effects will be minimised by selecting access routes to specific points for installation of the poles carrying the OHL that take all ecological factors into consideration. Best working practices and the use of very low-ground pressure machinery and helicopters to access such areas will minimise the potential for any long-term effects.

Species

Otter

7.5.5 There is limited **minor negative** potential for disturbance of foraging/resting otter due to temporary works access and any associated temporary habitat damage/loss from the riparian zone at any river or burn crossing points. However, it is assessed that full due regard for the riparian zone will be taken, and any potentially damaging action such as crossing burns and rivers will be mitigated for by selection of alternate access routes that avoid water crossing. It is unlikely that any disturbance due to works would significantly affect commuting and foraging otter, or cause any significant damage that might affect the positive conservation status of otter locally or in the wider area.

7.5.6 Uncontrolled construction activities could cause sediment release in watercourses, and chemicals may be leached into the watercourse from machinery such as fuel oils etc. Any pollution may lead to a reduction in the otter's prey species and also may effect on otter directly. The potential for pollution of watercourses and associated effects on otter are **minor negative** along most of the proposed route. However, there is some potential for release of silt into drainage ditches at any point where the proposed route passes through forestry plantations, where drainage crossing may be unavoidable and where tree removal is required to create the wayleave/servitude for the proposed route. The potential effects on otter is assessed as **moderate negative**.

7.5.7 An increase in road traffic throughout the construction phase of the development could feasibly increase the risk of vehicles colliding with foraging otter, resulting in death or injury. However, direct mortality of otter as road casualties is thought to be minimal as the road network is already well used by the public and construction will be limited to daylight hours (**minor negative)**. Otter foraging will usually occur between dusk and dawn. Dusk/dawn at certain times of the year may coincide with commuting works traffic and would be the main period of concern.

7.5.8 These potential effects could result in a **minor-moderate negative** effect on an ecological receptor considered of Local Authority Area ecological importance.

Badger

7.5.9 An increase in road traffic throughout the construction phase of the proposed scheme may increase the risk of traffic-related badger mortality or injury. The area has specific setts that already experience this problem. However, predicted direct mortality of badgers as road casualties is thought to be negligible as construction will be limited to daylight hours. Badger foraging will usually occur at night. Dawn/dusk at certain times of the year may coincide with commuting works traffic and would be the main concern period.

7.5.10 Badger setts along the proposed route of the OHL were all highlighted to SPT at an early stage of consultation, and it is predicted that no setts will be within 30m of the proposed route/proposed points of works for almost all sections of the route. However, Conhess forest may contain Badger setts close to the proposed works route. This area could not be fully searched due to the dense impenetrable conifer growth. There is therefore potential to encounter a sett in that area during wayleave/servitude clearance works. This issue will be dealt with through production of an Environmental Management Plan, which will establish basic working practices to safeguard badgers and their places of rest. It will be necessary to have an ecological clerk of works present during clearing of the wayleave/servitude to ensure that if a sett is found that works cease immediately, and consultation with SNH takes place before any further works progress.

7.5.11 Potential effects on any as yet undiscovered setts are predicted to be high as they would only be apparent at the time of wayleave/servitude clearance.

7.5.12 Pre-construction discussions with SNH on licensing requirements for potential disturbance to badger setts within Conhess forest will be undertaken following approval of planning consent.

7.5.13 The overall predicted impact on Badgers is assessed as **minor negative.**

Water Vole

7.5.14 Water voles were absent from the study area. Potential effects on this species are therefore considered to be **none**.

Breeding Birds

7.5.15 Breeding birds are widespread along the proposed route of the OHL. Effects could be high if the construction works take place during the main breeding season which is April to mid July. Such effects include disturbance of breeding birds with the potential for destruction of nests, eggs and young in plantation woodland through felling of trees, crushing of active ground nests, exposure of eggs and young, reduced feeding rates for young in areas where construction work is proceeding, and increased depredation of eggs and young.

7.5.16 Forestry wayleave/servitude clearance is potentially the highest effect construction activity on breeding birds, with a moderate to major effect predicted if occurring during the main breeding season, with total nest and habitat loss during clearance.

7.5.17 Loss of woodland habitat during wayleave/servitude creation outwith the breeding season may result in some permanent displacement of some territories of common woodland passerine bird species, and of foraging habitat but avoids the critical breeding period.

7.5.18 Overall predicted effect is **major - moderate negative** to the actual breeding birds present but is considered **minor negative** on a regional basis for the species concerned.

Other Species

Red Squirrel

7.5.19 Effects are assessed as being **minor negative**, although anecdotal information on the distribution of the species in the study area is minimal. There is negligible potential for road mortality associated with construction traffic due to the distribution of the species. There have been no sightings in the study area along the proposed route, and specifically, there have been no sightings in the Conhess commercial conifer forest where wayleave/servitude clearance is required.

Common Lizard

7.5.20 Not enough is known about the distribution of the species based on the anecdotal records collected. Given that most of the proposed route is across improved farmland, the construction effect is assessed as being localised and minor, with populations on lowland mire and rough pasture/riparian margins most at risk of effect: **minor negative**.

Small Pearl-bordered Fritillary

7.5.21 Potential effects are assessed as being **major negative** with the proximity of the colony to a major access track at Conhess Forest due to potential effects associated with dust, mud, silt, and other pollutants associated with any heavy traffic movements along the access track. It should be noted that the colony would also be exposed to these effects due to eventual forestry logging operations.

Large Heath

Potential effects are assessed as **minor negative** and localised as the key habitats for this species are lowland raised bogs where the species occurs. The proposed OHL route crosses one lowland raised bog (NY 302 761) east of Berclees Farm, where only low numbers of Large Heath have been observed (2007). It also crosses two other areas of peatland (intermediate bog) east of High Stenries Farm (NY 297 768) and west of Allfornought Farm (NY 287 778) where the butterfly was detected in low numbers in 2007.

Bats

7.5.22 It is likely that bats occur at low density along the entire OHL route corridor, with a scattered pattern of occurrence. Roost sites are most likely to be in and around farm steadings and in mature woodlands, with foraging most likely concentrated along riparian corridors and along forest edges. Disturbance of foraging bats is likely to be negligible give that they forage after dusk, and works are proposed for daylight hours only. Creation of the wayleave/servitude through Conhess Forest will create additional potential foraging corridors. However, removal of mature trees for creation of wayleaves within Cadgill Wood and Ned's Beck, and along some field boundaries which may result in a loss of mature trees with roosting opportunities for bats. Predicted effects are therefore **minor negative**.

Construction Mitigation

7.5.23 Details of the mitigation will be transferred to an Environmental Management Plan (EMP), the implementation and monitoring of which will be overseen by an Environmental Manager, who will be responsible for the safe retention of the sensitive ecological areas. The success of protective measures will be reviewed every two months to ensure that all areas are adequately protected.

7.5.24 All Site staff will receive tool box talks on the various ecological sensitivities of the proposed scheme as part of their site induction. Generic mitigation and standard best practice methods in construction will be implemented to avoid, reduce and offset effects as follows:

Avoid

- ensure that work compounds and access routes, etc. are not located in, adjacent to (if potentially damaging to the adjacent habitats), or across areas of habitat with significant ecological value or where valued species are present. Access routes will be selected based on avoidance of these key habitat areas and known locations of key species, or timing of access will be taken to minimise damage/disturbance;
- vehicle tracking or construction within 30m of badger setts will be avoided (unless setts are by public roads/tracks, where disturbance by vehicles is the norm);
- establish site fencing as appropriate to prevent access to ecologically sensitive areas adjacent to working areas;
- pre-construction species surveys of effected areas, with attention paid to changes in programme timetables;
- covering of pits or provision of mammal ramps in all excavations over 0.5m in depth to prevent animals, such as badger and otter falling in holes and becoming trapped; and

- follow SEPA Pollution Prevention Guidelines (PPGs) to prevent pollution of watercourses and standing water through siltation or chemicals.
- refueling will take place as far away from key ecological features as possible and should only take place in a securely bunded area within the proposed works area, with spill kit on site. No chemicals or fuels will be stored outside of this bund;
- any mechanical vegetation clearance within 100m of setts should always be done prior to November (the badger breeding season is November to May), and within 50m should be done by hand. Note: A licence is needed for works within 30m of a sett. Use of heavy vibration or pile driving equipment will be restricted to no closer than 100m to any active badger sett between November and June (badger breeding season);
- badger gates may need to be installed in any perimeter fencing that could form an obstruction to badger passage; if so, specialist advice should be sought; and
- water sources where badgers may potentially drink should always be safeguarded.

Reduce

- restrict workforce to clearly demarcated working areas through the erection of suitable fencing to prevent unnecessary damage;
- timing of works to minimise disturbance i.e. not during the breeding seasons for key species resident near to the route of the proposed powerline where the work could cause a significant disturbance, or within an hour of dusk/dawn or at night time; and
- lighting to be sensitively designed to avoid light spill, where lighting is necessary for night-time security.

Offset

- in collaboration with Landscape and Visual mitigation as described in Chapter 6, any new landscape planting required will comprise native species of local origin in appropriate locations to tie in with existing semi-natural habitat.

Construction Residual Effects

7.5.25 None predicted.

Operation

7.5.26 Occasional line inspections may be required during the working life of the OHL but no significant effects are predicted from these or the normal operation of the OHL. It is also assessed that the OHL will have a negligible effect upon migrating/wintering birds such as wildfowl and waders, other than limited and highly seasonal potential displacement from use of fields that the OHL passes through. Monitoring during the autumn-spring 2008-2009 demonstrated that the overall significance of this is considered to be **none**.

FURTHER SURVEY, MONITORING AND FOLLOW UP

7.5.27 In addition to a commitment to and transferral of the mitigation outlined above, there will be pre-construction and further surveys to prevent/minimise direct mortality and disturbance to protected species within the site, particularly otter, badger and breeding birds as follows:

- Where mature trees are identified for removal they will be inspected for suitability to support roosting bats prior to removal. Where opportunities for roosting bats are present, above ladder height, the tree will be climbed and inspected by a trained and licensed bat worker. If a bat roost is identified to be present, a Section 44 licence will be required from the Scottish Government before work can take place.
- Further badger monitoring/survey work will be completed within six months prior to construction commencing, targeted on setts within 100m of the proposed route. If any sett may be subject to disturbance then a developmental licence may be required from Scottish Natural Heritage if a protection zone of 30m cannot be retained around each badger sett;

- Pre-construction surveys will also be carried out for otter within six months prior to construction for watercourses where their presence has been identified;
- Finally, the success of all the mitigation would require monitoring, which may be required over the entire construction and post construction period; and
- Nesting bird surveys will be required for areas where off-track access, vegetation removal, material storage, and locations for OHL poles are required between 15th April and 31st July.

7.6 ASSESSMENT OF EFFECTS, MITIGATION AND RESIDUAL EFFECTS: STUDY AREA 2: EWE HILL - NEWFIELD

Zone of Influence

Construction

Assessment of Effects

7.6.1 Construction of the proposed scheme is assessed to have potential ecological effects ranging from **minor** to **moderate** depending on the ecological receptor and the time of year of works in the area where the receptor occurs. The level of potential effect is therefore governed by the time of year that it will be necessary to carry out the work. This assessment provides an indication of the potential effect based on the worst case scenario of a time of year when effects would be most significant.

Protected Sites

Habitats

7.6.2 There will be no direct/indirect effect (**none**) on any site with statutory nature conservation designations.

7.6.3 There will be no direct/indirect effect (**none**) on any site with a non-statutory nature conservation designation.

7.6.4 There will be no direct/indirect effect (**none**) on any key/notable habitats.

Species

Otter

7.6.5 There is limited **minor negative** potential for disturbance of foraging/resting otter due to temporary works access and any associated temporary habitat damage/loss from the riparian zone at any river or burn crossing points. However, it is assessed that full due regard for the riparian zone will be taken, and any potentially damaging action such as crossing burns and rivers will be mitigated for by selection of alternate access routes that avoid water crossing. It is unlikely that any disturbance due to works would significantly effect commuting and foraging otter, or cause any significant damage that might effect on the positive conservation status of otter locally or in the wider area.

7.6.6 Uncontrolled construction activities could cause sediment release in watercourses, and chemicals may be leached into the watercourse from machinery such as fuel oils etc. Any pollution may lead to a reduction in the otter's prey species and also may effect on otter directly. The potential for pollution of watercourses and associated effects on otter are **minor negative** along most of the proposed route. However, there is some potential for release of silt into drainage ditches at any point where the proposed route passes through forestry plantations, where drainage crossing may be unavoidable and where tree removal is required to create the wayleave/servitude for the proposed route. The effect on otter is assessed as **moderate negative**.

7.6.7 An increase in road traffic throughout the construction phase of the development could feasibly increase the risk of vehicles colliding with foraging otters resulting in death or injury. However, direct mortality of otter as road casualties is thought to be minimal as the road network is already well used by the public and construction will be limited to daylight hours (**minor negative**). Otter foraging will usually occur between dusk and dawn. Dusk/dawn at certain times of the year may coincide with commuting works traffic and would be the main period of concern.

These potential effects could result in a **minor-moderate negative** effect on an ecological receptor considered of Local Authority Area ecological importance.

Badger

7.6.8 An increase in road traffic throughout the construction phase of the proposed scheme may increase the risk of traffic-related badger mortality or injury. The area has specific setts that already experience this problem. However, predicted direct mortality of badgers as road casualties is thought to be negligible as construction will be limited to daylight hours. Badger foraging will usually occur at night. Dawn/dusk at certain times of the year may coincide with commuting works traffic and would be the main concern period.

7.6.9 Badger setts within the proposed OHL route were all highlighted to SPT at an early stage of consultation, and it is predicted that no setts will be within 30m of the proposed OHL route/proposed points of works for almost all sections of the scheme. However, the plantation forest north of Corrie Common may contain Badger setts close to the proposed works route. Sections of this forest could not be fully searched due to the dense impenetrable conifer growth. There is therefore potential to encounter a sett in that area during wayleave/servitude clearance works. This issue will be dealt with through production of an Environmental Management Plan, which will establish basic working practices to safeguard badgers and their places of rest. It will be necessary to have an ecological clerk of works present during clearing of the wayleave/servitude to ensure that if a sett is found that works cease immediately, and consultation with SNH takes place before any further works progress.

7.6.10 Potential impact on any as yet undiscovered setts is predicted to potentially be **major negative** as they would only be apparent at the time of wayleave/servitude clearance.

7.6.11 The overall predicted impact on Badgers is assessed as **moderate-minor negative.**

7.6.12 Pre-construction discussions with SNH on licensing requirements for potential disturbance to badger setts within the forest will be undertaken following approval of planning consent.

Water Vole

7.6.13 Water voles are limited to only one locality which lies upstream north of the proposed OHL route and will not be affected by the construction works. Potential effects on this species are therefore considered to be **none**.

Breeding Birds

7.6.14 Breeding birds are widespread along the proposed OHL route. If the construction works take place during the main breeding season the predicted impact may be **major negative**: April-mid July. Such effects include disturbance of breeding birds with the potential for destruction of nests, eggs and young in plantation woodland through felling of trees, crushing of active ground nests, exposure of eggs and young, reduced feeding rates for young in areas where construction work is proceeding, and increased depredation of eggs and young.

7.6.15 Forestry wayleave/servitude clearance is potentially the greatest effect construction activity on breeding birds, with a **moderate to major negative** effect predicted if occurring during the main breeding season, with total nest and habitat loss during clearance.

7.6.16 Loss of woodland habitat during wayleave/servitude creation during outwith the breeding season may result in some permanent displacement of some territories of common woodland passerine bird species, and of foraging habitat but avoids the critical breeding period so is considered a **minor negative** impact.

Other Species

Red Squirrel

7.6.17 SNH provided a copy of the 'Red Squirrel Priority Woodland' map for southwestern Scotland. This indicates that the plantation forest (NY 215 865) north of Corrie Common is classed as a red squirrel priority woodland by SNH. The southern section of this commercial forest has been systematically clear-felled between 2006-2010, with felling operations continuing to advance northwards through the forest. The proposed OHL route will involve some clear-felling of mature conifer forest if the current logging operations have not continued to the north of the proposed route by the time the proposed scheme is consented. Effect on any red squirrel resident in the area being felled will be **major negative** although the pattern of commercial felling means that the red squirrel population will have to retract

northwards due to habitat loss. There is **minor negative** potential for road mortality associated with construction traffic due to the distribution of the species.

Common Lizard

7.6.18 Not enough is known about the distribution of the species based on the anecdotal records collected. Given that most of the proposed route is across improved farmland the construction effect is assessed as being localised and **minor negative**, with populations on lowland mire and rough pasture/riparian margins most at risk of effect.

Large Heath

7.6.19 Effect is assessed as **none** as the proposed route of the OHL does not cross any lowland raised bogs/wet heath areas where the species is known to occur.

Bats

7.6.20 It has been assessed that there are few significant trees along the proposed route that could be utilised by roosting bats. Predicted effect is therefore **none**.

7.6.21 It is likely that bats are at low density along the entire route corridor, with a scattered pattern of occurrence. Roost sites are most likely to be in and around farm steadings, with foraging most likely concentrated along riparian corridors and along forest edges. Disturbance of foraging bats is likely to be **none** give that they forage after dusk.

Construction Mitigation

7.6.22 Details of the mitigation will be transferred to a EMP, the implementation and monitoring of which will be overseen by an Environmental Manager, who will be responsible for the safe retention of the sensitive ecological areas. The success of protective measures will be reviewed every two months to ensure that all areas are adequately protected.

7.6.23 All Site staff will receive tool box talks on the various ecological sensitivities of the proposed scheme as part of their site induction. Generic mitigation and standard best practice methods in construction will be implemented to avoid, reduce and offset effects as follows:

Avoid

- ensure that work compounds and access routes, etc. are not located in, adjacent to (if potentially damaging to the adjacent habitats), or across areas of habitat with significant ecological value or where valued species are present. Access routes will be selected based on avoidance of these key habitat areas and known locations of key species, or timing of access will be taken to minimise damage/disturbance;
- vehicle tracking or construction within 30m of badger setts will be avoided (unless setts are by public roads/tracks, where disturbance by vehicles is the norm);
- establish site fencing as appropriate to prevent access to ecologically sensitive areas adjacent to working areas;
- pre-construction species surveys of effected areas, with attention paid to changes in programme timetables;
- covering of pits or provision of mammal ramps in all excavations over 0.5m in depth to prevent animals, such as badger and otter falling in holes and becoming trapped; and
- follow SEPA Pollution Prevention Guidelines (PPGs) to prevent pollution of watercourses and standing water through siltation or chemicals.
- refuelling will take place as far away from key ecological features as possible and should only take place in a securely bunded area within the proposed works area, with spill kit on site. No chemicals or fuels will be stored outside of this bund;
- any mechanical vegetation clearance within 100m of setts should always be done prior to November (the badger breeding season is November to May), and within 50m should be done by hand. Note: A licence is needed for works within 30m of a sett. Use of heavy vibration or pile driving equipment will be restricted to no closer than 100m to any active badger sett between November and June (badger breeding season);

- badger gates may need to be installed in any perimeter fencing that could form an obstruction to badger passage; if so, specialist advice should be sought; and
- water sources where badgers may potentially drink should always be safeguarded.

Reduce

- restrict workforce to clearly demarcated working areas through the erection of suitable fencing to prevent unnecessary damage;
- timing of works to minimise disturbance i.e. not during the breeding seasons for key species resident near to the route of the proposed powerline where the work could cause a significant disturbance, or within an hour of dusk/dawn or at night time; and
- lighting to be sensitively designed to avoid light spill, where lighting is necessary for night-time security.

Offset

- in collaboration with Landscape and Visual mitigation as described in Chapter 6, any new landscape planting required will comprise native species of local origin in appropriate locations to tie in with existing semi-natural habitat.

Construction Residual Effects

None predicted.

Operation

7.6.24 Occasional line inspections may be required during the working life of the OHL but no significant effects are predicted from these or the normal operation of the OHL. It is also assessed that the proposed scheme may have a **minor negative** effect upon migrating/wintering birds such as wildfowl and waders, other than limited and highly seasonal potential displacement from use of fields that the scheme passes through. Monitoring during the autumn-spring 2008-2009 demonstrated that the overall significance of this is considered to be **none**.

MONITORING AND FOLLOW UP

7.6.25 In addition to a commitment to and transferral of the mitigation outlined above, there will be pre-construction and further surveys to prevent/minimise direct mortality and disturbance to protected species within the site, particularly otter, badger and breeding birds as follows:

- Further badger monitoring/survey work will be completed within six months prior to construction commencing, targeted on setts within 100m of the proposed route. If any sett may be subject to disturbance then a developmental licence may be required from Scottish Natural Heritage if a protection zone of 30m cannot be retained around each badger sett;
- Pre-construction surveys will also be carried out for otter within six months prior to construction for watercourses where their presence has been identified;
- Finally, the success of all the mitigation would require monitoring, which may be required over the entire construction and post construction period; and
- Nesting bird surveys will be required for areas where off-track access, vegetation removal, material storage, and locations for wood poles are required between 15th April and 31st July.

7.7 COMPLIANCE WITH LEGISLATION AND PLANNING POLICY

7.7.1 All mitigation recommendations are made in compliance with current national legislation and policies. In order to ensure that the works contractor adheres to the recommendations and policies as set out in this ES, it is proposed that an ecological clerk of works is appointed to ensure that construction effects are minimised through best working practices and dissemination of information through the contractors.

7.8 SUMMARY

7.8.1 The overall proposal and programme of works with appropriate mitigation followed is unlikely to have any significant long-term effects on any of the ecological receptors. However, there is potential for some **moderate negative** effects during construction particularly on the commoner breeding bird species. The presence of an ecological clerk of works should ensure that any such effects are minimised and mitigated for appropriately.

Table 7.9: Summary of Effects Table for Key Ecology and Nature Conservation: Study Area 1: Gretna – Ewe Hill

Description of Likely Significant Effects	Significance of Effects					Summary of Mitigation / Enhancement Measures	Significance of Residual Effects					Relevant Policy	Relevant Legislation
	Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		
Construction													
Damage to habitats of ecological value	Authority Area	Minor Negative	T/P	I	ST	▪ Avoid vehicle tracking across sensitive habitats such as peatlands, or time activity so is least damaging	Authority Area	Minor negative	P	D	LT	Scottish Planning Policy	Habitat Regulations
Increase in mortality risk for badger, otter, and red squirrel from construction traffic	Local	Minor/minor-moderate Negative	P	I	ST	▪ Avoidance of dawn/dusk works associated traffic/briefing contractors on locations with species at risk, maximum low speed limits for works traffic	Local	Minor negative	-	-	-	Scottish Planning Policy	Protection of Badgers Act, 1992; Habitat Regulations, WCA, 1981
Otter – disturbance to foraging otter	Authority Area	Minor Negative	T	I	ST	▪ All excavations over 0.5m covered or escape ramp provided ▪ Sensitive lighting scheme ▪ No night time working ▪ Resurvey six months prior to construction	Authority Area	None Not Ecologically Significant	-	-	-	Scottish Planning Policy	Habitat Regulations
Disturbance to badger setts	Local	Minor Negative	P	D	LT	▪ All badger setts to be retained and protected	Local	None Not Ecologically Significant	-	-	-	Scottish Planning Policy	Protection of Badgers Act, 1992
Breeding birds – loss of habitat and mortality of	Local	Major-moderate Negative	P	D	LT	▪ Identification of least damaging access routes, clearance of vegetation	Local	Moderate-minor Negative	-	-	-	Scottish Planning Policy	WCA, 1981

Description of Likely	Significance of Effects					Summary of Mitigation / Enhancement Measures	Significance of Residual Effects					Relevant Policy	Relevant Legislation
birds						outwith breeding season or inspection of vegetation prior to removal.							
Migrating and wintering birds – disturbance to foraging or commuting birds	Local	None	P	D	LT	▪ None possible	Local	None	P	D	LT	Scottish Planning Policy	
Bats – disturbance to foraging or commuting bats	Authority Area	Minor Negative	T	I	ST	▪ Night lighting scheme to be hooded/directed away from woodland and riparian corridors	Authority Area	Minor Positive	-	-	-	Scottish Planning Policy	Habitat Regulations
Bats – Loss of mature trees with features that may support roosting bats	Authority Area	Minor Negative	P	D	LT	▪ Trees to be retained where possible ▪ Any trees to be felled that have cavities/potential for use by roosting bats to be inspected by a licensed ecologist prior to felling	Authority Area	Minor Negative Not Ecologically Significant	-	-	-	Scottish Planning Policy	Habitat Regulations
Small Pearl-bordered Fritillary	Local	Major Negative	T	D	ST	▪ Avoid use of track by colony area between May-July ▪ Maintain slow speeds on track and avoid very dry and dusty or very wet and muddy weather to use the track by the colony	Local	None-Minor negative	T	I	ST	Scottish Planning Policy	
Large Heath	Local	Minor Negative	T	D	ST	▪ Avoid peatland tracking between early June-mid-July or longer if possible. Minimise vehicle use on	Local	Minor negative but not Ecologically	P	D	LT	Scottish Planning Policy	

Description of Likely	Significance of Effects					Summary of Mitigation / Enhancement Measures	Significance of Residual Effects					Relevant Policy	Relevant Legislation
						peatland areas ■ Use very-low ground pressure vehicles		Significant					
Operation: There are no significant potential ecological effects predicted for the operational phase of the transmission line works, however, there will be times when the line must be inspected and maintenance/refurbishment carried out:													
Ongoing maintenance	Local	Minor Negative	T	D	ST	■ Appropriate timing of maintenance/refurbishment works to be established to avoid times when the key ecological interests may be effected, e.g. avoid bird breeding season etc.	Local	None Not Ecologically Significant	-	-	-	Scottish Planning Policy4	Protection of Badgers Act, 1992; Habitat Regulations, WCA, 1981

Key to table:

P/T = Permanent or Temporary, D/I = Direct or Indirect, ST/MT/LT = Short Term, Medium Term or Long Term

N/A = Not Applicable

Table 7.10: Summary of Effects Table for Key Ecology and Nature Conservation: Study Area 2: Ewe Hill – Newfield

Description of Likely Significant Effects	Significance of Effects					Summary of Mitigation / Enhancement Measures	Significance of Residual Effects					Relevant Policy	Relevant Legislation
	Receptor Value	Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		Receptor Value	Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		
Construction													
Damage to habitats of ecological value	Authority Area	Minor Negative	T/P	I	ST	▪ Avoid vehicle tracking across sensitive habitats such as peatlands, or time activity so is least damaging	Authority Area	Minor negative	P	D	LT	Scottish Planning Policy	Habitat Regulations
Increase in mortality risk for badger, otter, and red squirrel from construction traffic	Local	Minor/minor-moderate Negative	P	I	ST	▪ Avoidance of dawn/dusk works associated traffic/briefing contractors on locations with species at risk, maximum low speed limits for works traffic	Local	Minor Negative	-	-	-	Scottish Planning Policy	Protection of Badgers Act, 1992; Habitat Regulations, WCA, 1981
Otter – disturbance to foraging otter	Authority Area	Minor Negative	T	I	ST	▪ All excavations over 0.5m covered or escape ramp provided ▪ Sensitive lighting scheme ▪ No night time working ▪ Resurvey six months prior to	Authority Area	None Not Ecologically Significant	-	-	-	Scottish Planning Policy	Habitat Regulations

Description of Likely	Significance of Effects					Summary of Mitigation /	Significance of Residual Effects					Relevant Policy	Relevant Legislation
						construction							
Disturbance to badger setts	Local	Minor Negative	P	D	LT	▪ All badger setts to be retained and protected	Local	None Not Ecologically Significant	-	-	-	Scottish Planning Policy	Protection of Badgers Act, 1992
Breeding birds – loss of habitat and mortality of birds	Local	Major-moderate Negative	P	D	LT	▪ Identification of least damaging access routes, clearance of vegetation outwith breeding season or inspection of vegetation prior to removal	Local	Moderate-minor	-	-	-	Scottish Planning Policy	WCA, 1981
Migrating and wintering birds – disturbance to foraging or commuting birds	Local	None	P	D	LT	▪ None possible	Local	None	P	D	LT	Scottish Planning Policy	
Bats – disturbance to foraging or commuting bats	Authority Area	Minor Negative	T	I	ST	▪ Night lighting scheme to be hooded/directed away from woodland and riparian corridors	Authority Area	Minor Positive	-	-	-	Scottish Planning Policy	Habitat Regulations
Bats – Loss of mature trees with features that may support roosting bats	Authority Area	Minor Negative	P	D	LT	▪ Trees to be retained where possible ▪ Any trees to be felled that have cavities/potential for use by roosting bats to be inspected by a licensed ecologist prior to felling	Authority Area	Minor Negative Not Ecologically Significant	-	-	-	Scottish Planning Policy	Habitat Regulations

Operation: There are no significant potential ecological effects predicted for the operational phase of the transmission line works, however, there will be times when the line must be inspected and maintenance/refurbishment carried out:													
Ongoing maintenance	Local	Minor Negative	T	D	ST	▪ Appropriate timing of maintenance/refurbishment works to be established to avoid times when the key ecological interests may be effected, e.g. avoid bird breeding season etc.	Local	None Not Ecologically Significant	-	-	-	Scottish Planning Policy4	Protection of Badgers Act, 1992; Habitat Regulations, WCA, 1981

Key to table:

P/T = Permanent or Temporary, D/I = Direct or Indirect, ST/MT/LT = Short Term, Medium Term or Long Term

N/A = Not Applicable

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8 Archaeology and Cultural Heritage

8.1 INTRODUCTION

8.1.1 This chapter provides an assessment of the effects of the proposed scheme, as described in Chapter 3, on archaeological remains and the mitigation measures required to prevent, reduce or offset those effects and the residual effects.

8.2 LEGISLATION, POLICY AND GUIDANCE

Legislative Framework

8.2.1 The applicable legislative framework is summarised as follows:

- Ancient Monuments and Archaeological Areas Act (AMAAA) 1979; and
- Planning (Listed Buildings and Conservation Areas) (Scotland) Act (PLBCAS) 1997.

8.2.2 The AMAAA largely deals with Scheduled Ancient Monuments (SAMs) and designated archaeological areas, detailing in particular what can and cannot be undertaken due to archaeological reason. Part III of the Act also details financial implications relating specifically from archaeological investigations. The precursor of the guidance provided in further planning policy guidance is described below.

8.2.3 The PLBCAS provides for the protection of Listed Buildings and Conservation Areas, and is largely expressed in the planning process through policies in regional and local planning guidance, as outlined below.

Planning Policy

8.2.4 Guidance set out in the Scottish Planning Policy (2010) document identifies the need for early consultation in the planning process to determine the impact of construction schemes upon any buried archaeological strata. It indicates that there is a presumption in favour of preservation in situ over excavation, where remains are of national importance. The SPP also presumes in favour of most, if not all, archaeological work is completed in advance of development rather than as a condition, although this process is also detailed.

Guidance

8.2.5 This assessment has been carried out in accordance with standards set by the Institute for Archaeologists (IfA, 2008).

8.3 ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

Extent of Study Area

8.3.1 The study area for archaeological assessment purposes has been considered as a c1.5km linear corridor centred on the routes of the OHLs. The extent of this study area incorporates the entire scheme, including the Ewe Hill substation and access road, as well as the underground cable sections into the Gretna and Ewe Hill substations.

Consultation

8.3.2 Consultation occurred with Dumfries and Galloway Council's Archaeology Officer and Historic Scotland to determine the requirement for any further archaeological work.

Method of Baseline Data Collection

8.3.3 In summary, the assessment of effects on archaeological remains has involved:

- A review of policy considerations and legislative requirements;
- A review of information held by the Dumfries and Galloway Sites and Monuments Record;
- Examination of relevant publications, articles, historic maps and plans in the National Library of Scotland and the Royal Commission for Ancient and Historic Monuments in Scotland (RCAHMS);
- Examination of the proposed construction methods and the likelihood of survival of archaeological remains;
- A site walkover; and
- An evaluation of likely effects of construction of the proposed scheme and the need for further work, based upon the potential for archaeological resources to be present within the archaeological study area.

Significance Criteria

8.3.4 The assessment of likely significant effects as a result of the proposed scheme has taken into account both the construction and operational phases. The significance level attributed to each effect has been assessed based on the magnitude of change to baseline conditions, and the sensitivity of the affected receptor/receiving environment to change, Magnitude of change and the sensitivity of the affected receptor/receiving environment have been assessed on a scale of high, medium, low and none.

Effect Significance

8.3.5 The following terms have been used to define the significance of the effects identified:

- **Major effect:** where the proposed scheme could be expected to have a very significant effect (either positive or negative) on archaeology. Where there are major adverse effects caused to sites of high archaeological potential, SAMs (including their settings) and to other archaeological sites of importance in breach of prevailing planning policy, the severity of the effects would require in-situ preservation and/or considerable archaeological works.
- **Moderate effect:** where the proposed scheme could be expected to have a noticeable effect (either positive or negative) on archaeology. Moderate adverse effects would allow archaeological resources at a local level to be left in situ. Archaeological investigation would provide a positive contribution to research agendas.
- **Minor effect:** where the proposed scheme could be expected to result in a small, barely noticeable effect (either positive or negative) on archaeology. There are effects to small areas of known or potential resources at a local level or where the resource is very truncated or fragmented. The monitoring of the effects and recording of any resources would be achieved by an archaeological watching brief. The removal of the archaeological resource would not affect future archaeological investigation and would increase archaeological knowledge.
- **None:** where no discernible effect is expected as a result of the proposed scheme on archaeology. This applies where there are no effects on a known or predicted archaeological resource or its settings or where mitigation protects the resource from accidental effects and adverse effects.

8.4 BASELINE

8.4.1 Data in relation to key archaeological sites/events (within a 1.5km corridor surrounding the proposed scheme) are provided for each date period summarised in Table 8.1 below. The locations of key archaeological features are also provided on Figures 8.1 and 8.2.

Table 8.1 Historic Timescales Used in this Chapter

Prehistoric		
Palaeolithic-Early Stone Age	450,000	-12,000 BC
Mesolithic-Middle Stone Age	12,000	- 4,000 BC
Neolithic-New Stone Age	4,000	- 1,800 BC
Bronze Age	2,000	- 700 BC
Iron Age	700 BC	-AD43
Historic		
Roman	AD 43	- 410
Post Roman	AD410	- 1066
Medieval	AD 1066	- 1485
Post Medieval	AD 1485	- 1900
Modern	AD 1900	- Present Day

Prehistoric

8.4.2 The modern landscape may be viewed as having origins to a certain extent through the woodland clearances from the middle phase of the Neolithic (Cummings and Fowler, 2007). The clearances which began from this point enabled the proliferation of agriculture, enclosure construction and general settlement across the route corridor. Little evidence could be identified to ascertain what activity may have preceded these clearances, though the existence of plentiful worked stone from throughout the later prehistoric indicates that the raw materials were readily available whether through trade or direct extraction.

8.4.3 Continuity within the prehistoric period as a whole, though particularly between the Neolithic and Bronze Age, is noted in a number of larger sites which have been subject to archaeological investigation, including the Twelve Apostles Stone Circle, East Cluden, and from data obtained through the excavations at Cruggleston Castle (Ewart, 1985) and the long term Newbarns Project (Penman and Penman, latest report reviewed 2008). There is also evidence to confirm that continuity at some level was maintained into the Roman period.

Roman

8.4.4 The Gretna substation is situated near to outlying forts and fortlets dated to the Roman era. While none are known to exist along the routes of the OHLs, a fort is known to the south of the OHL at Middlebie. The Birrens Roman Fort (Blatobulgium) functioned as an outpost to Hadrians Wall (Toolis, 1999). Furthermore, it is likely that the site was occupied for potentially over a century as a Hadrianic wood and turf structure and later cleared for a stone Antonine construction (Robertson, 1975).

Post Roman

8.4.5 There is very limited evidence to confirm significant continuity of site usage following the zenith of the Roman era within northern England and Scotland. Within the southwest of Scotland, there is a suggestion from some sites (Laing and Longley, 2006) that earthen sites attracted activity into the 6th century although no such evidence is recorded either along the routes of the OHL or in the nearby area.

Medieval/Post Medieval

8.4.6 The evidence recovered for the route of the OHLs is not readily distinguishable between discrete Medieval activity and Post Medieval activity. Rather settlements and farming began in the recognisable rig and furrow tradition and in many areas was maintained for several centuries thus attracting farmsteads and villages in their locality. Alongside these are the settled and farmed areas of much greater antiquity such as around Cruggleston Castle.

8.4.7 In the latter parts of the Post Medieval period, the regional economy of the area solidified to being based around dairy farming and those industries which benefited most from the plentiful opportunities to derive power via water mills (Donnachie, 1971). The area around the proposed scheme appears to have been biased towards crop production, some indications of quarrying and a strong tradition of woodland exploitation with many of the forested areas in the wider area having their origins in the 18th century.

Gretna Substation to Ewe Hill Substation

Designated Sites

8.4.8 The following three Scheduled Ancient Monuments (SAMs) have been identified within the archaeological study area:

- The Medieval earthwork boundary at Scots' Dike;
- The prehistoric (possibly Neolithic) cursus at Tympanheck Cottage; and
- The settlements at Newhall.

8.4.9 The Scots' Dike earthwork (likely to date to the 16th century) runs for c5.5km east of Craw's Knowe. It is, for the majority of its length closest to the OHL, covered with mature trees which makes long distance observations of the general earthwork location relatively clear, but obscures a more detailed understanding of the monument at close quarters. The earthwork is of variable structure along its length (with multiple ditches and banks being present).

8.4.10 The scheduled monument at Tympanheck is indicated as being of sufficiently large area to capture the expected associated features surrounding it.

8.4.11 The settlements on the eastern slopes of Newhall Hill are both classified as being defended, both through use of the natural topography and construction of an earthwork defence. While the settlements occupy the highest ground of the hill, views towards the Ewe Hill Substation location are restricted due to the routing east of Crawthat Hill.

8.4.12 The previously Scheduled fort at Crawthat represents an example of a feature of Dark Age/Medieval date which had been subject to several instances of Modern disturbance (upon its surface and flanks) leading up to its descheduling in late 2009. It remains a highly visible landmark next to the Lockerbie-Langholm road, and is in close proximity to the planned access road to the Ewe Hill Substation.

Prehistoric

8.4.13 All of the sites of prehistoric date are clustered immediately to the southeast of the Ewe Hill substation, around the settlements at Muckle Slab, Kirtlehead and Winterhope. The remains constitute a dispersed group of ring enclosures (NY28SE 43, NY28SE 70 and NY28SE 28.01), and burnt mounds (NY28SE 41 and NY28SE 42). There is no dating evidence to characterise the features further as unique elements of the archaeological landscape, although it would not be unreasonable to suggest that the burnt mounds may relate to the earliest phases of human occupation of the area (possibly Bronze Age).

8.4.14 The identification of two of the ring enclosures from aerial photography, and one of those in spite of it being in a forested area, is indicative of the good levels of survival of features of this date.

Roman/Post Roman

8.4.15 No records of Roman or Post Roman features have been identified.

Medieval/Post Medieval

8.4.16 The records available for the area around the proposed scheme confirm the dominance of farming in the Medieval and Post Medieval periods. While there is little readily available information pertaining to the individual farmsteads, the establishment of each will have followed a phase of deforestation which may itself be of significant antiquity.

8.4.17 Farmsteads are recorded as being regularly spaced throughout the region at locations such as Alderman's Seat, Staffler, Stubbyknowe and Greenwrae (see Appendix 8.1 for a full list). Areas of retained rig and furrow are somewhat rarer along the route of the OHL, being positively identified at Cadgillhead (NY37NW 33), Solwaybank (NY37NW 34) and Ley Hill (NY28SE 28.00). There does not appear to be a location bias for these features.

Undated

8.4.18 A standing stone is recorded at Winterhope (NY28SE 19) although it is unclear what its original location was and there is no suggestion that it was a constituent of a larger feature originally.

Ewe Hill Substation to Newfield Substation

Designated Sites

8.4.19 The following two SAMs have been identified within the archaeological study area:

- The settlements at Newhall Hill; and
- The Craighousesteads fort.

8.4.20 The settlements recorded on the eastern slopes of Newhall Hill are both classified as being defended, both through use of the natural topography and construction of an earthwork defence. While the settlements occupy the highest ground of the hill, views towards the Ewe Hill substation location are restricted due to the routing east of Crowthat Hill.

8.4.21 The Craighousesteads fort is located approximately 1.5km northwest of the Ewe Hill substation location, and within c300m of the OHL at it's closest point.

8.4.22 The previously Scheduled fort at Crawthat represents an example of a feature of Dark Age/Medieval date which had been subject to several instances of Modern disturbance (upon its surface and flanks) leading up to its descheduling in late 2009. It remains a highly visible landmark next to the Lockerbie-Langholm road, and is in close proximity to the planned access road to the Ewe Hill Windfarm Substation.

Prehistoric

8.4.23 There is little precise dating evidence pertaining to the known archaeological features. All but two of the records of prehistoric activity lie around Craighousestead Hill, Pearsby Hall and Mid Hill. Examples of cord rig, enclosures and a fort are recorded, potentially of Bronze Age or Iron Age date.

8.4.24 The majority of the sites described above are positioned either upon, or on the flanks leading to, higher ground.

Roman/Post Roman

8.4.25 No records of Roman or Post Roman features have been identified.

Medieval/Post Medieval

8.4.26 The evidence of features of Medieval or Post Medieval date is of exclusively agricultural related activity, with a series of examples of farmsteads and also two sheepfolds.

8.5 ASSESSMENT OF EFFECTS, MITIGATION AND RESIDUAL EFFECTS

8.5.1 Archaeological and cultural heritage resources may constitute both above and below ground assets, which may either be in a stable environment, subject to gradual improvement or gradual degradation. The changes associated with a development both during construction and operation upon such assets can lead to changes in the environment.

8.5.2 A detailed assessment of potential effects on each of the archaeological features identified in the vicinity of the proposed scheme is presented in Appendix 8.1.

Gretna Substation to Ewe Hill Substation

Disturbance or loss of archaeological remains

8.5.3 The assessment of the known and potential archaeological resources both along the route of the OHL and within the wider archaeology study area has indicated that there are remains present pertaining to mainly prehistoric and Medieval/Post Medieval activity.

8.5.4 While some areas of activity are demonstrably multi-phase, there are significant areas of retained prehistoric field systems and also earth works of that era. Similarly, there is little suggestion that large numbers of the Medieval/Post Medieval farmsteads which exist across the route corridor have been lost through later redevelopment, but rather they have retained their nature of dispersed settlements.

8.5.5 The retained archaeological remains may therefore be viewed both as discrete archaeological features, but also as constituents of a wider prehistoric or historic landscape; illustrating the spread of settlement and land exploitation through time, reflecting both climatic change and also changes in urban demands.

8.5.6 The predilection for settlement activity on higher ground may also reflect an interest for retaining inter-visibility of settled areas, while field systems tended to be relegated to the flanks of the hills.

8.5.7 The potential for prehistoric features to be retained in a well preserved condition within areas of historic forests is also highlighted.

8.5.8 The sensitivity of the potential remains outlined above (because of the potential archaeological value of areas of prehistoric or medieval farming activity) is minor to moderate and the magnitude of change to the surviving archaeological resources, prior to mitigation, is minor to moderate. Therefore, there is likely to be both indirect and direct, permanent, long-term effects on potential remains outlined above of **minor to moderate** adverse significance prior to the implementation of mitigation measures.

Mitigation of Disturbance or loss of archaeological remains

8.5.9 There has been significant consideration of visual impact and the inter-visibility of archaeological features issue has, to a considerable extent, been subject to mitigation through routeing to avoid hill tops and ridgelines.

8.5.10 Direct impacts upon archaeological resources are considered to be unlikely given the very small footprint of each wood pole. Mitigation would therefore be best served in focusing in areas which historically have not been interrogated for archaeological features, such as forested areas originating in the Post Medieval era. This could be achieved through detailed walkovers of recently felled areas.

Residual Effects of Disturbance or loss of archaeological remains

8.5.11 The archaeological importance of the unknown archaeological remains is variable at this stage and the magnitude of change to the surviving archaeological resource, should it be present, following mitigation, will be low. Therefore, there is likely to be a direct, permanent, long-term effect on the archaeological remains of **minor adverse significance** following the implementation of appropriate mitigation measures.

Impact upon built heritage resources

8.5.12 The assessment has highlighted the presence of several built heritage resources in the vicinity of the route of the OHL. While built heritage assets are of both innate value and sensitivity, setting constitutes significantly towards the importance of a resource. The construction of the proposed scheme will result in a change of landscape over the route. In common with aspects of the archaeological landscape, the effect has already been limited through the design of the OHL route given that it avoids the highest ground and as such limits effects upon long distance views. Furthermore, the route will not require the alteration of any structures or curtilage features.

8.5.13 As such, potential effects will be restricted to indirect effects. The sensitivity of the resources outlined above is minor to moderate and the magnitude of change to built heritage resources, prior to mitigation but taking into account the design, is minor. Therefore, there is likely to be indirect, permanent, long-term effects on potential remains outlined above of **minor adverse significance** prior to the implementation of mitigation measures.

Mitigation of Impact upon built heritage resources

8.5.14 There has been significant consideration of visual effect and the inter-visibility of archaeological features has, to a considerable extent, been subject to mitigation through routeing to avoid hill tops, ridgelines and built archaeological resources. No further mitigation is considered necessary.

Residual Effects of Impact upon built heritage resources

8.5.15 The residual impacts upon built heritage resources remain as indirect, permanent, long-term and are likely to be of **minor adverse significance**.

Ewe Hill Substation to Newfield Substation

Disturbance or loss of archaeological remains

8.5.16 The assessment of the known and potential archaeological resources both along the route of the OHL and within the wider archaeology study area has indicated that there are remains present pertaining to mainly prehistoric and Medieval/Post Medieval activity.

8.5.17 While some areas of activity are demonstrably multi-phase, there are significant areas of retained prehistoric field systems and also earth works of that era. Similarly, there is little suggestion that large numbers of the Medieval/Post Medieval farmsteads which exist across the route corridor have been lost through later redevelopment, but rather they have retained their nature of dispersed settlements.

8.5.18 The retained archaeological remains may therefore be viewed both as discrete archaeological features, but also as constituents of a wider prehistoric or historic landscape; illustrating the spread of settlement and land exploitation through time, reflecting both climatic change and also changes in urban demands.

8.5.19 The predilection for settlement activity on higher ground may also reflect an interest for retaining inter-visibility of settled areas, while field systems tended to be relegated to the flanks of the hills.

8.5.20 The potential for prehistoric features to be retained in a well preserved condition within areas of historic forests is also highlighted.

8.5.21 The sensitivity of the potential remains outlined above is minor to moderate and the magnitude of change to the surviving archaeological resources, prior to mitigation, is minor to moderate. Therefore, there is likely to be both indirect and direct, permanent, long-term effects on potential remains outlined above of **Minor to Moderate adverse significance** prior to the implementation of mitigation measures.

Mitigation of Disturbance or loss of archaeological remains

8.5.22 There has been significant consideration of visual impact and the inter-visibility of archaeological features issue has, to a considerable extent, been subject to mitigation through routeing to avoid hill tops and ridgelines.

8.5.23 Direct impacts upon archaeological resources are considered to be unlikely given the very small footprint of each wood pole. Mitigation would therefore be best served in focusing in areas which historically have not been interrogated for archaeological features, such as forested areas originating in the Post Medieval era. This could be achieved through detailed walkovers of recently felled areas.

Residual Effects of Disturbance or loss of archaeological remains

8.5.24 The archaeological importance of the unknown archaeological remains is variable at this stage and the magnitude of change to the surviving archaeological resource, should it be present, following mitigation, will be low. Therefore, there is likely to be a direct, permanent, long-term effect on the archaeological remains of **Minor adverse significance** following the implementation of appropriate mitigation measures.

Impact upon built heritage resources

8.5.25 The assessment has highlighted the presence of several built heritage resources in the vicinity of the route of the OHL. While built heritage assets are of both innate value and sensitivity, setting constitutes significantly towards the importance of a resource. The construction of the proposed scheme will result in a change of landscape over the route. In common with aspects of the archaeological landscape, the impact has already been limited through the design of the OHL route given that it avoids the highest ground and as such limits impacts upon long distance views. Furthermore, the route will not require the alteration of any structures or curtilage features.

8.5.26 As such, potential effects will be restricted to indirect effects. The sensitivity of the resources outlined above is minor to moderate and the magnitude of change to built heritage resources, prior to mitigation but taking into account the design, is minor. Therefore, there is likely to be indirect, permanent, long-term effects on potential remains outlined above of **Minor adverse significance** prior to the implementation of mitigation measures.

Mitigation of Impact upon built heritage resources

8.5.27 There has been significant consideration of visual impact and the inter-visibility of archaeological features has, to a considerable extent, been subject to mitigation through routeing to avoid hill tops, ridgelines and built archaeological resources. No further mitigation is considered necessary.

Residual Effects of Impact upon built heritage resources

8.5.28 The residual impacts upon built heritage resources remain as indirect, permanent, long-term and are likely to be of **Minor adverse significance**.

8.6 MONITORING AND FOLLOW UP

8.6.1 No monitoring or follow-up is considered necessary during the construction and operation of the proposed scheme.

8.7 LIMITATIONS AND ASSUMPTIONS

8.7.1 This assessment of the archaeological potential of the proposed scheme is reliant on the data provided by local and national authorities, and within the previous archaeological and historical reports regarding known archaeological sites within or in the locality of the archaeology study area. This assessment has been supported by detailed site visits and walkovers by an experienced archaeological consultant.

8.8 SUMMARY

8.8.1 The archaeological assessment has confirmed that while there is no evidence offeatures of archaeological interest directly on the routes of the OHLs, there are a number of archaeological sites within the archaeology study area 1.5km either side of the OHLs, mostly indicating prehistoric or Medieval/Post Medieval occupation and/or agriculture.

8.8.2 The use of higher ground for settlement activity within these periods, and very little evidence of destructive subsequent re-use, is highly suggestive of archaeological evidence being relatively easily identifiable.

8.8.3 The route selection process undertaken for the OHLs has, through design, sought to avoid higher ground which will limit the likelihood of direct effects upon unknown archaeological resources in these locations and furthermore will limit the indirect impacts in terms of inter-visibility between sites lying on higher contours.

8.8.4 The presence of archaeological features within forested areas which have the origins in the Post Medieval period has been demonstrated through the archaeological records along the route corridor. These features are likely to be dated to the prehistoric period. The tree cover, existing as commercial forestry, may be suitable for additional walkover survey which would indicate where additional features of this type may exist within forested areas.

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Table 8.2: Summary of Effects Table for Archaeology and Cultural Heritage: Study Area 1: Gretna – Ewe Hill

Description of Likely Significant Effects	Significance of Effects					Summary of Mitigation / Enhancement Measures	Significance of Residual Effects					Relevant Policy	Relevant Legislation
	Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		
Construction													
Disturbance or loss of Archaeological Remains	Authority Area	Minor-moderate Negative	P	D	LT	▪ Detailed routeing of OHL, cables and access road. Careful positioning of substation. ▪ Further assessment of forested areas where access has not been possible.	Authority Area	Minor negative	-	-	-	Scottish Planning Policy	Ancient Monuments and Archaeological Areas Act, 1979.
Impact on built heritage resources	Authority Area	Minor Negative	P	D	LT	▪ Detailed routeing of OHL, cables and access road. Careful positioning of substation.	Authority Area	Minor negative	-	-	-	Scottish Planning Policy	Planning (Listed Buildings and Conservation Areas) (Scotland) Act, 1997.

Table 8.3: Summary of Effects Table for Archaeology and Cultural Heritage: Study Area 2: Ewe Hill to Newfield

Description of Likely Significant Effects	Significance of Effects					Summary of Mitigation / Enhancement Measures	Significance of Residual Effects					Relevant Policy	Relevant Legislation
	Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		
Construction													
Disturbance or loss of Archaeological Remains	Authority Area	Minor-moderate Negative	P	D	LT	▪ Detailed routeing of OHL, cables and access road. Careful positioning of substation. ▪ Further assessment of forested areas where access has not been possible.	Authority Area	Minor negative	-	-	-	Scottish Planning Policy	Ancient Monuments and Archaeological Areas Act, 1979.
Impact on built heritage resources	Authority Area	Minor Negative	P	D	LT	▪ Detailed routeing of OHL, cables and access road. Careful positioning of substation.	Authority Area	Minor negative	-	-	-	Scottish Planning Policy	Planning (Listed Buildings and Conservation Areas) (Scotland) Act, 1997.

Key to table:

P/T = Permanent or Temporary, D/I = Direct or Indirect, ST/MT/LT = Short Term, Medium Term or Long Term

N/A = Not Applicable

9 Geology and Soils

9.1 INTRODUCTION

9.1.1 This chapter provides an assessment of the effects of the proposed scheme, as described in Chapter 3, on the underlying superficial and bedrock geology. An assessment is made of the potential for existing and historical ground contamination likely to be encountered at the site and for contamination to occur during and after the construction stage.

9.1.2 Where significant effects have been identified, the mitigation measures proposed to avoid, reduce or offset these have been presented. In line with the approach adopted for this EIA, the residual effects of the project have been evaluated taking account of the committed mitigation measures.

9.2 LEGISLATION, POLICY AND GUIDANCE

Legislative Framework

9.2.1 The applicable legislative framework is summarised as follows:

Environmental Protection Act 1990 (EPA 1990)

9.2.2 UK legislation on contaminated land is principally contained in Part IIA of the *EPA 1990*. This legislation endorses the principle of a 'suitable for use' approach to contaminated land, where remedial action is only required if there are unacceptable risks to health or the environment, taking into account the use of the land and its environmental setting.

9.2.3 The statutory guidance which brought into effect the *EPA 1990* in April 2000, describes a risk assessment methodology in terms of ‘significant pollutants' and ‘significant pollutant linkages’ within a source-pathway-receptor model of the site. The model comprises:

- the principal pollutant hazards associated with the site (the sources);
- the principal receptors at risk from the identified hazards; and
- the existence, or absence, of plausible pathways which may exist between the identified hazards and receptors.

9.2.4 For land to be determined as 'contaminated' in a regulatory sense, and thereby requiring remediation (or a change to less sensitive use), all three elements (source-pathway-receptor) of a significant pollutant linkage must be present.

9.2.5 The legislation places a responsibility on the local authority to determine whether the land in its area is contaminated by consideration of whether:

- significant harm is being caused; or
- there is a significant possibility of significant harm being caused; or
- significant pollution of the Water Environment is being caused or there is a significant possibility of such pollution being caused.

Planning Policy

9.2.6 Planning policy at the national, regional and local level is identified in Chapter 5 Policies and Plans. The principal policies with regard to geology which are relevant to the proposed scheme (taking into account its location and broad baseline parameters at the outset of the study) are as follows:

Scottish Planning Policy (February 2010)

9.2.7 This highlights that development will be required to manage a wide variety of wastes in a manner consistent with the provisions of the EU Waste Framework Directive and the Landfill (Scotland) Regulations, 2003.

PAN33: Development of Contaminated Land (2000)

9.2.8 This advocates a 'suitable for use' approach which ensures that land is made suitable for its current use and any new use (para. 19). It is stated that the developer must build-up a picture of the source(s), pathway(s) and receptor(s) that are relevant to the particular site, consider the risks that are relevant and design an appropriate remedial solution (para 23). It is further stated that planning authorities have a positive role to play in tackling the legacy of contaminated land by ensuring that contaminated land is identified at an early stage in the planning process and is taken into account in the determination of planning applications through appropriate remediation and conditions (para. 85).

PAN51: Planning, Environmental Protection and Regulation (2006)

9.2.9 It is stated that the sensitivity of an area, including consideration of soil quality, may be a material consideration if at risk of being affected by pollution (para. 50).

PAN60: Planning for Natural Heritage

9.2.10 This states that planning authorities should consider the effect of development proposals on geomorphological processes, landforms and soils and seek to avoid, reduce, mitigate or compensate for any adverse effect (para. 34).

Dumfries & Galloway Structure Plan

9.2.11 The Structure Plan, Policy D31, indicates that proposals likely to sterilise significant workable reserves of minerals will not normally be permitted. Map D5 shows a schematic figure of potentially workable mineral reserves.

9.2.12 The Structure Plan Section 3.75 notes the importance of peatlands and need for bogs to be protected. Section 3.76 deals with peat bogs designated as Special Areas of Conservation.

Guidance

9.2.13 The assessment has been undertaken in accordance with relevant guidance including:

- BS10175:2001 (Code of Practice for the Investigation of Potentially Contaminated Sites);
- BS5930:1999 (Code of Practice for Site Investigation);
- Guidance on preliminary site inspection of contaminated land CLR2 Applied Environmental Research Centre Volume 1 1994;
- Sampling Strategies for Contaminated Land CLR 4 Centre for Research into the Built Environment DoE 1994;
- Other relevant guidelines issued by the Department of the Environment, Transport and the Regions (DETR) and the Royal Institution of Chartered Surveyors (RICS); and
- SNH guidance on protection of Geodiversity.

9.3 ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

Scope of the Assessment

9.3.1 The scope of this assessment of effects on geology includes:

- Determination of the baseline geological conditions, the likely presence of contamination and the sensitivity of the site and receptors;
- Review of the proposed scheme design to determine the predicted effects posed by the permanent development of the site on baseline geological conditions; and
- Evaluation of the significance of predicted effects taking into account impact magnitude (before and after mitigation) and baseline environmental sensitivity.

9.3.2 The approach has considered the effects of the project's construction and permanent development on the geology of the area.

Extent of the Study Area

9.3.3 The study area for the purposes of the assessment of geological effects extends to the areas surrounding the proposed scheme, as described in Chapter 3 of this ES.

Consultation

9.3.4 The British Geological Society and UK RIGS (Regionally Important Geological Sites) Conservation Association were consulted to obtain any records of geological sensitivities in the study area.

Method of Baseline Data Collation

Desk Study

9.3.5 A desk study appraisal of available information has been undertaken in order to establish the status and condition of geological resources along and surrounding the proposed scheme.

9.3.6 The following sources of information have been referred to in this assessment:

- Published geological information from the British Geological Survey (BGS), including:
  - Geological Map Sheet no 6 Annan, scale 1:50 000, Drift editions;
  - Geological Map Sheet no 10 Ecclefechan, scale 1:50 000, Drift edition; and
  - BGS historical borehole records.
- Historical Ordnance Survey maps of the site and surrounding area; and
- Scottish Natural Heritage (SNH), Sitelink, online designated site database.

Site Visit

9.3.7 A site walkover was undertaken to identify any key local geological features and ground conditions that should be incorporated into the baseline review.

Significance Criteria

9.3.8 The assessment of potential effects as a result of the proposed scheme has taken into account both the construction and operational phases. The significance level attributed to each effect has been assessed based on the magnitude of change due to the development proposals, and the sensitivity of the affected receptor/receiving environment to change, as well as a number of other factors that are outlined in more detail in Chapter 4 of this ES. Magnitude of change and the sensitivity of the affected receptor/receiving environment are both assessed on a scale of high, medium, low and negligible.

Effect Significance

9.3.9 The following terms have been used to define the significance of the effects identified:

- **Major effect:** where the proposed scheme could be expected to have a very significant effect (either positive or negative) on geology, soils and contaminated land;

- **Moderate effect:** where the proposed scheme could be expected to have a noticeable effect (either positive or negative) on geology, soils and contaminated land;
- **Minor effect:** where the proposed scheme could be expected to result in a small, barely noticeable effect (either positive or negative) on geology, soils and contaminated land; and
- **None:** where no discernible effect is expected as a result of the proposed scheme on geology, soils and contaminated land.

9.4 BASELINE CONDITIONS

Gretna to Ewe Hill

Designated Geological Sites

9.4.1 A review of published BGS and SNH information indicates that the proposed route of the OHL does not pass through any sites designated for their geological interest.

9.4.2 Consultation information from the UK RIGS Conservation Association has indicated no RIGS sites along the proposed OHL route. The bedrock section in the Kirtle Water is suggested to potentially be deserving of RIGS status for the Carboniferous sedimentary rocks exposed there, however the Association felt that the OHL would be a limited threat to this "unprotected geodiversity asset".

Superficial Deposits

9.4.3 Table 9.1 defines the superficial geology, present at the surface, for the OHL from Gretna substation to Ewe Hill Windfarm substation.

Table 9.1 Superficial deposits from Gretna to Ewe Hill

From	Distance (m)	To	Type	Composition
Gretna	2 500	Cadgill Burn	Gretna Till Formation	Diamicton – typically boulder clay (clay with variable sand content, pebbles and cobbles)
Cadgill Burn	70	Cadgill Burn	Alluvium	Sand, Silt & Clay
Cadgill Burn	2 100	Ned's Back	Gretna Till Formation	Diamicton – typically boulder clay
Ned's Back	200	Ned's Back	River Terrace Deposits	Sand & Gravel
Ned's Back	500	South of Solway Bank Wood	Gretna Till Formation	Diamicton – typically boulder clay
South of Solway Bank Wood	300	South of Solway Bank Wood	Peat	Peat
South of Solway Bank Wood	2 000	North of High Stenries	Gretna Till Formation	Diamicton – typically boulder clay
North of High Stenries	150	North of High Stenries (northeast of Wallacehill)	Peat	Peat (Blanket Bog)
North of High Stenries	800	Chapel Hill	Gretna Till Formation	Diamicton – typically boulder clay
Chapel Hill	150	Chapel Hill	Kiblane Sand & Gravel Formation	Sand, Gravel & Boulder
Chapel Hill	3400	Kirktle Water	Gretna Till Formation	Diamicton – typically boulder clay
Kirktle Water	170	Kirktle Water	Alluvium	Sand, Silt & Clay
Kirktle Water	800	Byre Cleuch	Gretna Till Formation	Diamicton – typically boulder clay

From	Distance (m)	To	Type	Composition
Byre Cleuch	900	North East of Dunnabie Hill	Langholm Till Formation	Diamicton – typically boulder clay
North East of Dunnabie Hill	200	North East of Dunnabie Hill	Exposed Bedrock (Lower Palaeozoic Rock)	Wacke and Mudstone
North East of Dunnabie Hill	300	Long Cleuch	Langholm Till Formation	Diamicton – typically boulder clay
Long Cleuch	540	Crummies Cleuch	Exposed Bedrock (Lower Palaeozoic Rock)	Wacke and Mudstone
Crummies Cleuch	40	Tanker's Gill	Langholm Till Formation	Diamicton – typically boulder clay
Tanker's Gill	70	Tanker's Gill	Alluvium	Sand, Silt & Clay
Tanker's Gill	120	Ewe Hill	Langholm Till Formation	Diamicton – typically boulder clay

9.4.4 With the exception of Peat (Blanket Bog) north of High Stenries, the identified superficial deposits are considered to be of negligible to minor importance with regard to rarity, formation, mineral/aggregate resource or educational interest. Therefore, the sensitivity of superficial geology to development is considered to be Low.

9.4.5 The Peat (Blanket Bog) north of High Stenries is considered to be of Medium sensitivity, taking into account its limited extent (c.0.1 Ha) and lack of continuity with other blanket bog features in the wider area.

Bedrock Geology

9.4.6 Bedrock underlying the proposed scheme is indicated in Table 9.2 below.

Table 9.2 Bedrock from Gretna to Ewe Hill

From	Distance (m)	To	Type	Composition
Gretna	3 560	North of Timpanheck	Sherwood Sandstone Group	Sandstone
North of Timpanheck	380	West of Parkhead	Cumbrian Coast Group	Mudstone & Sandstone
West of Parkhead	500	East of Cadgillhead	Pennine Coal Measures Group	Mudstone, Siltstone & Sandstone
East of Cadgillhead	3 190	North of High Stenries	Yoredale Group	Mudstone, Sandstone & Limestone
North of High Stenries	1 570	North East of Conhess	Border Group	Mudstone, Siltstone & Sandstone
North East of Conhess	2 340	East of Setthorns	Ballagan Formation	Sandstone, Siltstone, and Dolomitic Limestone
East of Setthorns	860	South of Winterhope	Birrenswark Volcanic Formation	Olivine-Basalt
South of Winterhope	340	Byre Cleuch	Kinnesswood Formation	Standstone & Nodular Limestone (Cornstone)
Byre Cleuch	2 400	Ewe Hill	Lower Palaeozoic Rock	Wacke and Mudstone

9.4.7 Given the nature of the bedrock formations along the route, all of which are commonly encountered in Scotland and not representing significant mineral resources or feaatures of wider than local geological interest, and the significant depths that bedrock is likely to be encountered in most areas, its sensitivity to development is considered to be **Low**.

Geological and Geo-morphological Features

9.4.8 Table 9.3 summaries relevant geological and geo-morphological features which lie on or close to the proposed OHL from Gretna substation to Ewe Hill Windfarm substation.

Table 9.3 Geological and Geo-morphological features from Gretna to Ewe Hill

Feature	Distance from Gretna (m)	Place Name	Notes
Fault	5 900	NE of Cadgillhead	Trending west to east across the proposed OHL
Fault	6 200	South and East of Solway Bank Wood	Trending north to south, within 200m of the proposed OHL
Made Ground	7 600	Gidbson's Knowe	200m from proposed OHL – worked ground
Mass Movement	15 100	W of Bomestead settlement	600m S of Ewe Hill Substation - Landslide deposits
Land Form	430	W of Staffler	Glacial meltwater channel
Land Form	660	Straffler	Crestline of drumlin – 400m E of the proposed OHL
Land Form	1 900	Greenwrae	Glacial meltwater channel
Land Form	4 000	Cadgill Wood	Glacial meltwater channel
Land Form	8 600	Allfornought	Glacial meltwater channel margin – 300m N of the proposed OHL
Land Form	9 000	Chapelhill to the E Allfornought to the W	E – 3 Crestline of drumlins and 2 Glacial meltwater channels W – 2 Glacial meltwater channels
Land Form	11 200	Lauriesclose	2 Glacial meltwater channel margins

9.4.9 None of the above features have been designated for geological interest. Furthmore, many of these features are not directly in the line of the proposed OHL and are unlilkely to be affected at all by the construction or permanent development, therefore their sensitivity to the proposed scheme is considered to be Low.

Contamination

9.4.10 A review of a selection of historical maps revealed the majority of the area along the proposed OHL to have been undeveloped agricultural land and did not identify any potentially hazardous industrial land uses. The potential for presence of contamination is considered to be **None** and has therefore not been considered further in this assessment.

Ewe Hill to Newfield

Designated Geological Sites

9.4.11 A review of published BGS and SNH information indicates that the OHL or access tracks do not pass through any sites designated for their geological interest.

9.4.12 Consultation information from the UK RIGS Conservation Association has indicated no current or proposed RIGS sites along the proposed OHL route.

Superficial Deposits

9.4.13 Table 9.4 outlines the superficial geology for the proposed scheme from Ewe Hill Windfarm substation to Newfield substation.

Table 9.4 Superficial geology from Ewe Hill to Newfield

From	Distance (m)	To	Type	Composition
Ewe Hill	400	Mid Hill	Langholm Till Formation	Diamicton
Mid Hill	350	Mid Hill	Exposed Bedrock (Lower Palaeozoic Rock)	Wacke and Mudstone
Mid Hill	1 190	Craighousesteads Fort	Langholm Till Formation	Diamicton
Craighousesteads Fort	250	Craighousesteads Fort	Exposed Bedrock (Lower Palaeozoic Rock)	Wacke and Mudstone
Craighousesteads Fort	520	Water of Milk	Langholm Till Formation	Diamicton
Water of Milk	170	Water of Milk	Alluvium	Sand, Silt & Clay
Water of Milk	370	West of Water of Milk	Langholm Till Formation	Diamicton
West of Water of Milk	170	West of Water of Milk	Exposed Bedrock (Lower Palaeozoic Rock)	Wacke and Mudstone
West of Water of Milk	100	Palmer's Sike	Langholm Till Formation	Diamicton
Palmer's Sike	120	Palmer's Sike	Alluvium	Sand, Silt & Clay
Palmer's Sike	170	West of Palmer's Sike	Langholm Till Formation	Diamicton
West of Palmer's Sike	330	West of Palmer's Sike	Exposed Bedrock (Lower Palaeozoic Rock)	Wacke and Mudstone
West of Palmer's Sike	1 070	North of Corrie Common	Langholm Till Formation	Diamicton
North of Corrie Common	200	North of Corrie Common	Peat	Peat/Blanket Bog
North of Corrie Common	260	Moss Plantation	Langholm Till Formation	Diamicton
Moss Plantation	800	West Ladycleuch Plantation	Exposed Bedrock (Lower Palaeozoic Rock)	Wacke and Mudstone
West Ladycleuch Plantation	250	Mid Ladycleuch Plantation	Langholm Till Formation	Diamicton
Mid Ladycleuch Plantation	330	Mid Ladycleuch Plantation	Exposed Bedrock (Lower Palaeozoic Rock)	Wacke and Mudstone
Mid Ladycleuch Plantation	350	Corrie Water	Langholm Till Formation	Diamicton
Corrie Water	300	Corrie Water	Alluvium	Sand, Silt & Clay
Corrie Water	470	West of Corrie Water	Langholm Till Formation	Diamicton
West of Corrie Water	600	Hog Hill	Exposed Bedrock (Lower Palaeozoic Rock)	Wacke and Mudstone
Hog Hill	320	Newfield	Langholm Till Formation	Diamicton

9.4.14 With the exception of Peat (Blanket Bog) north of Corrie Common, the identified superficial deposits are considered to be of negligible to minor importance with regard to rarity, formation, mineral/aggregate resource or educational interest. Therefore, the sensitivity of superficial geology to development is considered to be Low.

9.4.15 The Peat (Blanket Bog) at Corrie Common is considered to be of Medium sensitivity, taking into account its limited extent (c.0.3 Ha) and lack of continuity with other blanket bog features in the wider area.

Bedrock Geology

9.4.16 Bedrock underlying the proposed scheme between Ewe Hill and Newfield is indicated in Table 9.5 below.

Table 9.5 Bedrock from Ewe Hill to Newfield

From	Distance (m)	To	Type	Composition
Ewe Hill	8 150	Newfield	Lower Palaeozoic Rock	Wacke and Mudstone

9.4.17 Given the nature of the wacke/mudstone bedrock along the route, which is commonly encountered in Scotland and not representing significant mineral resources or feaatures of local or wider geological interest, its sensitivity to development is considered to be **Low**.

Geological and Geo-morphological Features

9.4.18 Table 9.6 summaries geological and geo-morphological features which lie on or close to the proposed scheme from Ewe Hill Wind Farm substation to the Newfield Wind Farm substation.

Table 9.6 Additional geological features from Ewe Hill to Newfield

Feature	Distance from Ewe Hill (m)	Place Name	Notes
Made Ground	6 800	West of Mirrenhill Cottages	200m from proposed OHL – quarry
Mass Movement	4 000	South of Stidrigg	1000m south of proposed OHL – landslide deposits
Land Form	600	Mid Hill	Glacial meltwater channel

9.4.19 None of the above features have been designated for geological interest or are considered to have any greater than local importance. Furthmore, many of these features are not directly in the line of the proposed OHL and will unlilkely be affected at all by the construction or permanent development, therefore their sensitivity to the proposed scheme is considered to be Low.

Contamination

9.4.20 A review of a selection of historical maps revealed the majority of the area along the proposed OHL to have been undeveloped agricultural land and did not identify any potentially hazardous industrial land uses. The potential for presence of contamination is considered to be **None** and has therefore not been considered further in this assessment.

Future Baseline

9.4.21 Existing baseline conditions are unlikely to change significantly in a 'do-nothing' scenario.

9.5 ASSESSMENT OF EFFECTS, MITIGATION AND RESIDUAL EFFECTS

Gretna to Ewe Hill

Construction

Localised Compaction of Soils

9.5.1 There is potential for localised compaction of soils and superficial deposits resulting in loss of soil structure and associated alterations to surface run-off, drainage potential and perched water table geometry.

9.5.2 With the exception of the very small area of peat to the north of High Stenries, the sensitivity of soils and superficial deposits along the route of the OHL is Low and the magnitude of change, prior to mitigation, is Low. Therefore, there is likely to be **no** significant effect on the majority of soils along the route of the OHL.

9.5.3 The sensitivity of the blanket bog to the north of High Stenries is considered to be Medium and therefore there will be a direct, temporary effect on the blanket bog of **Minor adverse** significance prior the implementation of mitigation measures.

Mitigation

9.5.4 The contractor will produce a Environmental Management Plan (EMP) containing a construction method statement that must be agreed with the Local Authority and SEPA. This will include information on best practices in soil handling and storage, and particular measures to be undertaken with respect to protection of peat, concerns related to peat stability, and protection of watercourses from siltation.

Residual Effects

9.5.5 The sensitivity of the blanket bog north of High Stenries is Medium and the magnitude of change, following mitigation, is Negligible. Therefore, **no** permanent effect on soils and superficial deposits is is predicted following the implementation of mitigation measures.

Erosion of Soils

9.5.6 There is potential for erosion of soils through poor management of on-site stockpiles.

9.5.7 The sensitivity of soils and superficial deposits along the majority of the route of the OHL is Low and the magnitude of change, prior to mitigation, is Medium. Therefore, there is potential for permanent, short to medium-term effect on soils and superficial deposits of **Minor adverse** significance prior to the implementation of mitigation measures.

9.5.8 There is considered to be a direct, permanent, short to medium-term effect on the peat deposits north of High Stenries of **Moderate adverse** significance prior to the implementation of mitigation measures.

Mitigation

9.5.9 The contractor's EMP will contain a construction method statement with information on soil handling and storage. All earth bunds and soil storage areas will be well managed to minimise runoff and erosion through the use of temporary covers for short term stockpiles and reseeding with grass for long term stockpiles.

Residual Effects

9.5.10 The sensitivity of peat deposits north of High Stenries is Medium and the magnitude of change, following mitigation, is Negligible. Therefore, the effect on those peat deposits is considered to be **None** following the implementation of mitigation measures.

Pollution of Permeable Soils

9.5.11 There is potential for pollution of permeable soils and superficial deposits from spillage or leakage of fuels or chemicals.

9.5.12 The sensitivity of soils and superficial deposits along the majority of the route of the OHL is Low and the magnitude of change, prior to mitigation, is High. Therefore, there is a potential for direct, temporary, short to medium -term effect on soils and superficial deposits of **Moderate adverse** significance prior to the implementation of mitigation measures.

9.5.13 There is considered to be a direct, temporary, short to medium -term effect on the peat deposits north of High Stenries of **Major adverse** significance prior to the implementation of mitigation measures.

Mitigation

9.5.14 The contractor's EMP will contain a construction method statement with information on chemical and fuel handling and storage, management of maintenance activities on site and emergency response in the case of a leak or spill.

9.5.15 All fuel and other chemicals will be stored in accordance with relevant best practice, including:

- In line with manufacturer's recommendations;
- In appropriate impermeable bunded areas;
- Away from extremes in temperature; and
- Only until the end of shelf life.

9.5.16 Vehicles and plant will be regularly maintained and all maintenance will be undertaken on impermeable surfaces in order to minimise risks of leaks to soil.

Residual Effects

9.5.17 The sensitivity of soils and superficial deposits within the site boundary is Low and the magnitude of change, following mitigation, is Low. Therefore, **No** significant residual effect is predicted for soils and superficial deposits along the majority of the OHL route.

9.5.18 There is potential for a direct, temporary, short to medium-term effect on the peat deposits north of High Stenries of **Minor adverse** significance following the implementation of mitigation measures.

Operation

9.5.19 **No** significant effects have been predicted with respect to the operational phase.

Ewe Hill to Newfield

Construction

Localised Compaction of Soils

9.5.20 There is potential for localised compaction of soils and superficial deposits resulting in loss of soil structure and associated alterations to surface run-off, drainage potential and perched water table geometry.

9.5.21 The sensitivity of soils and superficial deposits along the route of the OHL, with the exception of Blanket Bog north of Corrie Common, is Low and the magnitude of change, prior to mitigation, is Low. Therefore, there is likely to be **no** significant effect on most of the soils and superficial deposits.

9.5.22 The sensitivity of the Blanket Bog north of Corrie Common is Medium and the magnitude of change, prior to mitigation is Low, taking into account the limited extent of OHL route crossing the Blanket Bog. There is potential for a direct, temporary negative effect on soils at this location, is of **Minor adverse** significance prior to mitigation.

Mitigation

9.5.23 The contractor will produce a Environmental Management Plan (EMP) containing a construction method statement that must be agreed with the Local Authority and SEPA. This will include information on best practices in soil handling and storage, and particular measures to be undertaken with respect to protection of peat, concerns related to peat stability, and protection of watercourses from siltation.

Residual Effects

9.5.24 The sensitivity of the Blanket Bog north of Corrie Common is Medium and the magnitude of change, following mitigation, is Negligible. Therefore, the potential for direct, permanent effect on soils and superficial deposits is considered to be **None** following the implementation of mitigation measures.

Erosion of Soils

9.5.25 There is potential for erosion of soils through poor management of on-site stockpiles.

9.5.26 The sensitivity of soils and superficial deposits along the majority of the route of the OHL is Low and the magnitude of change, prior to mitigation, is Medium. Therefore, the potential for a direct, permanent, short to medium-term effect on soils and superficial deposits is of **Minor adverse** significance prior to the implementation of mitigation measures.

9.5.27 There is considered to be a direct, permanent, short to medium-term effect on the peat deposits north of Corrie Common of **Moderate adverse** significance prior to the implementation of mitigation measures.

Mitigation

9.5.28 SPT's EMP will contain information provided by the contractor including construction method statement with information on soil handling and storage. All earth bunds and soil storage areas will be well managed to minimise runoff and erosion through the use of temporary covers for short term stockpiles and reseeding with grass for long term stockpiles.

Residual Effects

9.5.29 The sensitivity of peat deposits north of Corrie Common is Medium and the magnitude of change, following mitigation, is Negligible. Therefore, the effect on peat deposits is considered to be **None** following the implementation of mitigation measures.

Pollution of Permeable Soils

9.5.30 There is potential for pollution of permeable soils and superficial deposits from spillage or leakage of fuels or chemicals.

9.5.31 The sensitivity of soils and superficial deposits along the majority of the route of the OHL is Low and the magnitude of change, prior to mitigation, is High. Therefore, the potential for a direct, temporary, short to medium -term effect on soils and superficial deposits of **Moderate adverse** significance prior to the implementation of mitigation measures.

9.5.32 There is considered to be a direct, temporary, short to medium -term effect on the peat deposits north of Corrie Common of **Major adverse** significance prior to the implementation of mitigation measures.

Mitigation

9.5.33 SPT's EMP will contain a construction method statement with information on chemical and fuel handling and storage, management of maintenance activities on site and emergency response in the case of a leak or spill.

9.5.34 All fuel and other chemicals will be stored in accordance with relevant best practice, including:

- In line with manufacturer's recommendations;
- In appropriate impermeable bunded areas;
- Away from extremes in temperature; and
- Only until the end of shelf life.

9.5.35 Vehicles and plant will be regularly maintained and all maintenance will be undertaken on impermeable surfaces in order to minimise risks of leaks to soil.

Residual Effects

9.5.36 The sensitivity of soils and superficial deposits within the site boundary is Low and the magnitude of change, following mitigation, is Low. Therefore, the residual effect predicted for soils and superficial deposits along the majority of the OHL route is **None**.

9.5.37 There is likely to be a direct, temporary, short to medium-term effect on the peat deposits north of Corrie Common of **Minor adverse** significance following the implementation of mitigation measures.

Operation

9.5.38 **No** significant effects have been predicted with respect to the operational phase.

9.6 MONITORING AND FOLLOW UP

9.6.1 No monitoring or follow up will be required during the operational phase of the development.

9.7 LIMITATIONS AND ASSUMPTIONS

9.7.1 The baseline and impact assessments were carried out primarily by means of consultations and desk-based studies. No primary data collection or analysis has been undertaken to inform this assessment.

9.8 SUMMARY

9.8.1 There are no sites or features designated for their geological interest located along the route of the proposed OHLs. The geology of the Gretna to Ewe Hill route is indicated as comprising mainly diamicton on top of sandstone and mudstone. The route crosses one limited area of Blanket Bog (c.25m length along the route). The geology of the Ewe Hill to Newfield route is indicated as comprising mainly diamicton on top of wacke ad mudstone. The route crosses one limited area of Blanket Bog (c.50m length along the route). The route has predominantly remained as undeveloped agricultural land.

9.8.2 The main construction effects associated with the proposals include compaction of soils, mobilisation of contamination, soil loss through off-site disposal or erosion and pollution of soils through poor site practice. The key mitigation measures that will be implemented will be the

production of an EMP which will include a construction method statement that must be agreed with the Local Authority and SEPA. This will include information on best practice construction techniques that will be maintained.

Table 9.7: Summary of Effects Table for Geology and Soils: Study Area 1: Gretna – Ewe Hill

Description of Likely Significant Effects	Significance of Effects					Summary of Mitigation / Enhancement Measures	Significance of Residual Effects					Relevant Policy	Relevant Legislation
	Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		
Construction													
Localised compaction of peat	Local	Minor Negative	T	D	ST	▪ Production of EMP detailing best practice in soil handling, storage and protection of peat.	Local	None	-	-	-	Scottish Planning Policy; D&GC Structure Plan	N/A
Erosion of soils/peat	Local	Minor/moderate Negative	P	D	LT	▪ Production of EMP detailing best practice in soil handling, storage and protection of peat.	Local	None	-	-	-	Scottish Planning Policy; D&GC Structure Plan	N/A
Pollution of permeable soils/peat	Local	Moderate/major Negative	T	D	ST/MT	▪ Production of EMP detailing chemical and fuel handling and storage, management of maintenance	Local	Minor Negative	-	-	-	Scottish Planning Policy	Environmental Protection Act, 1990.

Description of Likely Significant Effects	Significance of Effects					Summary of Mitigation / Enhancement Measures	Significance of Residual Effects					Relevant Policy	Relevant Legislation
	Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		
						activities on site and emergency response. ■ Appropriate maintenance regime for plant.							

Table 9.8: Summary of Effects Table for Geology and Soils: Study Area 2: Ewe Hill to Newfield

Description of Likely Significant Effects	Significance of Effects					Summary of Mitigation / Enhancement Measures	Significance of Residual Effects					Relevant Policy	Relevant Legislation
	Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		
Construction													
Localised compaction of peat	Local	Minor Negative	T	D	ST	■ Production of EMP detailing best practice in soil handling, storage and protection of peat.	Local	None	-	-	-	Scottish Planning Policy; D&GC Structure Plan	N/A
Erosion of soils/peat	Local	Minor/moderate Negative	P	D	LT	■ Production of EMP detailing	Local	None	-	-	-	Scottish Planning Policy;	N/A

Description of Likely Significant Effects	Significance of Effects					Summary of Mitigation / Enhancement Measures	Significance of Residual Effects					Relevant Policy	Relevant Legislation
	Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		
Construction													
						best practice in soil handling, storage and protection of peat.						D&GC Structure Plan	
Pollution of permeable soils/peat	Local	Moderate/major Negative	T	D	ST/MT	■ Production of EMP detailing chemical and fuel handling and storage, management of maintenance activities on site and emergency response. ■ Appropriate maintenance regime for plant.	Local	Minor	-	-	-	Scottish Planning Policy	Environmental Protection Act, 1990.

Key to table:

P/T = Permanent or Temporary, D/I = Direct or Indirect, ST/MT/LT = Short Term, Medium Term or Long Term

N/A = Not Applicable

10 Hydrology

10.1 INTRODUCTION

10.1.1 The works involved in erecting and stringing of the wood poles, installation of two short sections of underground cable and construction of the Ewe Hill substation and access road will require some activities to be undertaken in the vicinity of surface watercourses and waterbodies. Therefore, this chapter presents an assessment of the potential for hydrological impacts associated with these construction works.

10.1.2 For the purposes of this assessment, watercourses have been identified as those which appear on the Ordnance Survey (OS) 1:50,000 scale maps. However generic mitigation has also been provided within this chapter for works in and around smaller surface water features such as drainage ditches and small burns.

10.1.3 No construction works associated with the installation of the wood poles are anticipated to be required within any watercourses or waterbodies. The only activities that will be required over watercourses will be crossing by construction vehicles (as required by the Principal Contractor) and stringing of the conductors which will be undertaken in such a way as to ensure that the wires do not enter any watercourse. It should be noted that the erection of new poles does not require the use of concrete.

10.1.4 The access road to the substation will require the installation of one 1.2m diameter culvert within an unnamed watercourse, as indicated on Figure 10.1. The full length of the road will be serviced by 'toe of embankment' ditches or filter ditches. Small culverts will be situated at regular intervals beneath the road to allow for free draining downhill of the road. Filter ditches will also line the perimeter of hardstanding at the proposed substation.

10.1.5 The machinery and methodology that will be used on the ground for the proposed scheme construction is provided in Chapter 3 of this ES.

10.1.6 All construction vehicles will be fitted with low ground pressure tracks, where practicable, and no road vehicles will be used to cross any watercourses unless the watercrossing route has been previously agreed with the local landowner and SEPA.

10.1.7 With the exception of the access road to the substation, it is not proposed to form any additional new permanent access tracks. Repeated crossings of watercourses for erection of the wood poles will be avoided where practicable. Where plant or vehicles have to make repeated crossings of a watercourse, a temporary haul road bridge or flumed / culverted crossing will be erected, in line with General Binding Rule 6 and following consultation with SEPA. General Bindings Rules are the lowest level of control required under the Controlled Activities Regulations, 2005 (see paragraph 10.2.3 below).

10.1.8 Where topography dictates, some excavation may be required to create a temporary working platform for the machines. If this is required, the ground would be returned to its former condition.

10.1.9 Excavation work will also be required to install a short (approximately 250m) underground cable to connect the line to the substation at Gretna and another approximately 100m section of underground cable to connect into the Ewe Hill substation.

10.2 LEGISLATION, POLICY AND GUIDANCE

Legislative Framework

10.2.1 The aquatic environment in Scotland is afforded significant protection through key statutes and the regulatory activity of SEPA and the local authorities. Until recently, these focused on the discharge consenting process for potentially polluting effluents under the framework provided by the Control of Pollution Act 1974 (COPA), as amended. In the last few years, legislation originating in Europe has reinforced standards and procedures.

10.2.2 The EC Water Framework Directive (WFD) (Directive 2000/60/EC) has been implemented in Scotland through the Water Environment and Water Services (Scotland) Act 2003 (WEWSA). This Act introduces a regulatory system for the water environment with SEPA as the lead authority working alongside the public, private and voluntary sectors. The Act ensures that all human activities that can have a harmful effect on the water environment can be controlled by establishing a framework for co-ordinated controls on water abstraction and impoundment, engineering works near watercourses, and all forms of pollution to water.

10.2.3 The Controlled Activities Regulations, 2005 (CAR) introduced under WEWSA provides the main regulatory controls for protecting the water environment from harm and the main regulatory tools to deliver the objectives of the Water Framework and Groundwater Directives. SEPA is responsible for implementing the Regulations, which are intended to introduce proportionate risk-based controls to protect the water environment and promote the sustainable use of water. They introduce specific controls for activities affecting watercourses and waterbodies and encompass the following activities relevant to the overhead line route:

- discharges to all wetlands, surface waters and groundwaters (replacing COPA); and
- engineering works in inland waters and wetlands.

10.2.4 The assessment presented in this chapter is based on the 'best practice' approach advocated by the WFD involving careful consideration of mitigation for aspects of the project which are predicted to have hydrological and water quality effects. In addition, SEPA has introduced new water monitoring and classification systems that will provide the data to support the aim of the WFD that all water bodies are of good ecological status, or similar objective, by 2015. The WFD introduces a holistic approach to monitoring for a range of different pressures. The new classification system covers all rivers, lochs, transitional, coastal and groundwater bodies, and is based on a new ecological classification system with five quality classes; High, Good, Moderate, Poor and Bad. It has been devised following EU and UK guidance and is underpinned by a range of biological quality elements, supported by measurements of chemistry, hydrology (changes to levels and flows) and morphology (changes to the shape and function of water bodies).

10.2.5 Private water supplies are regulated by local authorities using the Private Water Supply (Scotland) Regulations 2006 and the Water (Scotland) Act 1980.

10.2.6 All private water supplies are required to be registered with the local authority where the source of the supply is located.

Planning Policy

10.2.7 Planning policy at the national, regional and local level is identified in Chapter 5 Policies and Plans.

10.2.8 The Scottish Planning Policy provides guidance on policies with regards to flooding and drainage. Amongst its guidance, the key relevant statements in relation to this ES include:

- Development which would have a significant probability of being affected by flooding or would increase the probability of flooding elsewhere should not be permitted.
- The area of impermeable surface should be kept to a minimum in all new developments.

- Culverts are a frequent cause of local flooding, particularly if design or maintenance is inadequate. Watercourses should not be culverted as part of a new development unless there is no practical alternative.
- If culverts are unavoidable, they should be designed to maintain or improve existing flow conditions and aquatic life. A culvert may be acceptable as part of a scheme to manage flood risk or where it is used to carry a watercourse under a road.

Planning Advice Note 79: Water and Drainage

10.2.9 PAN 79 provides advice on good practice in relation to the provision of water and drainage in a planning context. It encourages joint working in order to ensure a common understanding of any capacity constraints and agreement on the means of their removal. The PAN explains the framework within which Scottish Water provides and contributes to new water infrastructure and contains advice on the appropriateness of private schemes. It clarifies the role of the planning authority in setting the direction of development to inform the planning and delivery of new infrastructure in a coordinated way. It also highlights the respective roles of Scottish Water and SEPA, indicating when and how they should interact with the planning system.

Annandale & Eskdale Local Plan

General Policy 45: Nature Conservation Sites of National Importance

10.2.10 The Planning Authority will assess development proposals which may affect the nature conservation sites of national importance against the criteria set out in Structure Plan Policy E5. Justification: There is a range of sites which are of national importance in nature conservation terms and are the core areas for the protection and enhancement of nature conservation interest. These include Sites of Special Scientific Interest and National Nature Reserves.

10.2.11 The nearest statutory designated site is Bells Flow SSSI which is located immediately adjacent to the east of the OHL. There is no potential for direct impact on Bells Flow SSSI as the OHL will not extend into the SSSI. However, there may be potential for indirect impacts associated with alteration of the hydrological regime which feeds into the SSSI.

Guidance

SEPA Pollution Prevention Guidelines (PPG) 1: General Guide to the Prevention of Pollution

10.2.12 This provides high level guidance on best practice construction methods and signposts to other PPGs and relevant publications.

SEPA PPG5: Works In, Near or Liable to Affect Watercourses

10.2.13 This provides advice on pollution prevention planning, how to avoid pollution of the water environment, waste management and incident response. The revised October 2007 version incorporates PPG23: Maintenance of Structures Over Water.

SEPA 'Special Requirements for Civil Engineering Contracts for the Prevention of Pollution v2' and 'Guidance on the Special Requirements v2' (2006)

10.2.14 These documents provide construction best practice with regards to pollution prevention and waste minimisation and a definitive list of clauses for inclusion within contractual documents.

CIRIA C532 'Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors' (2001)

10.2.15 This provides guidance on environmental good practice for the control of water pollution arising from construction activities. It focuses on the potential sources of water pollution from within construction sites and the effective methods of preventing its occurrence.

CIRIA C521 'Sustainable Urban Drainage Systems, Design Manual for Scotland and Northern Ireland' (2000)

10.2.16 This design manual provides detailed technical advice on sustainable methods of water drainage, describes current best practice in Scotland and Northern Ireland and sets out the technical and planning considerations for designing sustainable urban drainage systems for surface water (SUDS).

CIRIA C609 'Sustainable Urban Drainage Systems – Hydraulic, Structural and Water Quality Advice' (2004)

10.2.17 This technical report summarises current knowledge on the best approaches to design and construction of SUDS.

CIRIA C697 'The SUDS Manual' (2007)

10.2.18 This manual provides best practice guidance on the planning, design, construction, operation and maintenance of Sustainable Drainage Systems (SUDS) to facilitate their effective implementation within developments.

10.3 ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

Key Issues for Consideration in the EIA

10.3.1 The approach to this assessment has considered the effects of the scheme's construction on hydrology and water quality. This approach has been an iterative one whereby mitigation has been evolved in response to identification and evaluation of effects on hydrology and water quality. The assessment which is presented in this chapter therefore reports the pre-mitigation effects and the residual effects on the aquatic environment taking account of both generic mitigation (including best construction practice) and mitigation specific to the hydrological nature of the study area.

10.3.2 Given the very small footprint of the foundations for each wood pole and that the underground section leading into Gretna substation will be laid following the same procedures that all underground utilities are installed, long-term effects of the new wood poles on hydrology, particularly in relation to aspects such as drainage and flooding, are predicted to be negligible and have therefore not been considered further.

10.3.3 The 1.2m diameter culvert to be installed beneath the permanent access road to the Ewe Hill substation has been sized by assessing the upstream catchment and designed to accommodate a 1 in 100 year storm event plus 20% (to account for climate change). Therefore, no further consideration of downstream flooding has been included within this assessment.

Extent of Study Area

10.3.4 The study area has largely incorporated the routes of the OHLs, but has also included areas upstream and downstream of the route corridor which may also be affected.

10.3.5 The criteria for defining the study area with regard to hydrological resources have been established based on the professional judgement and experience of WSP with regards likely access and working areas, consultation with SEPA and with due consideration to the relevant guidance on hydrological assessment.

Consultation

10.3.6 SEPA has been consulted with regards to potential impacts on hydrology associated with construction and operation of the proposed scheme. Dumfries and Galloway Council (D&GC) Environmental Health Department was contacted for information on known Private Water Supplies in the study area that may be affected.

Method of Baseline Data Collection

- Baseline conditions have been established primarily via desk-based research and has included the following:
- Consultation with the bodies described above;
- Identification of the locations and characteristics of catchments and principal watercourses and waterbodies as shown on 1:50,000 scale OS mapping which may be affected by construction activities;
- Identification of SEPA / WFD watercourse and waterbody classifications;
- Review and collation of pertinent information on surface hydrology, flooding, climate etc;
- Review of hydrogeological characteristics and groundwater resource; and
- Review of Private Water Supply records held by Dumfries and Galloway Council.

10.3.7 The findings of the desk study have been supported by site surveys where required. These have included visual inspections of surface watercourses where works are likely to occur within or in the close vicinity.

10.3.8 The characterisation of hydrological sensitivities has been guided by the matrix presented in Table 10.1 which lists indicative criteria.

Table 10.1 Catchment Sensitivity Classification

Sensitivity Category	Sensitivity Criteria	
	Along Route	Downstream in Catchment
High Sensitivity	• Aquatic Natura 2000 site, Special Area of Conservation (SAC) or Site of Special Scientific Interest (SSSI) affected • Wetland/watercourse of High or Good Ecological Potential • Highly vulnerable groundwater • Raised or blanket bog	• Aquatic Natura 2000 site, SAC or SSSI immediately downstream/adjacent
Moderate Sensitivity	• Wetland/watercourse of Moderate Ecological Potential • Moderately vulnerable groundwater • Significant peat deposits	• Aquatic Natura 2000 site, SAC or SSSI further down catchment
Low Sensitivity	• Wetland/watercourse of Poor or Bad Ecological Potential or no WFD classification • Low vulnerability groundwater • Thin superficial peat deposits	
Not Sensitive	• No aquatic habitats or watercourses present • No significant groundwater present	

10.3.9 The criteria for sensitivity has been developed based on a hierarchy of factors relating to quality of the aquatic environment including international and national designations, water quality information, watercourse status from the WFD review work undertaken to date by SEPA, consultations, site visits and the professional judgement of the assessment team.

Significance Criteria

10.3.10 The prediction and assessment of effects on hydrology, hydrogeology and other aquatic resources has been undertaken using a series of tables to document the various potential impacts from aspects of the construction works. Effects have been predicted for the proposed project based on the guideline criteria for impact magnitudes set out in Table 10.2.

Table 10.2 Impact Magnitude

Impact Magnitude	Guideline Criteria
High	Total loss of, or alteration to, key features of the baseline resource such that post development characteristics or quality would be fundamentally and irreversibly changed eg watercourse realignment
Medium	Loss of, or alteration to, key features of the baseline resource such that post development characteristics or quality would be partially changed eg instream permanent bridge supports
Low	Small changes to the baseline resource, which are detectable but the underlying characteristics or quality of the baseline situation would be similar to pre-development conditions eg culverting of very small watercourses
Negligible	A very slight change from baseline conditions, which is barely distinguishable, and approximates to the 'no-change' situation eg short term compaction from machinery movements

10.3.11 Using these criteria, potential effects have been assessed for the project. These effects are presented in Section 10.5, as is further information on generic and site specific mitigation and residual effects of the project taking into account this mitigation.

10.3.12 The significance of the predicted effects has been assessed in relation to the sensitivities of the baseline resource. A matrix of significance was developed to provide a consistent framework for evaluation, and is presented in Table 10.3. Guideline criteria for the various categories of effect are included in Table 10.4.

Table 10.3 Effect Significance Matrix

Magnitude	**Sensitivity**			
	High	Moderate	Low	Not Sensitive
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Minor
Low	Moderate	Minor	Minor	None
Negligible	Minor	Minor	None	None

Table 10.4 Effect Significance Categories

Significance	**Definition**	**Guideline Criteria**
Major	A fundamental change to the environment	Changes in water quality or quantity affecting widespread catchments or groundwater reserves of strategic significance, or changes resulting in substantial loss of conservation value to aquatic habitats and designations
Moderate	A larger, but non-fundamental change to the environment	Changes in water quality or quantity affecting part of a catchment or groundwaters of moderate vulnerability, or changes resulting in loss of conservation value to aquatic habitats or designated areas
Minor	A small but detectable change to the environment	Localised changes resulting in minor and reversible effects on surface and groundwater quality or aquatic habitats
None	No detectable change to the environment	No effects on drainage patterns, surface and groundwater quality or aquatic habitat

10.3.13 In the above classification, fundamental changes are those which are permanent, either detrimental or beneficial, and would result in widespread change to the baseline environment. For the purposes of this assessment, those effects identified as being 'major' or 'moderate' have been evaluated as 'significant environmental effects' and therefore those which may have an adverse effect on the status of waterbodies.

10.3.14 The matrices used to guide the assessment have been applied with a degree of flexibility since the evaluation of effects would always be subject to particular location-specific characteristics which need to be taken into account. For this reason, the evaluation of significance of effects in particular would not always correlate exactly with the cells in the relevant matrix where professional judgement and knowledge of local conditions may result in a slightly different interpretation of the impact concerned. Cumulative effects have been taken into account through prediction and evaluation of effects at a catchment-wide level.

10.4 BASELINE CONDITIONS (INCLUDING FUTURE BASELINE WITHOUT DEVELOPMENT)

Gretna-Ewe Hill

Surface Watercourses

Overview

10.4.1 Surface watercourses have been defined as waterbodies or other natural courses of permanently flowing water which have potential significance for their aquatic and/or riparian habitat or species they support. This does not include drainage ditches or channels which are man made or water features which only contain water at certain times of the year. Watercourses have been classed in this assessment as those which are identifiable on Ordnance Survey mapping at 1:50,000 scale.

10.4.2 There are a number of watercourses indicated on OS mapping as being crossed by the route, as illustrated on Figure 10.2 and described below. For ease of reporting, all watercourses that will be crossed by the OHL have been numbered and described from south to north.

10.4.3 The watercourses described below fall within the catchments of two principle waterbodies, the River Sark and Kirtle Water.

10.4.4 The River Sark forms from the confluence of the Woodside Burn which rises on the western slopes of Allfornought Hill and Hall Burn which rises on the southern slopes of Healy Hill. The catchment of the river extends across the most of the southern part of the study area and incorporates predominantly agricultural land drained by numerous burns. The River Sark and it's tributaries is classified a salmonid water and has been classified as Moderate with regards to Ecological status. The key pressure identified as preventing the river from meeting Good ecological status or potential is diffuse source pollution, predominantly from mixed farming activities and other land management measures.

10.4.5 The Kirtle Water is classified as a salmonid water and rises in the foothills of Burnt Hill, Kirtlehead Hill and Doe Hill, approximately 2km to the north of Kirtlehead. It flows in a southerly direction and is fed from numerous sources including discharge from Winterhope Reservoir and various tributaries including Byre Cleuch and various other small watercourses described above. The approximately 9.3km stretch of the Kirtle Water from its headwaters to the point of its meeting with the Kirk Burn at Waterbeck is classified by SEPA as Moderate in terms of ecological status. The key pressures identified as preventing the Kirtle Water from meeting Good ecological status or potential is flow regulation and abstraction from water collection, purification and distribution activities.

Water Crossing GE1: Westgill Sike

10.4.6 Westgill Sike is a small burn which is indicated as rising immediately to the south of the access road to Greenwrae Farm and flowing in a southeasterly direction for approximately 2km before joining the River Sark. The course of the burn has been altered to serve as a drainage channel for the surrounding fields and it currently follows field boundaries.

10.4.7 The OHL will cross Westgill Sike at two locations, the first being as it crosses a field boundary at grid reference 332840, 571755, and the second being at the crossing of another field boundary at grid reference 332782, 572031.

10.4.8 Westgill Sike is unclassified with regards to its ecological potential. Given that it is a tributary of the River Sark, but also taking into consideration the modifications that have been made to allow field drainage, it is considered to have a Moderate sensitivity to change for the purposes of this assessment.

10.4.9 The pole positions in this area will be accessed from the nearest main road, to the north, east or south.

Water Crossing GE2, GE3 and GE4: Cadgill Burn

10.4.10 The Cadgill Burn is a tributary of the River Sark which rises at the base of High Muir, to the northeast of Snab, and flows in a south-easterly direction for approximately 8.4km. It is fed by a number of small tributaries and follows along the bases of various small hills and through Cadgill Wood before joining the River Sark to the northeast of Cadgillfoot.

10.4.11 The entire stretch of the Cadgill Burn is classified by SEPA as Good in terms of ecological status (RBMP Water Body Information Sheet 10670) and therefore is considered to have a Moderate sensitivity to change for the purposes of this assessment. Historical water quality monitoring data provided by SEPA indicates that the quality of the Cadgill Burn has been excellent (former SEPA Class A1). It was reported that an assessment of the invertebrate and fish fauna of the River Sark catchment was undertaken in August 1994. While all the sampling sites were classed as good water quality, the range of top scoring fauna was limited. Salmonid parr were found to be present within the Cadgill Burn, although in low densities.

10.4.12 The OHL will cross the Cadgill Burn at three separate locations as indicated on Figure 10.2. The first crossing (GE2) will be approximately 400m to the southeast of Tympanheck, where the burn flows from west to east at Cuddy Cleauch (grid reference 332491, 573983), a low-lying marshy area where the burn is fed by natural springs and field drains. Poles to the south of the burn are likely to be accessed from Cadgillfoot, while pole positions to the north of the burn will be accessed from Tympanheck.

10.4.13 The second location (GE3), where the OHL will cross Ned's Beck, a tributary of Cadgill Burn at grid reference 331653, 574955. At this point, Ned's Beck flows from north to south, parallel to the main road through Cadgill Wood. Pole locations on the east side of the burn will be accessed from the public road to the east and the pole locations on the west side of the burn will be accessed from farm tracks through fields to the west.

10.4.14 The OHL will cross a small tributary of the Cadgill Burn at grid reference 329787, 576685 (GE4). The tributary flows in a southwesterly direction across grass moorland used for rough grazing for sheep and cattle. Pole locations to the south of the burn will be accessed from Berclees Farm while pole locations to the north will be accessed either from High Stenries or from the public road to the north.

Water Crossing GE5: Unnamed Burn

10.4.15 The OHL will cross a small unnamed burn at grid reference 328513, 578299, approximately 500m east northeast of Chapelhill. This watercourse rises in coniferous plantation woodland on the western slopes of Allfornought Hill and flows in a westerly direction for approximately 3km before joining the Kirtle Water.

10.4.16 This burn is unclassified with regards to its ecological potential. Given that it is a tributary of the Kirtle Water, this burn is considered to have a Moderate sensitivity to change for the purposes of this assessment.

10.4.17 Pole locations to the south of the watercourse will be accessed either from Allfornought or from the public road to the south. Access through Allfornought will involve crossing the Woodside Burn at two locations. The existing access track to the residential property crosses the burn at grid reference 329311, 577614. Construction vehicles would continue tracking north towards Conhess Forest and would therefore cross Woodside Burn again around grid reference 329256, 578272.

10.4.18 Pole locations to the north of the watercourse will be accessed either from Chapelhill, Conhess or from existing forestry tracks to the north.

Water Crossing GE6: Unnamed Burn

10.4.19 The OHL will cross a small unnamed burn at grid reference 328434, 578500, approximately 670m east of Conhess. This watercourse rises in coniferous plantation woodland on the western slopes of Allfornought Hill and flows in a southwesterly and then westerly direction for approximately 2.5km before joining the Kirtle Water.

10.4.20 This burn is unclassified with regards to its ecological potential. Given that it is a tributary of the Kirtle Water, this burn is considered to have a Moderate sensitivity to change for the purposes of this assessment.

10.4.21 Pole locations around this watercourse will be accessed either from Chapelhill, Conhess or from Allfornought. Vehicles accessing from Allfornought will need to cross the burn further upstream around grid reference 328914, 578385.

Water Crossing GE7: Conhess Burn

10.4.22 The OHL will cross Conhess Burn at grid reference 328264, 578818, approximately 670m northeast of Conhess. This watercourse rises in coniferous plantation woodland on the western slopes of Allfornought Hill and flows in a southwesterly and then westerly direction for approximately 2km before joining the Kirtle Water.

10.4.23 This burn is unclassified with regards to its ecological potential. Given that it is a tributary of the Kirtle Water, this burn is considered to have a Moderate sensitivity to change for the purposes of this assessment.

10.4.24 Pole locations around this watercourse will be accessed either from Conhess or from existing forestry tracks.

Water Crossing GE8: Unnamed Burn

10.4.25 The OHL will cross an unnamed burn at grid reference 328059, 579211, approximately 970m east northeast of Hallsike. This watercourse rises in coniferous plantation woodland on the western slopes of Allfornought Hill and flows in a southwesterly and then westerly direction for approximately 2km before joining the Kirtle Water.

10.4.26 This burn is unclassified with regards to its ecological potential. Given that it is a tributary of the Kirtle Water, this burn is considered to have a Moderate sensitivity to change for the purposes of this assessment.

10.4.27 Pole locations around this watercourse will be accessed from existing forestry tracks.

Water Crossing GE9: Hallsike Burn

10.4.28 The OHL will cross Hallsike Burn at grid reference 327958, 579408, approximately 960m northeast of Hallsike. This watercourse rises in coniferous plantation woodland on the western slopes of Allfornought Hill and flows in a westerly and then southwesterly direction for approximately 1.5km before joining the Kirtle Water.

10.4.29 This burn is unclassified with regards to its ecological potential. Given that it is a tributary of the Kirtle Water, this burn is considered to have a Moderate sensitivity to change for the purposes of this assessment.

10.4.30 Pole locations around this watercourse will be accessed from existing forestry tracks.

Water Crossing GE10: Pokeskine Sike

10.4.31 The OHL will cross Pokeskine Sike at grid reference 327673, 579985, approximately 700m east of Kirtleton. Pokeskine Sike rises in the foothills of Gowd Muir and Standingstone Edge and flows in a south-westerly direction through coniferous plantation woodland and arable fields for approximately 3km before joining the Kirtle Water.

10.4.32 This burn is unclassified with regards to its ecological potential. Given that it is a tributary of the Kirtle Water, this burn is considered to have a Moderate sensitivity to change for the purposes of this assessment.

10.4.33 Pole locations around this watercourse will be accessed either from Kirtleton or from existing forestry tracks.

Water Crossing GE11: Keppock Sike

10.4.34 The OHL will cross Keppock Sike at grid reference 327419, 580498, approximately 700m east of Kirtleton. Pokeskine Sike rises in the foothills of Gowd Muir and flows in a south-westerly direction through coniferous plantation woodland and arable fields for approximately 1.5km before joining the Kirtle Water.

10.4.35 This burn is unclassified with regards to its ecological potential. Given that it is a tributary of the Kirtle Water, this burn is considered to have a Moderate sensitivity to change for the purposes of this assessment.

10.4.36 Pole locations around this watercourse will be accessed either from Kirtleton or from existing forestry tracks.

Water Crossing GE12: Kirtle Water

10.4.37 The OHL will cross the Kirtle Water at grid reference 326938, 581455, approximately 530m north of Setthorns. Pole locations around this watercourse will be accessed from the existing road to Winterhope.

10.4.38 As previously discussed, the Kirtle Water is classified by SEPA as Moderate in terms of ecological status and therefore is considered to have a Moderate sensitivity to change for the purposes of this assessment.

Water Crossing GE13 and GE14: Byre Cleuch

10.4.39 Byre Cleuch, which is currently unclassified by SEPA with regards to ecological status, rises in the southern slopes of Kirtlehead Hill. It flows in a south-easterly direction for approximately 1.5km before joining the Kirtle Water, and therefore is considered to have a Moderate sensitivity to change for the purposes of this assessment.

10.4.40 The OHL will cross Byre Cleuch at two locations at grid references 326684, 581939 (GE13) and 326530, 582120 (GE14), approximately 560m west of Winterhope Farm.

10.4.41 Construction vehicles will require to track up the hill slopes from the Winterhope access road or from existing tracks from Winterhope Farm and Kirtlehead.

Water Crossing GE15, GE16 and GE17: Dalbate Burn

10.4.42 The Dalbate Burn rises in the western slopes of Kirtlehead Hill and the eastern and southern slopes of Crawthat Hill and is formed by the convergence of a number of smaller tributaries including Long Cleuch (GE15), Crummie Cleuch (GE16) and Tanker's Gill (GE17). It flows in a southerly direction for approximately 3.5km before joining the Kirk Burn, a tributary of the Kirtle Water. The Kirk Burn is classified by SEPA as Good in terms of ecological status and therefore the Dalbate Burn, as a tributary of the Kirk Burn, is considered to have a High sensitivity to change for the purposes of this assessment.

10.4.43 The OHL will cross Long Cleuch at grid reference 325602, 583197 (GE15), Crummie Cleuch at grid reference 325157, 583664 (GE16) and Tanker's Gill at grid reference 325101, 583712 (GE17), between 1.6km and 2.3km to the northwest of Kirtlehead.

10.4.44 Construction vehicles will track up the hill slopes from the Winterhope access road or from existing tracks leading from Winterhope Farm and Kirtlehead to pole locations to the southeast of Long Cleuch. The remaining pole locations would be accessed from the existing farm tracks on Crawthat Hill.

Water Crossing GE18 and GE19: Kirk Burn

10.4.45 The permanent access track to the Ewe Hill substation will cross the Kirk Burn and a tributary of the Kirk Burn at grid references 324183, 582869 and 324857, 582884 respectively.

10.4.46 The Kirk Burn rises in the western slopes of Crawthat Hill, approximately 850m to the northwest of crossing point GE18. It continues to flow in a generally southerly direction for approximately 6.5km before converging with the Kirtle Water.

10.4.47 As previously discussed, the Kirk Burn is classified by SEPA as Good in terms of ecological status and therefore is considered to have a High sensitivity to change for the purposes of this assessment.

Groundwater

10.4.48 Groundwater along the length of the proposed OHL is described as being associated with the Annandale bedrock and localised sand and gravel aquifers. SEPA has classified the status of this groundwater, including both it's quality and quantity, as Good, and therefore meets the requirements of the WFD. This groundwater body is considered to have a High sensitivity to change for the purposes of this assessment.

10.4.49 There will be minimal disturbance to groundwaters associated with the erection of wood poles. Therefore, for the purposes of this assessment only potential impacts on groundwater associated with construction of the Ewe Hill substation have been considered.

Private Water Supplies (PWS)

10.4.50 D&GC's Environmental Health Department was consulted for information on PWS along the route of the OHL. Table 10.5 below provides a summary of the PWS records within 1km of the proposed construction works and the locations of these are illustrated on Figure 10.3:

Table 10.5 PWS between Gretna substation and Ewe Hill substation

Figure Reference	Name	Coordinates	Supply Type
GE_D&GC_PWS_1	Megsfield, Waterbeck	327604, 58099	Spring
GE_D&GC_PWS_2	Crawthat House, Waterbeck	325141, 582462	Spring

10.4.51 As part of the Agriculture and Sporting Activities baseline survey, a structured interview was held with the landowners and tenants of the affected farms to ascertain baseline information, which included use of PWS. The following farms confirmed that it had a PWS:

- GE_AGSURV_PWS_1: Greenwrae Farm;
- GE_AGSURV_PWS_2: Chapelhill Farm (PWS for animals only); and
- GE_AGSURV_PWS_3: Conhess Farm (PWS no longer used).

10.4.52 All of the above represent the receptors for water from PWS, however no information has been made available regarding the location of the source of water nor the means of conveyance to the receptor.

10.4.53 As water supply is considered to be a fundamental human right, the sensitivity of these PWS is considered to be **High** for the purposes of this assessment.

Flooding

10.4.54 A review of SEPA's Indicative River & Coastal Flood Map indicates that the banks of the Cadgill Burn and Kirtle Water are at risk from flooding. These are considered likely to represent events that are localised in their geographical extent and given that wood poles will be set back at least 10m from the edges of watercourses, they are not considered likely to increase the risk of flood events occurring. Therefore flooding has not been considered further in this assessment.

Protected Sites

10.4.55 The Bells Flow SSSI is a raised bog situated immediately to the north of Parkhead and northeast of Cadgillhead Farm (see Figure 10.2). The closest point of the OHL to the SSSI is an angle pole located adjacent to the public road southeast of Cadgillhead Farm and 600m from the south-western edge of the SSSI.

10.4.56 The topography of the SSSI and the immediate surrounding area slopes down to the southeast indicating that the bog is fed by water draining from the north and west. Given the distance of the angle poles to the SSSI, their small footprint and that they are all located a significant distance down slope to the southwest of the SSSI, it is considered unlikely that these will impact on surface or groundwater movements either into or from the raised bog. Therefore the hydrological impact on Bells Flow SSSI associated with the wood poles has not been considered further in this assessment.

Ewe Hill-Newfield

Surface Watercourses

Overview

10.4.57 Surface watercourses have been defined as waterbodies or other natural courses of permanently flowing water which have potential significance for their aquatic and/or riparian habitat or species they support. This does not include drainage ditches or channels which are man made or water features which only contain water at certain times of the year. Watercourses have been classed in this assessment as those which are identifiable on Ordnance Survey mapping at 1:50,000 scale.

10.4.58 There are a number of watercourses indicated on OS mapping as being crossed by the route, as illustrated on Figure 10.4 and described below. For ease of reporting, all watercourses that will be crossed by the OHL have been numbered and described from south to north.

10.4.59 The two main watercourses between the Ewe Hill and Newfield substations are the Water of Milk and the Corrie Water. The watercourses described below, with the exception of the Corrie Water, fall within the catchment of the Water of Milk.

10.4.60 The Water of Milk is formed by the confluence of a number of small watercourses which rise on the slopes of Mid Height, Fullwood Hill and Pleamoss Hill. As it flows in a generally south-westerly direction, it is fed by other tributaries flowing from Pleamoss Hill, Ward Hill, Percy Hill and Newland Hill. It is joined by Capel Burn and Crossdykes Burn at Capelfoot and by Booths Burn to the west of Craighousesteads. SEPA has classified the ecological status of the Water of Milk as Good and therefore meets the requirements of the WFD.

10.4.61 The Corrie Water is formed by the confluence of Heithat Burn and Cow Burn at Little Whitriggs. It flows in a southerly direction along the foot of Bow Hill for approximately 4.5km before

joining the Water of Milk to the southwest of Balstack. SEPA classifies the Corrie Water as Good with regards to ecological status. It therefore meets the requirements of the WFD.

10.4.62 Both of the watercourses described above eventually converge with the River Annan which is a salmonid water.

Water Crossing EN1: Priestbutts Burn

10.4.63 The OHL will cross Priestbutts Burn at grid reference 324854, 584749, approximately 1.2km east of Pearsby Hall. This watercourse rises on the western slopes of Burnt Hill and flows in a southwesterly direction for approximately 2km before joining the Water of Milk.

10.4.64 This burn is unclassified with regards to its ecological potential. Given that it is a tributary of the Water of Milk, this burn is considered to have a High sensitivity to change for the purposes of this assessment.

10.4.65 Pole locations will be accessed via the existing access track via Milton House and Pearsby Hall or by tracking overland from the new Ewe Hill substation.

Water Crossing EN2: Water of Milk

10.4.66 The OHL will cross the Water of Milk at grid reference 323457, 585832, approximately 320m north of Craighousesteads Farm.

10.4.67 As previously discussed, the Water of Milk is classified by SEPA as Good in terms of ecological status and therefore is considered to have a High sensitivity to change for the purposes of this assessment.

10.4.68 Pole locations will be accessed via the existing access track to Craighousesteads Farm.

Water Crossing EN3: Booths Burn

10.4.69 The OHL will cross Booths Burn at grid reference 322959, 585930, approximately 600m northwest of Craighousesteads Farm. This watercourse rises in the western slopes of Hart Fell and flows through coniferous plantation woodland and open moorland for approximately 4.3km in a generally southerly direction before joining the Water of Milk.

10.4.70 This burn is unclassified with regards to its ecological potential. Given that it is a tributary of the Water of Milk, this burn is considered to have a High sensitivity to change for the purposes of this assessment.

10.4.71 Pole locations to the east of Booths Burn will be accessed via the existing access track to Upper Whitcastles. Access to pole locations to the west of the burn will be via an existing farm track which connects to Corrie Common.

Water Crossing EN4: Stiddriggs Burn

10.4.72 The OHL will cross Stiddriggs Burn at grid reference 322959, 585925, approximately 1.6km east of Corrie Common. This watercourse rises in the foothills of Whitcastles Hill and flows in a southerly direction through coniferous plantation woodland and open moorland for approximately 4km before joining the Water of Milk.

10.4.73 This burn is unclassified with regards to its ecological potential. Given that it is a tributary of the Water of Milk, this burn is considered to have a High sensitivity to change for the purposes of this assessment.

10.4.74 Pole locations to the east of Stiddriggs Burn will be accessed via the existing access road to Whitcastles. Access to pole locations to the west of the burn will be via an existing forestry tracks within the recently felled section of plantation woodland east of Corrie Common.

Water Crossing EN5: Corrie Water

10.4.75 The OHL will cross Corrie Water at grid reference 319006, 586761 approximately 350m south of Little Whitriggs. This watercourse rises in the foothills of Whitcastles Hill and flows in a southerly direction through coniferous plantation woodland and open moorland for approximately 4km before joining the Water of Milk.

10.4.76 As previously discussed, the Corrie Water is classified by SEPA as Good in terms of ecological status and therefore is considered to have a High sensitivity to change for the purposes of this assessment.

10.4.77 Pole locations to the east of the burn will be accessed by tracking across the arable fields from Little Whitriggs. Access to pole locations to the west of the burn will be from the main road.

Groundwater

10.4.78 Groundwater along the length of the proposed OHL is described as being associated with the Annandale bedrock and localised sand and gravel aquifers. SEPA has classified the status of this groundwater, including both it's quality and quantity, as Good, and therefore meets the requirements of the WFD. This groundwater body is considered to have a High sensitivity to change for the purposes of this assessment.

10.4.79 There will be minimal disturbance to groundwaters associated with the erection of wood poles. Therefore, impacts on groundwater associated with construction of the OHL have not been considered further in this assessment.

Private Water Supplies (PWS)

10.4.80 D&GC's Environmental Health Department was consulted for information on PWS along the route of the OHL. Table 10.6 below provides a summary of the PWS records within 1km of the proposed construction works and the locations of these are illustrated on Figure 10.5:

Table 10.6 PWS between Ewe Hill substation and Newfield substation

Figure Reference	Name	Coordinates	Supply Type
EN_D&GC_PWS_1	Crossdykes Farm, Cottage and Bungalow, Lockerbie	323663, 586563	Spring

10.4.81 As part of the Agriculture and Sporting Activities baseline survey, a structured interview was held with the landowners and tenants of the affected farms to ascertain baseline information, which included use of PWS. The following farms confirmed that it had a PWS:

- EN_AGSURV_PWS_1: Craighousesteads Farm;
- EN_AGSURV_PWS_2: Little Whitriggs Farm (Spring); and
- EN_AGSURV_PWS_3: Cumstone Farm (Spring).

10.4.82 All of the above represent the receptors for water from PWS, however no information has been made available regarding the location of the source of water nor the means of conveyance to the receptor.

10.4.83 As water supply is considered to be a fundamental human right, the sensitivity of these PWS is considered to be High for the purposes of this assessment.

Flooding

10.4.84 A review of SEPA's Indicative River & Coastal Flood Map indicates that the banks of the Water of Milk, Booths Burn and Corrie Water are at risk from flooding. These are considered likely to represent events that are localised in their geographical extent and given that wood poles will be

set back at least 10m from the edges of watercourses, they are not considered likely to increase the risk of flood events occurring. Therefore flooding has not been considered further in this assessment.

10.5 ASSESSMENT OF SIGNIFICANT EFFECTS, MITIGATION AND RESIDUAL EFFECTS

Gretna-Ewe Hill

Pollution Impact from Silt-laden Runoff

10.5.1 Surface runoff containing silt, particularly during and after rainfall events, has the potential to enter the watercourses in the vicinity of works. Silt laden surface water runoff is predicted to arise from excavations, exposed ground and any temporary stockpiles. This has the potential to temporarily impact on the water quality and hydrological and ecological function of the receiving watercourse at and downstream of the works.

10.5.2 The magnitude of change, prior to mitigation, is Medium. Therefore, there is likely to be a direct, temporary, short-term effect of **Major** adverse significance prior to the implementation of mitigation measures on all watercourses identified as having a High sensitivity to change and Moderate adverse significance on watercourses identified as having Moderate sensitivity.

Mitigation Measures: Pollution Impact from Silt-laden Runoff

10.5.3 With specific reference to the SEPA 'Guidelines for Water Pollution Prevention from Civil Engineering Contracts' and 'Special Requirements', the contractor will produce a Environmental Management Plan (EMP) which contains a construction method statement that includes:

- A detailed breakdown of the phasing of construction activities;
- A pollution risk assessment of the site and the proposed activities;
- Identification of all Controlled Waters that may be affected by the works and temporary discharge points to these watercourses;
- Planning and design of appropriate pollution control measures during earthworks and construction;
- Management of the pollution control system, including dewatering of excavations away from watercourses;
- Contingency planning and emergency procedures; and
- On-going monitoring of construction procedures to ensure management of risk is maintained.

10.5.4 All earth moving works or similar operations will be carried out in accordance with BSI Code of Practice for Earth Works BS6031:1981.

10.5.5 While it is acknowledged that best practice to minimise run-off would be to undertake construction and dismantling during the driest period of the year, given the location of the proposed scheme in southern Dumfries and Galloway, there are likely to be significant periods of rainfall throughout the year. Therefore, construction staff will ensure that all excavations within 10m of watercourses are excavated away from the watercourse and backfilled immediately following placement or removal of wood poles and any dewatering will be pumped away from watercourses to allow filtration to the ground.

10.5.6 All temporary stockpiles associated with excavations for wood poles will be located a minimum of 10m from the edge of watercourses. All excavations will be backfilled as soon as practicable.

10.5.7 Where topography dictates that working platforms are needed, these will be formed to allow surface water to drain away from watercourses.

Residual Effects: Pollution Impact from Silt-laden Runoff

10.5.8 Following the application of the proposed mitigation measures, there would be a direct, temporary, short-term **Minor** adverse residual effect on water quality from construction activities. No residual operation effects are predicted.

Pollution Impact from Chemical Contaminated Runoff

10.5.9 Pollutants such as oils or fuel may be mobilised through mechanical leaks or spillage and carried in surface drainage. Unless managed appropriately, the pollutants could be washed into the watercourses, impacting on freshwater quality and ecological value.

10.5.10 The magnitude of change, prior to mitigation, is Medium. Therefore, there is potential for a direct, temporary, medium-term effect of **Major** adverse significance prior to the implementation of mitigation measures on all watercourses identified as having a High sensitivity to change and Moderate adverse significance on watercourses identified as having Moderate sensitivity.

Mitigation Measures: Pollution Impact from Chemical Contaminated Runoff

10.5.11 All fuel and other chemicals will be stored in accordance with best practice procedures, including in a designated fuelling site located at a safe distance from existing watercourses and in appropriate impermeable bunded containers/areas which will be defined within the EMP. These will be designed to capture any leakage, whether from a tank or from associated equipment such as filling and off-take points, sighting gauges etc, all of which will be located within the bund;

10.5.12 Oil booms and soakage pads will be maintained in site compounds and spill kits kept in all vehicles to enable a rapid and effective response to any accidental spillage or discharge. All construction staff will be trained in the effective use of this equipment;

10.5.13 Construction vehicles and plant will be regularly maintained and all maintenance, fuelling and vehicle washing will be undertaken on appropriate impermeable surfaces away from watercourses in order to minimise risks of leaks to soil and surface waters.

Residual Effects: Pollution Impact from Chemical Contaminated Runoff

10.5.14 Following the application of the proposed mitigation measures, **No** residual construction or operational effects are predicted.

Impact from Soil Compaction

10.5.15 Soil compaction can occur as a result of construction of permanent roads and by movement of construction vehicles and plant. Soil compaction can cause a reduction in water permeating to the ground, resulting in increased potentially contaminated surface runoff. Reduced permeability in soils also reduces the sites flood storage capacity which may result in localised flooding incidents.

10.5.16 The magnitude of change, prior to mitigation, is Low. Therefore, there is likely to be a direct, temporary, medium-term effect of **Moderate** adverse significance prior to the implementation of mitigation measures on all watercourses identified as having a High sensitivity to change and Minor adverse significance on watercourses identified as having Moderate sensitivity.

Mitigation Measures: Impact from Soil Compaction

10.5.17 No permanent access tracks will be constructed to provide access to the wood pole locations.

10.5.18 A permanent access road will be constructed, connecting the Ewe Hill substation to the B7068, to the east of Grange of Tundergarth, as shown on Figure 10.1. This will require the installation of culverts to allow the bridging of three small watercourses, following discussion with

SEPA. It will also be designed to allow the free drainage of surface waters either below or above the track.

10.5.19 All construction vehicles will, where practicable, be fitted with low ground pressure tracks and will be tracked to pole locations keeping as great a distance as practicable from watercourses.

10.5.20 Construction traffic will use the same haul routes and parking areas as specified within the EMP at all times, where practicable, to reduce compaction and associated run-off in the wider area.

10.5.21 Areas of soft or boggy ground or of significant depths of peat will be avoided where practicable.

Residual Effects: Impact from Soil Compaction

10.5.22 Following the application of the proposed mitigation measures, there would be a direct, temporary, short-term **Minor** adverse residual effect on water quality from construction activities. No residual operation effects are predicted.

Impact on Integrity of Banking

10.5.23 Vertical vehicular pressure on or close to the sides of watercourses can detrimentally affect the structural integrity of the burn banks, either through direct damage to bankside material or indirect loosening of soil structure thus impacting on the localised morphology and water quality of the watercourse through erosion or even collapse of the banking.

10.5.24 The sensitivity of the structure and morphology of the watercourses along the route of the OHL is considered to be moderate and the magnitude of change, prior to mitigation, is medium. Therefore, there is potential for a direct, permanent, medium-term effect of **Moderate** adverse significance prior to the implementation of mitigation measures.

Mitigation Measures: Impact on Integrity of Banking

10.5.25 Construction vehicles and construction working areas will, where practicable, maintain a minimum stand-off distance of 10m from the edge of watercourses. At those pole locations within 10m of the edge of watercourses, construction vehicles will be positioned on the far side of the excavation from the watercourse to minimise the risk of affecting the integrity of the bank.

10.5.26 Where level sections of watercourses need to be crossed occasionally by construction vehicles, they will be crossed by placing bog mats across the watercourse to avoid any damage being caused to the bank or bed in line with General Binding Rule (GBR) 6.

10.5.27 Repeated crossings of watercourses for erection of the wood poles will be avoided where practicable. Where plant or vehicles have to make repeated crossings of a watercourse, a temporary haul road bridge or flumed / culverted crossing will be erected, in line with GBR 6 and following consultation with SEPA.

10.5.28 Should any drainage ditches become damaged or blocked as a result of construction vehicles crossing them, these will be repaired or cleared by construction staff immediately.

Residual Effects

10.5.29 Following the application of the proposed mitigation measures, there would be a direct, permanent, medium-term effect of **Minor** adverse significance.

Direct discharge of untreated foul drainage

10.5.30 Unless appropriately sited and managed, there is potential for direct discharge of untreated foul sewage from welfare facilities from site compounds during construction and within the new Ewe Hill substation during operation to watercourses or water bodies.

10.5.31 The magnitude of change, prior to mitigation, is medium. Therefore, there is likely to be a direct, temporary, medium-term effect of **Major** adverse significance prior to the implementation of mitigation measures on all watercourses identified as having a High sensitivity to change (including the Dalbate Burn during operation of the substation) and Moderate adverse significance respectively on watercourses identified as having Moderate sensitivity.

Mitigation Measures: Direct discharge of untreated foul drainage

10.5.32 Welfare facilities will either connect directly to the foul sewer or to a septic tank, subject to approval from Scottish Water and SEPA.

10.5.33 If septic tanks are to be used, these will be maintained and emptied on a regular basis by a suitably licensed contractor.

Residual Effects: Direct discharge of untreated foul drainage

10.5.34 Following the application of the proposed mitigation measures, **No** residual construction or operational effects are predicted.

Damage to Private Water Supplies

10.5.35 A number of PWS have been identified in the vicinity of the proposed OHL which may become damaged during construction. This could potentially lead to contamination or severance of the water supply.

10.5.36 The magnitude of change, prior to mitigation, is high. Therefore, there is potential for a direct, temporary, medium-term effect of **Major** adverse significance prior to the implementation of mitigation measures.

Mitigation Measures: Damage to Private Water Supplies

10.5.37 Prior to any construction works being undertaken, the Principal Contractor (PC) will meet with each PWS users to identify the source, means of conveyance (pipe etc) and location of all receptors of the water supply (human, farm, livestock field etc).

10.5.38 The PC will then identify all construction activities to take place in or near the source, catchment and means of conveyance of the PWS.

10.5.39 The PC will then prepare a Risk Assessment to identify any potential effects that could occur to the PWS. If risks are identified, the PC will take tap water samples to identify baseline drinking water quality and water pressure and put in place mitigation measures such as fencing, cut-off ditches etc following agreement with the PWS users to ensure that the PWS is protected throughout the construction works.

10.5.40 Should damage occur to the PWS as a result of the construction works (to be verified through comparison with tap water quality and pressure baseline conditions), the PC will either repair this damage immediately to the satisfaction of the PWS users or, if the supply cannot be repaired, provide an alternative water supply following agreement with the PWS users.

10.5.41 During any repairs to the PWS, the PC will provide an alternative water supply that is satisfactory to the PWS users.

Residual Effects: Damage to Private Water Supplies

10.5.42 Following the application of the proposed mitigation measures, **No** residual construction or operational effects are predicted.

Ewe Hill-Newfield

Pollution Impact from Silt-laden Runoff

10.5.43 Surface runoff containing silt, particularly during and after rainfall events, has the potential to enter the watercourses in the vicinity of works. Silt laden surface water runoff is predicted to

arise from excavations, exposed ground and any temporary stockpiles. This has the potential to temporarily impact on the water quality and hydrological and ecological function of the receiving watercourse at and downstream of the works.

10.5.44 The magnitude of change, prior to mitigation, is medium. Therefore, there is potential for a direct, temporary, short-term effect of **Major** adverse significance prior to the implementation of mitigation measures.

Mitigation Measures: Pollution Impact from Silt-laden Runoff

10.5.45 With specific reference to the SEPA 'Guidelines for Water Pollution Prevention from Civil Engineering Contracts' and 'Special Requirements', the contractor will produce a Environmental Management Plan (EMP) which contains a construction method statement that includes:

- A detailed breakdown of the phasing of construction activities;
- A pollution risk assessment of the site and the proposed activities;
- Identification of all Controlled Waters that may be affected by the works and temporary discharge points to these watercourses;
- Planning and design of appropriate pollution control measures during earthworks and construction;
- Management of the pollution control system, including dewatering of excavations away from watercourses;
- Contingency planning and emergency procedures; and
- On-going monitoring of construction procedures to ensure management of risk is maintained.

10.5.46 All earth moving works or similar operations will be carried out in accordance with BSI Code of Practice for Earth Works BS6031:1981.

10.5.47 While it is acknowledged that best practice to minimise run-off would be to undertake construction and dismantling during the driest period of the year, given the location of the proposed scheme in southern Dumfries and Galloway, there are likely to be significant periods of rainfall throughout the year. Therefore, construction staff will ensure that all excavations within 10m of watercourses are excavated away from the watercourse and backfilled immediately following placement or removal of wood poles and any dewatering will be pumped away from watercourses to allow filtration to the ground.

10.5.48 All temporary stockpiles associated with excavations for wood poles will be located a minimum of 10m from the edge of watercourses. All excavations will be backfilled as soon as practicable.

10.5.49 Where topography dictates that working platforms are needed, these will be formed to allow surface water to drain away from watercourses.

Residual Effects: Pollution Impact from Silt-laden Runoff

10.5.50 Following the application of the proposed mitigation measures, there would be a direct, temporary, short-term **Minor** adverse residual effect on water quality from construction activities. No residual operation effects are predicted.

Pollution Impact from Chemical Contaminated Runoff

10.5.51 Pollutants such as oils or fuel may be mobilised through mechanical leaks or spillage and carried in surface drainage. Unless managed appropriately, the pollutants could be washed into the watercourses, impacting on freshwater quality and ecological value.

10.5.52 The magnitude of change, prior to mitigation, is medium. Therefore, there is potential for a direct, temporary, medium-term effect of **Major** adverse significance prior to the implementation of mitigation measures.

Mitigation Measures: Pollution Impact from Chemical Contaminated Runoff

10.5.53 All fuel and other chemicals will be stored in accordance with best practice procedures, including in a designated fuelling site located at a safe distance from existing watercourses and in appropriate impermeable bunded containers/areas which will be defined within the EMP. These will be designed to capture any leakage, whether from a tank or from associated equipment such as filling and off-take points, sighting gauges etc, all of which will be located within the bund;

10.5.54 Oil booms and soakage pads will be maintained in site compounds and spill kits kept in all vehicles to enable a rapid and effective response to any accidental spillage or discharge. All construction staff will be trained in the effective use of this equipment;

10.5.55 Construction vehicles and plant will be regularly maintained and all maintenance, fuelling and vehicle washing will be undertaken on appropriate impermeable surfaces away from watercourses in order to minimise risks of leaks to soil and surface waters.

Residual Effects: Pollution Impact from Chemical Contaminated Runoff

10.5.56 Following the application of the proposed mitigation measures, **No** residual construction or operational effects are predicted.

Impact from Soil Compaction

10.5.57 Soil compaction can occur as a result of construction of permanent roads and by movement of construction vehicles and plant. Soil compaction can cause a reduction in water permeating to the ground, resulting in increased potentially contaminated surface runoff. Reduced permeability in soils also reduces the sites flood storage capacity which may result in localised flooding incidents.

10.5.58 The magnitude of change, prior to mitigation, is low. Therefore, there is potential for a direct, temporary, medium-term effect of **Moderate** adverse significance prior to the implementation of mitigation measures.

Mitigation Measures: Impact from Soil Compaction

10.5.59 No permanent access tracks will be constructed to provide access to the wood pole locations.

10.5.60 All construction vehicles will, where practicable, be fitted with low ground pressure tracks and will be tracked to pole locations keeping as great a distance as practicable from watercourses.

10.5.61 Construction traffic will use the same haul routes and parking areas as specified within the EMP at all times, where practicable, to reduce compaction and associated run-off in the wider area.

10.5.62 Areas of soft or boggy ground or of significant depths of peat will be avoided where practicable.

Residual Effects: Impact from Soil Compaction

10.5.63 Following the application of the proposed mitigation measures, there would be a direct, temporary, short-term **Minor** adverse residual effect on water quality from construction activities. No residual operation effects are predicted.

Impact on Integrity of Banking

10.5.64 Vertical vehicular pressure on or close to the sides of watercourses can detrimentally affect the structural integrity of the burn banks, either through direct damage to bankside material

or indirect loosening of soil structure thus impacting on the localised morphology and water quality of the watercourse through erosion or even collapse of the banking.

10.5.65 The sensitivity of the structure and morphology of the watercourses along the route of the OHL is considered to be moderate and the magnitude of change, prior to mitigation, is medium. Therefore, there is potential for a direct, permanent, medium-term effect of Moderate adverse significance prior to the implementation of mitigation measures.

Mitigation Measures: Impact on Integrity of Banking

10.5.66 Construction vehicles and construction working areas will, where practicable, maintain a minimum stand-off distance of 10m from the edge of watercourses. At those pole locations within 10m of the edge of watercourses, construction vehicles will be positioned on the far side of the excavation from the watercourse to minimise the risk of affecting the integrity of the bank.

10.5.67 Where level sections of watercourses need to be crossed occasionally by construction vehicles, they will be crossed by placing bog mats across the watercourse to avoid any damage being caused to the bank or bed in line with General Binding Rule (GBR) 6.

10.5.68 Repeated crossings of watercourses for erection of the wood poles will be avoided where practicable. Where plant or vehicles have to make repeated crossings of a watercourse, a temporary haul road bridge or flumed / culverted crossing will be erected, in line with GBR 6 and following consultation with SEPA.

10.5.69 Should any drainage ditches become damaged or blocked as a result of construction vehicles crossing them, these will be repaired or cleared by construction staff immediately.

Residual Effects

10.5.70 Following the application of the proposed mitigation measures, there would be a direct, permanent, medium-term effect of **Minor** adverse significance.

Direct discharge of untreated foul drainage

10.5.71 Unless appropriately sited and managed, there is potential for direct discharge of untreated foul sewage from temporary welfare facilities at site compounds during construction.

10.5.72 The magnitude of change, prior to mitigation, is medium. Therefore, there is potential for a direct, temporary, medium-term effect of Major adverse significance prior to the implementation of mitigation measures.

Mitigation Measures: Direct discharge of untreated foul drainage

10.5.73 Welfare facilities at compounds will either drain to a portable septic tank or connect directly to the foul sewer.

10.5.74 If portable septic tanks are to be used, these will be maintained and removed from site on a regular basis by a suitably licensed supplier/contractor.

Residual Effects: Direct discharge of untreated foul drainage

10.5.75 Following the application of the proposed mitigation measures, No residual construction or operational effects are predicted.

Damage to Private Water Supplies

10.5.76 A number of PWS have been identified in the vicinity of the proposed OHL which may become damaged during construction. This could potentially lead to contamination or severance of the water supply.

10.5.77 The magnitude of change, prior to mitigation, is high. There is potential for a direct, temporary, medium-term effect of **Major** adverse significance prior to the implementation of mitigation measures.

Mitigation Measures: Damage to Private Water Supplies

10.5.78 Prior to any construction works being undertaken, the Principal Contractor (PC) will meet with each PWS users to identify the source, means of conveyance (pipe etc) and location of all receptors of the water supply (human, farm, livestock field etc).

10.5.79 The PC will then identify all construction activities to take place in or near the source, catchment and means of conveyance of the PWS.

10.5.80 The PC will then prepare a Risk Assessment to identify any potential impacts that could occur to the PWS. If risks are identified, the PC will take tap water samples to identify baseline drinking water quality and water pressure and put in place mitigation measures such as fencing, cut-off ditches etc following agreement with the PWS users to ensure that the PWS is protected throughout the construction works.

10.5.81 Should damage occur to the PWS as a result of the construction works (to be verified through comparison with tap water quality and pressure baseline conditions), the PC will either repair this damage immediately to the satisfaction of the PWS users or, if the supply cannot be repaired, provide an alternative water supply following agreement with the PWS users.

10.5.82 During any repairs to the PWS, the PC will provide an alternative water supply that is satisfactory to the PWS users.

Residual Effects: Damage to Private Water Supplies

10.5.83 Following the application of the proposed mitigation measures, **No** residual construction or operational effects are predicted.

Monitoring and Follow Up

10.5.84 Mitigation measures will be monitored by an Environmental Manager appointed by SPT and an Ecological Clerk of Works.

10.6 LIMITATIONS AND ASSUMPTIONS

10.6.1 The baseline and impact assessments were carried out primarily by means of consultations and desk-based studies. No primary data collection or analysis has been undertaken to inform this assessment.

10.7 SUMMARY

10.7.1 The proposed OHLs cross numerous small, unnamed watercourses, as well as larger watercourses including the Kirtle Water, the Water of Milk and the Corrie Water. Several Private Water Supplies have also been identified in the vicinity of the OHLs.

10.7.2 Where practicable, wood poles will be positioned at least 10m from the banks of the watercourses identified on the 1:50,000 plans. Therefore, it is considered unlikely for there to be any significant impacts associated with the operational phase of the OHLs.

10.7.3 Potential construction effects have been considered for construction of the OHLs, underground cables, the proposed Ewe Hill substation and the associated permanent access road, including pollution of watercourses resulting in adverse effects on water quality and loss of soil integrity resulting in changes to drainage patterns and effects on the integrity of watercourse banks. Adverse effects on water quality and quantity of Private Water Supplies have also been considered.

10.7.4 A number of mitigations measures have been committed to which will be drawn together into a Environmental Management Plan. These mitigation measures are considered to be robust

and implementable and will reduce the magnitude of impacts on watercourses to minor. Therefore, the significance of residual effects on watercourses, following the implementation of these mitigation measures, is considered to be Minor or Negligible and therefore not significant

Table 10.7: Summary of Effects Table for Hydrology: Study Area 1: Gretna – Ewe Hill

Description of Likely Significant Effects	Significance of Effects					Summary of Mitigation / Enhancement Measures	Significance of Residual Effects					Relevant Policy	Relevant Legislation
	Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		
Construction													
Pollution Impact from Silt-laden Runoff	Local	Major Negative	T	D	ST	▪ Production of EMP detailing best practice in pollution control.	Local	Minor Negative	T	D	ST	Scottish Planning Policy	Water Environment and Water Services (Scotland) Act 2003; Controlled Activities Regulations, 2005.
Pollution Impact from Chemical Contaminated Runoff	Local	Major Negative	T	D	MT	▪ Production of EMP detailing best practice in chemical and fuel storage, pollution control and emergency procedures.	Local	None	-	-	-	Scottish Planning Policy	Water Environment and Water Services (Scotland) Act 2003; Controlled Activities Regulations, 2005.
Impact from Soil Compaction	Local	Moderate Negative	T	D	MT	▪ Appropriate drainage design for permanent access road. ▪ Use of low pressure track and maintain	Local	Minor Negative	T	D	ST	Scottish Planning Policy	Environmental Protection Act, 1990; Water Environment and Water Services (Scotland) Act 2003; Controlled Activities Regulations, 2005.

Description of Likely Significant Effects	Significance of Effects					Summary of Mitigation / Enhancement Measures	Significance of Residual Effects					Relevant Policy	Relevant Legislation
	Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		
Construction													
						distance from watercourse. ■ Use of haul routes.							
Impact on integrity of banking	Local	Moderate Negative	P	D	MT	■ Maintain 10m working distance from bank, where practicable. ■ Use bog mats for temporary watercourse crossings. ■ Maintain and repair drainage ditches.	Local	Minor Negative.	P	D	ST	Scottish Planning Policy	Water Environment and Water Services (Scotland) Act 2003; Controlled Activities Regulations, 2005.
Direct discharge of untreated foul drainage	Local	Major Negative	T	D	MT	■ Welfare facilities connected directly to the foul sewer or septic tank. ■ Septic tanks to	Local	None	-	-	-	Scottish Planning Policy	Water Environment and Water Services (Scotland) Act 2003; Controlled Activities Regulations, 2005.

Description of Likely Significant Effects	Significance of Effects					Summary of Mitigation / Enhancement Measures	Significance of Residual Effects					Relevant Policy	Relevant Legislation
	Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		
Construction													
						be maintained and emptied on a regular basis.							
Damage to Private Water Supplies	Local	Major Negative	T	D	MT	■ Principal Contractor to prepare PWS Risk Assessment to identify appropriate management measures. ■ Management measures to be agreed with PWS user. ■ Any damage to PWS will be repaired by the contractor or an alternative supply provided.	Local	None	-	-	-	Scottish Planning Policy	Private Water Supply (Scotland) Regulations, 2006; Water Environment and Water Services (Scotland) Act 2003; Controlled Activities Regulations, 2005.

Table 10.8: Summary of Effects Table for Hydrology: Study Area 2: Ewe Hill to Newfield

Description of Likely Significant Effects	Significance of Effects					Summary of Mitigation / Enhancement Measures	Significance of Residual Effects					Relevant Policy	Relevant Legislation
	Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		
Construction													
Pollution Impact from Silt-laden Runoff	Local	Major Negative	T	D	ST	■ Production of EMP detailing best practice in pollution control.	Local	Minor Negative	T	D	ST	Scottish Planning Policy	Water Environment and Water Services (Scotland) Act 2003; Controlled Activities Regulations, 2005.
Pollution Impact from Chemical Contaminated Runoff	Local	Major Negative	T	D	MT	■ Production of EMP detailing best practice in chemical and fuel storage, pollution control and emergency procedures.	Local	None	-	-	-	Scottish Planning Policy	Water Environment and Water Services (Scotland) Act 2003; Controlled Activities Regulations, 2005.
Impact from Soil Compaction	Local	Moderate Negative	T	D	MT	■ Appropriate drainage design for permanent access road. ■ Use of low pressure track and maintain distance from	Local	Minor Negative	T	D	ST	Scottish Planning Policy	Environmental Protection Act, 1990; Water Environment and Water Services (Scotland) Act 2003; Controlled Activities Regulations, 2005.

Description of Likely Significant Effects	Significance of Effects					Summary of Mitigation / Enhancement Measures	Significance of Residual Effects					Relevant Policy	Relevant Legislation
	Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		
Construction													
						watercourse. ■ Use of haul routes.							
Impact on integrity of banking	Local	Moderate Negative	P	D	MT	■ Maintain 10m working distance from bank, where practicable. ■ Use bog mats for temporary watercourse crossings. ■ Maintain and repair drainage ditches.	Local	Minor Negative.	P	D	ST	Scottish Planning Policy	Water Environment and Water Services (Scotland) Act 2003; Controlled Activities Regulations, 2005.
Direct discharge of untreated foul drainage	Local	Major Negative	T	D	MT	■ Welfare facilities connected directly to the foul sewer or septic tank. ■ Septic tanks to be maintained	Local	None	-	-	-	Scottish Planning Policy	Water Environment and Water Services (Scotland) Act 2003; Controlled Activities Regulations, 2005.

Description of Likely Significant Effects	Significance of Effects					Summary of Mitigation / Enhancement Measures	Significance of Residual Effects					Relevant Policy	Relevant Legislation
	Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		
Construction													
						and emptied on a regular basis.							
Damage to Private Water Supplies	Local	Major Negative	T	D	MT	■ Principal Contractor to prepare PWS Risk Assessment to identify appropriate management measures. ■ Management measures to be agreed with PWS user. ■ Any damage to PWS will be repaired by the contractor or an alternative supply provided.	Local	None	-	-	-	Scottish Planning Policy	Private Water Supply (Scotland) Regulations, 2006; Water Environment and Water Services (Scotland) Act 2003; Controlled Activities Regulations, 2005.

Key to table:

P/T = Permanent or Temporary, D/I = Direct or Indirect, ST/MT/LT = Short Term, Medium Term or Long Term

N/A = Not Applicable

11 Agriculture and Sporting Interests

11.1 INTRODUCTION

11.1.1 This chapter considers the effects of the proposed project on agriculture and sporting interests as a result of the proposed scheme, as described in Chapter 3. For the purposes of this assessment, agriculture is considered to be the practice of cultivating the land and rearing stock to produce food products. Sporting interests include shooting and stalking activities over agricultural land, forestry as well as water and fishing activities upon lochs, reservoirs, rivers, burns, canals and ponds.

11.1.2 The approach to this assessment has been developed in accordance with the agreed methodology for the project overall, taking into account consultation responses received.

11.1.3 The agricultural activities in the study area potentially affected by the proposed scheme are diverse. The capability of land to support different types of agricultural systems, from intensive arable cropping to more extensive pasture based systems, is determined by a range of physical factors such as relief and topography, climate (rainfall and growing season) and soil characteristics. Land is classed by the Macaulay Land Use Research Institute (MLURI) according to its land capability, reflecting the above conditions, and which is further discussed in Section 11.4.

11.1.4 In addition to their main farming activities, farmers are developing, particularly in more recent years, complementary activities to generate more diverse income streams for the farming business. These include novel crop and livestock systems, provision of tourist accommodation, leisure and recreation pursuits (including equestrian activity), value-added products and contracting (labour and machinery).

11.1.5 The agricultural and land use assessment within this chapter:

- describes the agriculture and sporting activity in the route corridor;
- outlines the potential effects on agriculture and sporting activities during construction and operation of the proposed scheme;
- describes mitigation measures; and
- identifies residual effects as well as potential aggregate residual effects.

11.1.6 The detailed assessment of effects on forestry, as a result of the proposed project, is set out in Chapter 12 of this ES.

11.2 LEGISLATION, POLICY AND GUIDANCE

Legislative Framework

11.2.1 No applicable legislative framework with respect to assessing the impact on agricultural and sporting interests is currently available.

Planning Policy

11.2.2 The Scottish Planning Policy, as published in February 2010 by the Scottish Government, states that 'Development on prime agricultural land should not be permitted unless it is an essential component of the settlement strategy or is necessary to meet an established need'. Planning documents with some reference to development on rural land include:

- PAN 72 Housing in the Countryside; and

- PAN 73 Rural Diversification.

Guidance

11.2.3 No specific Guidance on assessing the effects of the proposed scheme on agricultural and sporting interests is currently available; however, the Land Capability Classification for Agriculture, issued by the Macaulay Land Use Research Institute, has been utilised within this assessment.

11.3 ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

Key Issues for Consideration in the EIA

11.3.1 The overall approach to the assessment of the effects of the proposed scheme on agriculture and sporting interests has considered the following, broadly related effects:

- loss of land permanently due to the construction of the proposed substations, transmission poles and associated stays, any permanent access tracks and associated features;
- temporary disruption and disturbance to cultivation and land management patterns, sporting activity and in some cases temporary or permanent change in land use;
- temporary access restrictions with changes in routes to and from fields;
- temporary disruption to existing drainage schemes and provision of water to farm buildings and fields;
- temporary and in some instances permanent loss of, or gaps in, shelterbelts and covers, hedges, dykes and other boundary features; and
- temporary and in some cases permanent disruption to commitments under existing or future environmental agreements.

11.3.2 The method of assessment of effects on agricultural and sporting interests has involved the following:

- characterisation of the baseline agricultural and sporting land use and determination of the sensitivity, based on literature review and consultations;
- review of specific aspects of the project, including the type of infrastructure to be installed, methods of construction, and operational effects (including maintenance and repair of faults), leading to the prediction and classification of impacts from each key stage of the project; and
- evaluation of the significance of the predicted effects, taking account of the magnitude of the effect (both before and after mitigation) and the sensitivity of the baseline environment.

Extent of Study Area

11.3.3 The study area comprises of all farming land areas crossed by the proposed scheme.

Consultation

11.3.4 Farm visits were conducted by SPT Wayleaves Officers in order to undertake consultation with affected farmers.

Method of Baseline Data Collection

11.3.5 A baseline survey was undertaken to assess the likely effects of the scheme on agriculture and sporting activities. A structured interview was held with the landowners and tenants of the affected farms to ascertain the following baseline information:

- extent of property holdings and form of land ownership;

- land use, crop and livestock enterprises;
- environmental agreements;
- sporting interests;
- labour and machinery resources;
- other business enterprises; and
- drainage and water supplies.

11.3.6 The questionnaire used in the survey can be found at Appendix 11.1

11.3.7 The results of these interviews were supplemented by an assessment of the Land Capability for Agriculture. Macaulay Land Capability for Agriculture data was used to identify the land class along the proposed route. This classification system gives an indication of the capability of the land to grow certain types of crops and grass. The full classification descriptions can be found in Appendix 11.2. 1:250,000 scale maps were available for the entire proposed route, with 1:50,000 scale maps are available for southern part of the route. The 1:250,000 scale maps may be interpreted to within 100ha. Maps at a scale of 1:50,000 have been used where available and allow identification of land class to within 10ha. The Land Classification information has been used in combination with visual assessments and other resources such as aerial photographs to provide an indication of the land capability along the proposed route. A full land capability assessment was not undertaken (this involves an invasive assessment of topsoil depth, soil texture, soil colour, wetness and stone content as well as a gradient assessment). It is recognised that the land capability data used has its limitations but this is considered sufficient for the purposes of this assessment.

Significance Criteria

11.3.8 To assess the overall significance of the potential effects of the proposed scheme on agricultural and sporting interests, an objective assessment involving sensitivity to impact and magnitude of effects has been adopted. This provided an assessment framework and ensured overall consistency of reporting.

11.3.9 The assessment of the sensitivity of agriculture and sporting interests is based on categories and criteria that have been applied to the sensitivity of the baseline agriculture and sporting land use. Table 11.1 sets out the guidance criteria for sensitivity.

Table 11.1 Guidance Criteria for Sensitivity

Sensitivity	Characteristics of Receptor
High	Intensive arable cropping and/or intensive livestock systems (e.g. dairying). Prime land quality (Class 1, Class 2 or Class 3_1). Land farmed according to organic standards. Driven shoots.
Moderate	Mixed livestock and crop systems of moderate intensity. Moderate land quality (Class 3_2 or 4). Land farmed conventionally. Stalking. Loch and river fishing.
Low	Extensive livestock system. Low land quality (Class 5, Class 6 and Class 7). Land farmed conventionally. Rough shooting.

Assessment of magnitude

11.3.10 The assessment of magnitude considers the extent to which the project would change the baseline environment. Table 11.2 sets out the guideline criteria for impact magnitude.

Table 11.2 Guidance Criteria for Impact Magnitude

Magnitude of Effect	Description of Effect (one or more criteria)
High	A permanent restriction on the choice or level of land operations and/or requiring major management adjustments affecting a substantial part (>5%) of the holding. A temporary restriction on the choice or level of land operations requiring major management adjustments. Potential for high degree of change in permanent or seasonal employment.
Medium	A temporary restriction on the choice or level of land operations and/or requiring major management adjustments affecting a large part of the holding, or a permanent restriction on a small part (<5%) of the holding. Potential for moderate degree of change in permanent or seasonal employment.
Low	A temporary restriction on the choice or level of land operations and/or requiring small management adjustments. Potential for low degree of change in permanent or seasonal employment.
Negligible	Negligible change to any of the above factors.

Assessment of significance

11.3.11 Significance is assessed through a consideration of the combination of the sensitivity of the receptor with the magnitude of change. Both moderate and major effects are considered to be significant, for the purpose of this EIA. Significant effects are assessed both before and after mitigation measures are implemented, with residual effects (post-mitigation) reported separately.

11.3.12 Table 11.3 sets out the guideline criteria for the significance of effects based on the combination of sensitivity and magnitude. Assessment of significance is based on the professional judgement of the assessor, as the evaluation of effects is subject to particular location-specific characteristics that require to be considered as part of the overall assessment.

Table 11.3 Guidance Criteria for Significance of Effects

Magnitude	Sensitivity		
	High	Medium	Low
High	Major	Moderate/Major	Moderate
Medium	Moderate/Major	Moderate	Minor
Low	Minor/Moderate	Minor	None
Negligible	Minor	None	None

11.3.13 Guideline criteria for the various categories of effect described below:

Major effect: where the proposed scheme will have a significant effect on agricultural/sporting land use. Major effects would result in the significant loss of high value agricultural/sporting land and/or disruption of current farming and sporting practice.

Moderate effect: where the proposed scheme will have a noticeable effect on agricultural/sporting land use. Moderate effects would result in some loss of prime and non-prime land and some disruption of current farming and sporting practice.

Minor effect: where the proposed scheme will have a small but detectable effect on agricultural/sporting land use. Minor effects would result in a small loss of non-prime land and minimal disruption of current farming and sporting practice.

None: where no significant effect is expected as a result of the the proposed scheme. This applies where only small areas of non-prime land are lost on a temporary basis.

11.4 BASELINE CONDITIONS (INCLUDING FUTURE BASELINE WITHOUT DEVELOPMENT)

11.4.1 The proposed route of the OHL extends to approximately 24.4km, of which 23.7 km passes through agricultural and sporting land. Agricultural and sporting interests along the proposed route are diverse. Land managers have adopted a range of agricultural systems dictated by physical factors such as relief and topography, climate (rainfall and growing season) and soil characteristics. These characteristics combine to give a range of possible agricultural systems from intensive arable cropping to much more extensive pasture based systems.

11.4.2 In addition to agricultural activity, land managers have developed diversification activities to generate more diverse income streams for the farming business. These include novel crop and livestock systems, provision of tourist accommodation, leisure and recreation pursuits, value-added products and contracting (labour and machinery).

11.4.3 The characteristics of agricultural and sporting land use along the proposed route of the OHLs are outlined in the following sections.

Gretna Substation to Ewe Hill Substation

General description

11.4.4 This section of the proposed route extends to approximately 15.5 km, of which some 12.7km is on land interests undertaking agricultural and sporting interests. The route passes through 17 land interests, 15 of which undertake agricultural and sporting activity. All of the tenants/landowners of these areas have been surveyed with the total land area for the farms extending to 2853.4ha.

11.4.5 The topography of the land through which the proposed route extends is described in Chapter 6 (Landscape and Visual).

Land Capability

11.4.6 Figure 11.1 shows the land capability on this section of the proposed route. At the start of the proposed route, between Gretna Substation and Tympanheck, the land capability ranges from Class 3 (capable of producing a moderate range of crops) to 4 (capable of producing a narrow range of crops). The land capability falls after this point, ranging from Class 4 (capable of producing a narrow range of crops) to Class 5 (land capable for use as improved grassland) between Tympanheck and Berclees. From Berclees to the proposed Ewe Hill substation, the majority of the land is classified as either Class 5 (land capable for use as improved grassland) or Class 6 (land capable of use only as rough grazings).

11.4.7 The length of land traversed by the proposed scheme by land capability is shown below (Table 11.4).

Table 11.4 Land Capability Gretna Substation to Ewehill Substation

Classification	Length of OHL (km)	% of overall route
Class 3_1	0.25	2%
Class 3_2	0.67	4%
Class 4	5.42	35%
Class 5	5.47	35%
Class 6	0.93	6%
Sub total	12.74	82%
Other (non-agricultural/forestry etc.)	2.71	18%
Total	15.45	100%

Scope of Agricultural Activity

11.4.8 Farm and estate type is summarised in Appendix 11.3. Agricultural activity is undertaken on 16 of the land units with all units being utilised for grazing and silage production. Six of the units are also used for cereal crop production. The majority of the stock grazed on the farms includes summer sheep, winter sheep and suckler cows. Other stock includes winter finishing cattle and dairy cows. Machinery including combine harvesters, silage harvesters, tractors and sprayers are utilised by the farms along the proposed route.

11.4.9 A number of the agricultural land interests have existing environmental agreements including:

- Crowdieknowe Farm: part of an Environmentally Sensitive Area (ESA); and
- Conhess Farm: part of the Countryside Premium Scheme (CPS).

Scope of Sporting Activity

11.4.10 Rough shooting is undertaken at five of the agricultural land interests; no land interest is used exclusively for sporting purposes. Winterhope Farm is also used for driven shooting. The majority of the areas where the proposed route crosses through are used for grazing and silage production and do not infringe on sporting use areas.

Ewe Hill Substation to Newfield Substation

General description

11.4.11 This section of the proposed route extends to approximately 8.8 km, of which some 8.5km is on land interests undertaking agricultural and sporting activities. The route passes through 9 land interests, 7 of which undertake agricultural and sporting activity. All of the tenants/landowners of these areas have been surveyed with the total land area for the farms extending to 2031.7ha.

11.4.12 The topography of the land through which the proposed route extends is described in Chapter 6 (Landscape and Visual).

Land Capability

11.4.13 Figure 11.2 shows the land capability on this section of the proposed route. The majority of the land along the proposed route is classified as Class 5 (land capable for use as improved grassland) with the exception of the area surrounding Cumstone Farm which is Class 4(capable of producing a narrow range of crops).

11.4.14 The length of land traversed by the proposed OHL by land capability is shown in Table 11.5.

Table 11.5: Land capability Ewe Hill Substation to Newfield Substation

Classification	Length of OHL (km)	% of overall route
Class 3_1	0	0%
Class 3_2	0	0%
Class 4	0.39	4%
Class 5	7.92	89%
Class 6	0	0%
Sub total	8.31	93%
Other (non-agricultural/forestry etc.)	0.60	7%
Total	8.91	100%

Scope of Agricultural Activity

11.4.15 Farm and estate type is summarised in Appendix 11.3. Agricultural activity is undertaken on seven of the land units with the majority of units being utilised for grazing and silage production. Whitcastles Farm and Cumstone Farm also use a small proportion of their land area for cereals production, with Whitcastles Farm also growing turnips. The majority of the stock grazed on the farms include sheep and suckler cows. Other stock includes beef cattle. Machinery including combine harvesters, silage harvesters and tractors are utilised by the farms along the proposed route.

11.4.16 A number of the agricultural land interests have existing environmental agreements/designations including:

- Whitehill Farm: under a Land Management Contract (LMC); and
- Whitcastles Farm and Cumstone Farm: part of the Rural Stewardship Scheme (RSS).

11.4.17 During farm surveys, Pearsby Hall Farm, Capelfoot Farm and Craighousesteads Farm indicated that they were close to or within a Site of Specific Scientific Interest (SSSI); however, SNH online maps do not indicate a SSSI in this area.

Scope of Sporting Activity

11.4.18 Rough shooting is undertaken at five of the land interests; no land interest is used exclusively for sporting purposes. Whitcastles Farm is also used for deer stalking. The majority of the areas where the proposed route crosses through are used for grazing and silage production and do not infringe on sporting use areas.

Future Baseline (without development)

11.4.19 It is likely that without the proposed scheme, the baseline conditions will not change significantly from the present time.

11.5 ASSESSMENT OF EFFECTS, MITIGATION AND RESIDUAL EFFECTS.

Gretna Substation to Ewe Hill Substation

Impact on Agricultural Activities

11.5.1 The route of the OHL passes through extensive farmland which predominantly supports silage production and animal grazing. The route also crosses through a small number of fields which are currently utilised for cereals production.

11.5.2 Construction and on-going operation and maintenance of the proposed scheme will, to varying degrees, affect the operation of agricultural enterprises.

11.5.3 During construction, the proposed scheme will result in the temporary disruption of agricultural activities through the:

- Disturbance of general farming operations by the construction corridor
- Change in normal access arrangements and movement of stock, vehicles and machinery about the farm holdings;
- Disturbance to agricultural soils, field drainage, building and livestock watering points and boundary features; and
- Loss of revenue and additional costs arising from disturbance.

11.5.4 Following construction and during the operational phase, access to agricultural land will be lost in the footprint of the transmission line poles and associated stays. Land would also be lost where access tracks are necessary; however, details of access tracks were unknown at the time of this report. The estimated overall disturbance area for each farm area is described in Table 11.6. The physical and on-going presence of the OHL and associated poles may disrupt field management patterns, particularly in an arable situation. In addition, operations such as irrigation are compromised in the immediate vicinity of the OHL.

11.5.5 The transmission pole heights vary from 15m to 17m; therefore, it is not anticipated that there will be access restrictions with regards to farm machinery as a result of the OHL.

Table 11.6 Accessible Agricultural Land Lost (Gretna Substation to Ewe Hill Substation)

Agricultural Area	Agricultural Land Lost						
	Prime land*			Non-prime land**			% of farm area lost
	Length of OHL (m)	No. of poles	Area lost to agricultural land (m^2)	Length of OHL (m)	No. of poles	Area lost to agricultural land (m^2)	
Aldermanseat Farm	0	0	0	0	1	185	0.02%
Staffler Farm	0	0	0	665	7	70	0.01%
Greenwrae Farm	0	0	0	1034	11	260	0.02%
Cadgillfoot Farm	254	3	80	573	6	110	0.03%
Tympanheck Farm	0	0	0	1054	12	260	0.03%
Cadgillhead Farm (Solwaybank Estates)	0	0	0	2058	25	650	0.02%
Berclees Farm	0	0	0	923	11	160	<0.01%
Highstenries Farm	0	0	0	781	10	230	0.02%

Agricultural Area	Agricultural Land Lost						
	Prime land*			Non-prime land**			% of farm area lost
	Length of OHL (m)	No. of poles	Area lost to agricultural land (m^2)	Length of OHL (m)	No. of poles	Area lost to agricultural land (m^2)	
Allfornought Farm (Solwaybank Estates)	0	0	0	822	9	140	<0.01%
Chapelhill Farm	0	0	0	620	10	240	0.02%
Conhess Farm	0	0	0	179	2	100	0.01%
Setthoms Farm	0	0	0	513	6	60	<0.01%
Crowdieknowe Farm	0	0	0	682	8	160	0.01%
Winterhope Farm	0	0	0	1694	20	550	0.01%
Crawthat Farm	0	0	0	889	11[+]	335[++]	0.02%

* LCA Class 1-3_1
** LCA Class 3_2-6
[+] Substation also present
++ not including substation footprint as unknown at the time of this report.

11.5.6 The baseline data collected during the survey was used to give an individual sensitivity assessment for each land interest affected by the proposed construction of the OHL. The sensitivity assessment for each land interest with respect to agriculture can be found in Appendix 11.4.

11.5.7 The significance the impact on agricultural activities for each affected farm, prior to mitigation, has been determined in accordance with the methodology outlined in Section 3 and ranges from **Minor** to **Moderate/Major** significance during construction and **Moderate** to **Moderate/Major** significance during the operational phase. The outcome of the assessment for each agricultural land interest is detailed in Appendix 11.4.

Mitigation of Impact on Agricultural Activities

11.5.8 The mitigation proposals relating to agriculture and sporting are based on the premise of:

- Prevent: routeing to prevent effects
- Reduction: provision of measures to minimise effect
- Offset: provision of works or compensation, including provision of measures to improve agricultural activity
- Enhancement: provision of measures to improve agricultural activity.

11.5.9 The permanent loss to agriculture will be reduced by micro-siting of wood poles, planning of access routes and careful development of the cable routes, access tracks and the substation in consultation with the land interest. Access for the land interests to their agricultural land will be provided at all times during the construction process and post construction. Damage to the agricultural capability of soils would be avoided by adoption of procedures relating to soil stripping, handling and storage during construction. Existing field drainage systems would be reinstated where encountered to ensure that land capability is maintained and flooding issues would not be worsened. Financial compensation would be provided for the loss of any area of land that would be lost to agriculture, according to the SPT wayleave agreement. Detailed mitigation measures to prevent, reduce and where possible offset effects on agriculture are listed in Appendix11.5. Details of specific mitigation measures to be employed on a farm-by-farm basis are detailed in Appendix 11.4.

Residual Effects of Impact on Agricultural Land

11.5.10 Following the application of the proposed mitigation measures, there would be a significance of **None** to **Minor** adverse residual impact on farm areas during the construction phase of the proposed scheme. The residual effects remaining post mitigation during the construction phase are temporary and mainly relate to access restrictions.

11.5.11 The residual impacts on agriculture during the operational phase of the proposed scheme range from **Minor** to **Minor/Moderate** adverse significance. The residual effects following mitigation relate to the permanent loss of land to agriculture as a result of the footprint of wood poles and related stays. Residual effects relating to individual farm units following construction are detailed in Table 11.7.

Table 11.7 Residual Effect By Farm (Gretna Substation to Ewe Hill Substation)

Agricultural area	Residual Significance	Residual Effects
Aldermanseat Farm	Minor	185m^2 of non-prime agricultural land in silage and grazing areas lost as a result of transmission poles footprint and associated stays.
Staffler Farm	Minor	70 m^2 of non-prime agricultural land in croping and grazing areas lost as a result of transmission poles footprint and associated stays.
Greenwrae Farm	Minor/Moderate	260 m^2 of non-prime agricultural land in silage and grazing areas lost as a result of transmission poles footprint and associated stays.
Cadgillfoot Farm	Minor/Moderate	190 m^2 of non-prime and prime agricultural land in silage and grazing areas lost as a result of transmission poles footprint and associated stays.
Tympanheck Farm	Minor	260 m^2 of non-prime agricultural land in silage and grazing areas lost as a result of transmission poles footprint and associated stays.
Cadgillhead Farm (Solwaybank Estates)	Minor	650 m^2 of non-prime agricultural land in silage and grazing areas lost as a result of transmission poles footprint and associated stays.
Berclees Farm	Minor	160 m^2 of non-prime agricultural land in silage and grazing areas lost as a result of transmission poles footprint and associated stays.
Highstenries Farm	Minor	230 m^2 of non-prime agricultural land in silage and grazing areas lost as a result of transmission poles footprint and associated stays.
Allfornought Farm (Solwaybank Estates)	Minor	140 m^2 of non-prime agricultural land in grazing areas lost as a result of transmission poles footprint and associated stays.
Chapelhill Farm	Minor	240 m^2 of non-prime agricultural land in silage and grazing areas lost as a result of transmission poles footprint and associated stays.
Conhess Farm	Minor	100 m^2 of non-prime agricultural land in silage ,grazing and cereals areas lost as a result of transmission poles footprint and associated stays.
Setthoms Farm	Minor	60 m^2 of non-prime agricultural land in grazing areas lost as a result of transmission poles footprint and associated stays.
Crowdieknowe Farm	Minor	160 m^2 of non-prime agricultural land in grazing areas lost as a result of transmission poles footprint and associated stays.
Winterhope Farm	Minor	550 m^2 of non-prime agricultural land in silage and grazing areas lost as a result of transmission poles footprint and associated stays.
Crawthat Farm	Minor	335 m^2 of non-prime agricultural land in silage and grazing areas lost as a result of transmission poles footprint and associated stays.

Impact on Sporting Activities

11.5.12 Four of the farms along the proposed route undertake rough shooting activities, with one farm carrying out driven shooting. Sporting activity may be affected temporarily during construction and operation of the proposed scheme. In addition, sporting activity such as shooting may be more permanently compromised in the immediate vicinity of the proposed scheme.

Mitigation of Impact on Sporting Activities

11.5.13 The effect on sporting activities will be mitigated during construction by ensuring land owners are consulted with regards to the construction programme and that access routes are maintained. The permanent loss to agriculture will be reduced by micro-siting of wood poles, planning of access routes and careful development of the proposed scheme in consultation with the land interest.

11.5.14 Detailed mitigation measures to prevent, reduce and where possible offset effects on sporting activities are listed in Appendix 11.5. Details of specific mitigation measures to be employed on a farm-by-farm basis are detailed in Appendix 11.4.

Residual Effects of Impact on Sporting Areas

11.5.15 With the exception of Winterhope Farm, all residual impacts following mitigation during the construction and operation phases have been determine to be of **None** significance and therefore not significant. The significance of the residual impact at Winterhope Farm has been assessed as **Minor** adverse significance, mainly due to the sensitivity of the driven shooting activity undertaken on this farm. The residual effects remaining following mitigation include temporary limited access during construction and the restriction to shooting activities in the near vicinity of the OHLs during the operational phase.

Ewe Hill Substation to Newfield Substation

Impact on Agricultural Activities

11.5.16 This section of the route passes through extensive farmland which predominantly supports silage production and animal grazing. The route also crosses through a small number of fields which are currently utilised for cereals and turnip production.

11.5.17 Construction and on-going operation and maintenance of the proposed scheme will, to varying degrees, affect the operation of agricultural enterprises.

11.5.18 During construction, the proposed scheme will result in the temporary disruption of agricultural activities through the:

- Disturbance of general farming operations by the construction corridor
- Change in normal access arrangements and movement of stock, vehicles and machinery about the farm holdings;
- Disturbance to agricultural soils, field drainage, building and livestock watering points and boundary features; and
- Loss of revenue and additional costs arising from disturbance.

11.5.19 Following construction and during the operational phase, access to agricultural land will be lost in the footprint of the wood poles and associated stays. Land would also be lost where access tracks are necessary although no permanent access tracks are proposed along this section of the proposed scheme. The estimated overall disturbance area for each farm area is described in Table 11.8. The physical and on-going presence of the OHL and associated poles may disrupt field management patterns, particularly in an arable situation. In addition, operations such as irrigation are compromised in the immediate vicinity of the OHL.

11.5.20 The transmission pole heights vary from 11.5m to 14m; therefore, it is not anticipated that there will be access restrictions with regards to farm machinery as a result of the OHL.

Table 11.8 Accessible Agricultural Land Lost (Ewe Hill Substation to Newhill Substation)

Agricultural Area	Agricultural Land Lost						
	Prime land*			Non-prime land**			% of farm area lost
	Length of OHL (m)	No. of poles	Area lost to agricultural land (m^2)	Length of OHL (m)	No. of poles	Area lost to agricultural land (m^2)	
Crawthat Farm	0	0	0	68	1[+]	185	0.01%
Pearsby Hall Farm	0	0	0	1966	26	730	0.02%
Craighousesteads Farm	0	0	0	775	9	270	0.04%
Whitecastles Farm (Castle Milk & Corrie Estates)	0	0	0	1410	14	460	<0.01%
Whitehill Farm	0	0	0	923	12	170	0.03%
Little Whiteriggs Farm	0	0	0	1745	23	400	0.03%
Cumstone Farm	0	0	0	1426	18[+]	625[++]	0.05%

* LCA Class 1-3_1
** LCA Class 3_2-6
[+] Substation also present
[++] not including substation footprint as unknown at the time of this report.

11.5.21 The baseline data collected during the survey was used to give an individual sensitivity assessment for each land interest affected by the proposed construction of the scheme. The sensitivity assessment for each land interest with respect to agriculture can be found in Appendix 11.4.

11.5.22 The significance the impact on agricultural activities for each affected farm, prior to mitigation, has been determined in accordance with the methodology outlined in Section 11.3 and ranges from **Moderate** significance during construction to **Moderate** significance during the operational phase. The outcome of the assessment for each agricultural land interest is detailed in Appendix 11.4.

Mitigation of Impact on Agricultural Activities

11.5.23 The mitigation proposals relating to agriculture and sporting are based on the premise of:

- Prevent: routeing to prevent effects
- Reduction: provision of measures to minimise effect
- Offset: provision of works or compensation, including provision of measures to improve agricultural activity
- Enhancement: provision of measures to improve agricultural activity.

11.5.24 The permanent loss to agriculture will be reduced by micro-siting of wood poles, planning of access routes and careful development of the proposed scheme in consultation with the land interest. Access for the land interests to their agricultural land will be provided at all times during the construction process and post construction. Damage to the agricultural capability of soils would be avoided by adoption of procedures relating to soil stripping, handling and storage during construction. Existing field drainage systems would be reinstated where encountered to ensure that land capability is maintained and flooding issues would not be worsened. Financial compensation would be provided for the loss of any area of land that would be lost to agriculture, according to the SPT wayleave agreement. Detailed mitigation measures to prevent, reduce and

where possible offset effects on agriculture are listed in Appendix 11.5. Details of specific mitigation measures to be employed on a farm-by-farm basis are detailed in Appendix 11.4.

Residual Effects of Impact on Agricultural Land

11.5.25 Following the application of the proposed mitigation measures, there would be a **Minor** adverse residual impact on farm areas during the construction phase of the proposed scheme. The residual effects remaining post mitigation during the construction phase are temporary and mainly relate to access restrictions.

11.5.26 The residual impacts on agriculture during the operational phase of the proposed scheme are of **Minor** adverse significance. The residual effects following mitigation relate to the permanent loss of land to agriculture as a result of the footprint of wood poles and related stays. Residual effects relating to individual farm units following construction are detailed in Table 11.9.

Table 11.9: Residual Effect by Farm (Ewe Hill Substation to Newfield Substation)

Agricultural area	Residual Significance	Residual Effects
Crawthat Farm	Minor	185m^2 of agricultural land in silage and grazing areas lost as a result of transmission poles footprint and associated stays.
Pearsby Hall Farm	Minor	730 m^2 of agricultural land in silage and grazing areas lost as a result of transmission poles footprint and associated stays.
Craighousesteads Farm	Minor	270 m^2 of agricultural land in grazing areas lost as a result of transmission poles footprint and associated stays.
Whitecastles Farm (Castle Milk & Corrie Estates)	Minor	460m^2 of agricultural land in silage, rape, turnip and grazing areas lost as a result of transmission poles footprint and associated stays.
Whitehill Farm	Minor	170 m^2 of agricultural land in hay and grazing areas lost as a result of transmission poles footprint and associated stays.
Little Whiteriggs Farm	Minor	400 m^2 of agricultural land in silage and grazing areas lost as a result of transmission poles footprint and associated stays.
Cumstone Farm	Minor	625 m^2 of agricultural land in grazing and silage areas lost as a result of transmission poles footprint and associated stays.

Impact on Sporting Activities

11.5.27 Five of the farms along the proposed route undertake rough shooting activities, with one farm carrying out deer stalking. Sporting activity may be affected temporarily during construction and operation of the proposed scheme. In addition, sporting activity such as shooting may be more permanently compromised in the immediate vicinity of the proposed scheme.

Mitigation of Impact on Sporting Activities

11.5.28 The impact on sporting activities will be mitigated during construction by ensuring land owners are consulted with regards to the construction programme and that access routes area maintained. The permanent loss to agriculture will be reduced by micro-siting of wood poles, planning of access routes and careful development of the proposed scheme in consultation with the land interest.

11.5.29 Detailed mitigation measures to prevent, reduce and where possible offset effects on sporting activities are listed in Appendix 11.5. Details of specific mitigation measures to be employed on a farm-by-farm basis are detailed in Appendix 11.4.

Residual Effects of Impact on Sporting Areas

11.5.30 All residual impacts following mitigation during the construction and operation phases have been determine to be of **None** significance. The residual effects remaining following mitigation include temporary short-term limited access during construction and the restriction to shooting activities in the near vicinity of the proposed scheme during the operational phase.

11.6 MONITORING AND FOLLOW UP

11.6.1 The agreed mitigation measures relating to agriculture and sporting activity as described within this ES are to be incorporated into the Environmental Management Plan. Monitoring of the implementation of mitigation measures during construction is to be undertaken by the Site Clerk of Works/Wayleaves Officer to ensure compliance. No further monitoring is currently proposed for the operational phase.

11.7 LIMITATIONS AND ASSUMPTIONS

11.7.1 The baseline information presented in this chapter is based on data available at the time of assessment.

11.7.2 Information on agricultural land capability is based on MLURI Land Capability for Agriculture data. For the purposes of this assessment, 1:250000 and 1:50000 scale maps were utilised. The 1:250,000 scale maps may be interpreted to within 100ha and the 1:50,000 may be interpreted within 10ha. As a result, the interpretation of land classification along the proposed route can only be accurately undertaken to within these areas. As a detailed soils survey has not been undertaken along the proposed route to date, the accuracy of the MLURIO data cannot be confirmed.

11.7.3 Absolute and percentage loss of agricultural land has been estimated using current understanding of farm boundaries, as determined during farm surveys, proposed route alignment drawings and wood pole design. Changes made to the project prior to the final design, such as route realignment and heavy duty wood pole specification alterations, may affect alter the impact assessment.

11.7.4 The assessment as reported in this chapter is considered to provide a sufficiently robust basis for assessment.

11.8 SUMMARY

11.8.1 The assessment of effects for the construction and operation of the proposed scheme has considered the effects of the scheme on each of the 24 agricultural and sporting land interests, as detailed in Appendix 11.4.

11.8.2 Mitigation has been developed to limit the effects during construction and operation of the proposed scheme as far as is practically possible. However, **Minor** adverse residual effects will remain on the land interests during the construction and operational phase, with the exception of Greenwrae and Cadgillfoot Farms (assessed as High sensitivity) where **Minor/Moderate** adverse residual effects remain following construction. The construction effects will be temporary and will result in short-term access limitations to some areas of agricultural land. The operational effects will be permanent and relate to the loss of an estimated 0.7ha of accessible agricultural land over both OHL routes as a result of the footprint of the 255 wood poles and associated stays.

11.8.3 During construction, some temporary access limitations will still remain with regards to sporting interests following implementation of mitigation measures. During the operational phase,

following implementation of the mitigation proposals, the residual effects on sporting interests are considered **None** with the exception of Winterhope Farm where the residual effects are considered **Minor** adverse and therefore not significant.

Residual Effects of Impact on Agricultural Land

11.8.4 Following the application of the proposed mitigation measures, there would be a **Minor** adverse residual impact on farm areas during the construction phase of the proposed scheme. The residual effects remaining post mitigation during the construction phase are temporary and mainly relate to access restrictions.

11.8.5 The residual impacts on agriculture during the operational phase of the project are of **Minor** adverse significance. The residual effects following mitigation relate to the permanent loss of land to agriculture as a result of the footprint of wood poles and related stays.

Impact on Sporting Activities

11.8.6 Five of the farms along the proposed route undertake rough shooting activities, with one farm carrying out deer stalking. Sporting activity may be affected temporarily during construction and operation of the proposed scheme. In addition, sporting activity such as shooting may be more permanently compromised in the immediate vicinity of the proposed scheme.

Mitigation of Impact on Sporting Activities

11.8.7 The impact on sporting activities will be mitigated during construction by ensuring land owners are consulted with regards to the construction programme and that access routes area maintained. The permanent loss to agriculture will be reduced by micro-siting of wood poles, planning of access routes and careful development of access tracks in consultation with the land interest.

11.8.8 Detailed mitigation measures to prevent, reduce and where possible offset effects on sporting activities are listed in Appendix 11.5. Details of specific mitigation measures to be employed on a farm-by-farm basis are detailed in Appendix 11.4.

Residual Effects of Impact on Sporting Areas

11.8.9 All residual impacts following mitigation during the construction and operation phases have been determine to be of **None** significance. The residual effects remaining following mitigation include temporary short-term limited access during construction and the restriction to shooting activities in the near vicinity of the proposed scheme during the operational phase.

Table 11.10: Summary of Effects Table for Agriculture and Sporting Interests: Study Area 1: Gretna – Ewe Hill

Description of Likely Significant Effects	Significance of Effects					Summary of Mitigation / Enhancement Measures	Significance of Residual Effects					Relevant Policy	Relevant Legislation
	Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		
Construction													
Impact on agricultural activities	Local	Moderate /Major Negative	T	D	ST	■ Access to agricultural land will be provided at all times. ■ Careful planning of access routes in agreement with landowner. ■ Best practice procedures relating to soil stripping, handling and storage during construction. ■ Reinstatement of existing field drainage systems.	Local	Minor Negative	T	D	ST	Scottish Planning Policy	N/A
Impact on Sporting Interests	Local	Minor Negative	T	D	ST	■ Consult landowners on construction programme.	Local	None	-	-	-	Scottish Planning Policy	N/A.

Description of Likely Significant Effects	Significance of Effects					Summary of Mitigation / Enhancement Measures	Significance of Residual Effects					Relevant Policy	Relevant Legislation
	Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		
						▪ Maintain access routes.							
Operation													
Impact on agricultural activities	Local	Moderate /Major Negative	P	D	LT	▪ Micrositing of wood poles in agreement with landowner. ▪ Careful development of the cable routes, access tracks and the substation in consultation with the land interest. ▪ Financial compensation would be provided for the loss of any area of land that would be lost to agriculture, according to the SPT wayleave agreement.	Local	Minor/Moderate Negative	P	D	LT	Scottish Planning Policy	N/A

Table 11.11: Summary of Effects Table for Agriculture and Sporting Interests: Study Area 2: Ewe Hill to Newfield

Description of Likely Significant Effects	Significance of Effects					Summary of Mitigation / Enhancement Measures	Significance of Residual Effects					Relevant Policy	Relevant Legislation
	Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		
Construction													
Impact on agricultural activities	Local	Moderate Negative	T	D	ST	▪ Access to agricultural land will be provided at all times. ▪ Careful planning of access routes in agreement with landowner. ▪ Best practice procedures relating to soil stripping, handling and storage during construction. ▪ Reinstatement of existing field drainage systems.	Local	Minor Negative	T	D	ST	Scottish Planning Policy	N/A
Impact on Sporting Interests	Local	Minor Negative	T	D	ST	▪ Consult landowners on construction programme. ▪ Maintain access routes.	Local	None	-	-	-	Scottish Planning Policy	N/A

Description of Likely Significant Effects	Significance of Effects					Summary of Mitigation / Enhancement Measures	Significance of Residual Effects					Relevant Policy	Relevant Legislation
	Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		
Operation													
Impact on agricultural activities	Local	Moderate Negative	P	D	LT	▪ Micrositing of wood poles in agreement with landowner. ▪ Careful development of the cable routes, access tracks and the substation in consultation with the land interest. ▪ Financial compensation would be provided for the loss of any area of land that would be lost to agriculture, according to the SPT wayleave agreement.	Local	Minor Negative	P	D	LT	Scottish Planning Policy	N/A

Key to table:

P/T = Permanent or Temporary, D/I = Direct or Indirect, ST/MT/LT = Short Term, Medium Term or Long Term

N/A = Not Applicable

12 Forestry

12.1 INTRODUCTION

12.1.1 This chapter considers the effects on forestry and woodland areas as a result of construction and operation of the proposed scheme between Gretna substation and Ewe Hill substation and between Ewe Hill substation and Newfield substation.

12.1.2 The approach to this assessment has been developed in accordance with the agreed methodology for the overall project, taking into account responses received from the scoping exercise undertaken by SPT, and the outcome of specific consultations undertaken to inform the content of this chapter.

12.1.3 This chapter summarises the findings of the assessment of the likely effects on forestry relating predominantly to the felling of the required 'wayleave corridor' during construction, and the presence of the OHLs within forests and woodlands during operation. The detailed assessment, undertaken by RTS is found in Appendix 12.1. A summary of the likely effects of felling on the landscape resource and visual amenity are addressed separately in Chapter 6 and those of Ecology in Chapter 7. A glossary of terms is provided in Appendix 12.2.

12.1.4 Careful routeing of the OHLs has been undertaken to minimise the area of felling required whilst being mindful of the need to achieve:

- Edges to the felled areas that are not liable to be damaged by the wind;
- A layout which does not unduly compromise forestry activities;
- A corridor within the forest which respects best practice forest design; and
- Avoids areas of sensitive habitat.

12.1.5 The effects of the introduction of OHLs into woodland will be short term during construction, and long-term during operation. The following interrelated effects can arise from the introduction of OHLs within woodland areas associated principally with the requirement for tree felling and vegetation management:

Short-term effects resulting from the Construction phase:

- Restriction on woodland management;
- Windthrow of adjoining trees; and
- Loss of native or Ancient semi-natural woodland

Long-term effects during the Operation phase:

- Increase of Windthrow risk during Operation;
- Landscape and Visual effect on woodland;
- Effects on Ecology (flora & fauna);
- Effects on the Hydrology as a result of tree clearance;
- Effects with regard to the Management of Native and other non-commercial woodlands;
- Effects on Shelter;
- Effects on restriction for the development of new potential forest and woodland areas; and
- Effects on forest management systems.

12.1.6 Table 12.1 below outlines the sources of possible effects and their corresponding effects on forestry which have been assessed in full. Measures to reduce or mitigate likely effects are discussed later in this chapter.

Table 12.1: Source of Impact and Possible Effect on Forestry

SOURCE OF IMPACT	POSSIBLE EFFECT ON FORESTRY
Felling and Construction	
Felling of Trees for Wayleave	Risk of windthrow to retained trees.
	Loss of native or ancient semi-natural woodland
	Effect on forest management
Operation and Maintenance	
Retention and maintenance of the wayleave.	Effects on forest management
	Effects on shelter for agriculture
	Risk of windthrow during operation

12.1.7 On the basis of the strategic routeing work undertaken, the professional judgement of the EIA team, experience from other OHL projects, policy guidance or standards of relevance to this topic area, the following possible effects were scoped out:

- Effects on shelter for agriculture;
- Effects on forestry management during construction;
- Effects on native and semi -natural woodlands; and
- Loss of regional forest resource.

12.2 ASSESSMENT METHODOLOGY

Regulatory Context

12.2.1 In Scotland, the regulatory authority for tree felling is the Forestry Commission (Scotland), with powers under the Forestry Act (1987). The principle exception to this is where tree felling forms part of a development with Planning Consent. Consultees engaged in both processes include Forestry Commission Scotland, SNH, SEPA, Historic Scotland and others where relevant.

Overall Approach

12.2.2 As there are no published criteria, guidance or methodologies in relation to the assessment of effects on forestry, the assessment is necessarily based on professional judgement informed by available forestry plans (and supporting information), field work, local management experience and consultation. The assessment has however taken account of national policy, guidance and advice including Forestry Commission Guidance where applicable.

Assessment Structure

12.2.3 The assessment is structured around the consideration of the following possible effects:

- effects of loss of areas of forest;
- effects of loss of trees from windthrow;
- effects on forest management; and

- Impact on the Scottish Government's policy on deafforestation.

Consultation

12.2.4 In addition to seeking a formal Scoping Opinion, account has also been taken of information provided and requests arising from further consultation with the relevant forest landowners/managers/agents (where possible).

12.2.5 The key issues discussed during the consultation included:

- Current forest management proposals and where present forest design plans;
- The scheme proposals in combination with the associated wind farms;
- Routeing of the overhead lines;
- Potential windthrow areas; and
- Forest access issues.

Data Collection and Field Survey

12.2.6 A number of data sources were used to inform the assessment including Forest compartment records and stock maps, ordnance survey maps and available aerial photography. A full list of data sources is provided in the detailed assessment provided in Appendix 12.1.

12.2.7 Field surveys were undertaken between November 2006 and October 2010 to supplement and verify the desk based work and consultations and further inform the assessment. The surveys comprised walking through each affected wooded area through which the proposed OHLs pass. Forest characteristics including forest type and detailed descriptions of the area, age, species mix, stocking density, together with length of proposed connection passing through the forest were recorded. A general assessment of site conditions including altitude, exposure and soil type was undertaken to inform the prediction of the likely risk of windthrow to the trees outwith the wayleave corridor.

Assessing Significance

12.2.8 The approach to the assessment has been to:

- Establish the baseline conditions;
- Assess, for every potential effect, whether it is adverse or beneficial in nature;
- Identify mitigation for those effects which have potential either by themselves or in combination with other effects to have an adverse environmental effect; and
- Assess the residual effect taking agreed mitigation measures into account.

12.2.9 The effect on woodland of introducing a new OHL is normally considered to be of an adverse nature (tree felling). Beneficial effects in some areas may arise where the introduction of the proposed OHL allows for the removal of ecologically habitat-poor conifer plantation. This may be followed by natural regeneration or planting of more diverse woodland tree mix or introduction of native woodland species, and the development of more open ground than that which existed originally.

12.2.10 The effect of the proposed OHLs on the woodland derives from the combination of the extent of the physical change and the degree of that change to the character of the site and its surroundings, and the sensitivity of the site and its surroundings.

12.2.11 The first stage of the woodland assessment therefore consists of establishing the existing (baseline) environmental conditions. This involves supplementing the information collected at the route selection stage with more detailed information relating to the character, quality and sensitivity

to change of the woodland affected. The assessment of change in the woodland considers a number of criteria as follows:

Table 12.2 - Guideline criteria for assessing woodland effects

Criteria considered	Type of Criterion
The degree of change caused by the physical presence of the new line and associated structures (e.g. substations). Safety clearance zones, etc:	Woodland change
The degree of change resulting from alterations to, or removal of, existing woodland, required to accommodate the new line and associated structures. Felling to windfirm and landscape edges, etc:	Woodland change
The degree of change resulting from changes to patterns in the woodland arising from the above. Changes to the wider, long term forest landscape design felling coupes, etc:	Woodland change
The degree and rate of change in the woodland, both in the recent past and that anticipated in the near future:	Woodland sensitivity
The quality of the woodland and the extent to which it is rare or distinctive (ecologically, and in landscape and visual terms):	Woodland sensitivity
The value attributed to the woodland through designations:	Woodland sensitivity

12.2.12 Judging the extremes of the various woodland change criteria allows their magnitude to be categorised as follows:

- **Major:** a noticeable change to the woodland over a wide area or an intensive change over a limited area.
- **Moderate:** small changes to the woodland over a wide area or noticeable change over a limited area.
- **Minor:** very minor changes to the woodland over a wide area or minor changes over a limited area.
- **None:** no discernable change to the woodland

12.2.13 In a similar manner, judging the extremes of sensitivity of the woodlands for this assessment, and dividing the range covered, allows the categorisation of sensitivity in broad terms as:

1. Highly sensitive: areas of woodland that are:

- Highly valued, e.g. Ancient Woodland Category 1a;
- Particularly rare or distinctive; or
- Considered susceptible to small changes.

2. Moderately sensitive: areas of woodland that are:

- Valued more locally; and/or
- Are tolerant of moderate levels of change.

3. Slightly sensitive: areas of woodland that are:

- Generally more commonplace;
- Considered potentially tolerant of noticeable change; or

- Undergoing substantial development such that their character is one of change

4. Areas that are not sensitive:

- Already fundamentally changed (second rotation commercial conifer);
- considered potentially tolerant of noticeable change; or
- having undergone substantial development such that their character is one of change.

12.2.14 Details of woodland designations were studied and incorporated within the assessment of effects.

12.2.15 The effect is categorised, as set out in Table 12.3 below, on the basis of the professional judgment of skilled observers.

12.2.16 Table 12.3 indicates in general terms how thresholds for the effects can be derived by considering together the guideline criteria regarding the degree of change and the sensitivity of the woodland. It must be emphasised, however, that the assessments of magnitude and sensitivity, as well as the assessed effects, are all matters of professional judgment of skilled observers.

Table 12.3 - Guideline effect categories

Effect	Definition	Guideline Threshold
None	No detectable change to the environment	No discernible change to the woodland
Minor	A detectable but non-material change to the environment	Minor changes to a woodland considered tolerant of change
Moderate	A material but non-fundamental change to the environment	Noticeable change to a woodland tolerant of moderate levels of change
Major	A fundamental change to the environment	Noticeable change to a sensitive or nationally valued woodland, or intensive change to less sensitive or regionally valued woodland

12.2.17 The "environment" is taken to include the ecological, landscape and visual environment.

12.2.18 Detailed site notes were prepared and, following analysis, management prescriptions and mitigation measures were formulated for each woodland area, and these can be found in Appendix 12.1.

12.2.19 Assessments of effects were made, and proposals developed to mitigate their effects, including, amongst other things, windthrow, landscape, visual, ecology, hydrology, shelter and woodland management.

12.2.20 The risk of windthrow and the operational effects on forest management are inherently different; therefore distinct sensitivity criteria are required for each effect to inform the overall judgement of significance of effect.

12.2.21 The sensitivity of the existing woodland to windthrow effects as a result of the introduction of the OHLs has been determined, taking account:

- Tree species and age;
- Site location, altitude, aspect and exposure (to prevailing winds);
- Previous silvicultural management regimes, including thinning; and
- Soil type, ground preparation methods and drainage conditions.

12.2.22 The sensitivity of forestry management to the effects of the wayleave felling has been determined taking account:

- Forest productivity (in terms of, species and crop mixture);
- Accessibility in terms of ground conditions;
- Current management regime, including objectives of management, and size of management unit;
- Imposition of additional safety constraints in forest areas adjacent to the overhead line[1].

12.2.23 Sensitivity is categorised as high, moderate, slight or none. It should be noted that not all aspects considered within the example conditions are required concurrently to define the sensitivity level.

12.2.24 The magnitude relates to the extent of change to the forest management or to the area likely to be subjected to windthrow. Magnitude is categorised as major, moderate, minor or negligible.

12.2.25 The significance of the likely effect was determined through professional judgement informed by available data sources and consultation, considering both the sensitivity of the forestry blocks together with the magnitude of change.

12.2.26 Effects are categorised as major, moderate, minor or none/no effect. Effects assessed to be major or moderate are considered to be 'significant' in accordance with the EIA Regulations. Those assessed as minor or none are considered to be not significant in terms of the EIA regulations.

12.3 BASELINE

12.3.1 The study area comprises three distinct areas of commercial conifer forest and a small number of agricultural shelterbelts/hedgerows and riparian woodlands. In arriving at the proposed routing, care has been taken to minimise the impact on areas of ancient semi natural woodland and areas deemed high amenity woodland.

Gretna Substation to Ewe Hill Substation

12.3.2 To the south east of Cadgillhead farm the OHL passes through a narrow strip of riparian woodland associated with Ned's Beck over a distance of 70m, this area is designated as ASNW. It then passes over open ground adjacent to Cadgill Wood prior to passing through hedgerow trees next to the minor road at Cadgillhead Farm.The OHL then passes for a distance of 140m through mixed woodland with areas of young Sitka Spruce and mixed broadleaf trees. This area is designated as ASNW.The line then turns north to cut through a young conifer woodland area primarliy of Sitka Spruce aproximately 15 years old for a distance of 310m prior to exiting the woodland into open farmland.

12.3.3 The OHL enters the Conhess Forest from the south and passes through the western part of the forest for a distance of approximately 200m. It then passes over a forest road into Alderwell Forest and runs through this forest for a distance of 1080m.

12.3.4 Both forests are approximately 23 years old (P 1987) and are predominately commercial plantations of Sitka Spruce. Within Conhess and Alderwell forest the trees are all mid rotation conifers with the exception of a small area at the south which is mixed broadleaf scrub.

[1] This is as a result of imposed additional work to manage and in particular harvest trees in close proximity to a power line (as detailed in AFAG guideline 804)

Ewe Hill Substation to Newfield Sub station

12.3.5 The OHL, travelling north, enters an area of commercial conifer forest at Corrie Common owned by Castlemilk and Corrie Estates. The OHL passes through an area of mature conifer (mainly Sitka Spruce) for a distance of 475m. The OHL then continues for 935m over an area of forest felled within the past 4 -6years which has then been replanted .The OHL then passes over an area of agricultural land before re-entering the forest again, passing through a further area of recently restocked woodland for a distance of 161m.

12.3.6 Within the Castlemilk and Corrie Estate woods, a third of the OHL passes through mature conifer and two thirds through recent conifer and broadleaf restocked land.

Baseline Summary

Table 12.4 below provides a summary of the baseline forestry conditions between Gretna and Ewe Hill and between Ewe Hill and Newfield.

Table 12.4 - Baseline Summary

Location	Forest or woodland area	Length of Affected Woodland(m)	Length of AW designated woodland
Gretna - Ewehill	Neds Beck(Cadgillhead)	70	70
Gretna - Ewehill	Cadgillhead wood	140	140
Gretna-Ewe Hill	Alderwell	1083	0
Gretna-Ewe Hill	Conhess	200	0
Ewe Hill-Newfield	Farm north of Conhess	70	0
Ewe Hill-Newfield	Castlemilk and Corrie Estates	1571	0
TOTAL		3134	210

The Do Nothing Scenario

12.3.7 In the absence of the Gretna Ewe Hill and Ewe Hill Newfield OHLs, the forest areas would continue to be managed by the forest owners/managers through a programme of tree felling and replanting to achieve the objectives within their long-term forest plans.

Gretna Substation to Ewe Hill Substation

12.3.8 At Conhess and Alderwell forests, the tree felling would normally commence within the next 10-20 years to create a series of felling and restocking coups in the process of restructuring these forests, developing a more diverse age and species structure for the next forest crop rotation. At Cadgillhead commercial connifer areas the felling would comence in 20-30 years following a series of thinning operations.

Ewe Hill Substation to Newfield Sub station

12.3.9 At Castlemilk and Corries Estate, the current forest plans for the forestry within the study area with regards to tree felling have been carried out, and are being planned to continue in the next 5-10 years.

12.4 ASSESSMENT OF EFFECTS, MITIGATION AND RESIDUAL EFFECTS

Strategic Routeing Studies

12.4.1 Prior to commencement of the EIA, the strategic routeing studies outlined in Chapter 2 sought to prevent or reduce effects of the proposed scheme where possible. The rules applied to the routeing studies sought to avoid areas of forestry where possible, as outlined within the Holford Rules and The Forestry Commission guidance on routeing transmission lines. However, where other environmental, landscape or technical considerations also applied, it was deemed that no reasonable alternative to routeing through these areas of forest was available.

12.4.2 During the EIA process, possible effects on forestry can be avoided or reduced through micro-siting of poles and related infrastructure. Further reductions of effect can be achieved in some situations through proposing specific construction practices. These measures have been applied in this EIA to reduce effects on forestry.

Good Practice Measures

12.4.3 Good forest practice measures have been incorporated into the Environmental Management Proposals produced to reduce the effect of the OHLs on forestry, and include:

- adherence to Forestry Commission Guidelines e.g. to ensure protection and enhancement of the water environment; and
- Implementation of tree harvesting and extraction methods to ensure minimisation of soil disturbance and compaction.

GRETNA SUBSTATION TO EWE HILL SUBSTATION

Felling and Construction

12.4.4 The sensitivity of the forests and woodlands, being commercial forest accustomed to the effects of the commercial felling cycle, is considered **Slight**.

12.4.5 Where the line passes through areas of ASNW at Neds Beck and Cadgillhead farm some removal of areas of woodland designated as ASNW will be required. At Neds Beck this will be partially limited by overflying the woodland which is in a gulley. At Cadgillhead the area designated as ASNW is mainly planted with conifer species, all nonnative. This is therefore defined as plantation on an ancient woodland site (PAWS).

12.4.6 Overall, the effect before mitigation measures, is considered **Minor**.

Likely Effects – Windthrow outwith the 70m wayleave

12.4.7 The creation of the 70m wide corridor through mid rotation and mature conifer trees within the study area will result in the creation of a “brown edge” to the forest. The risk of windthrow in this situation following felling of the minimum operational line corridor was reviewed in consultation with the private landowners and /or their agents. Areas were identified where the forest was deemed to be at high risk of windthrow on the basis of exposure, tree height, soils and drainage systems. The predicted area of forest outwith the 70m wayleave which would be subject to windthrow as a direct result of the minimum felling within the 70m corridor has been estimated at approximately 55.67Ha in the Conhess and Alderwell forests. Within Cadgilhead forest area due to the younger age of the trees the felling will be limited to the actual required corridor width of 70m.At Cadgilhead forest the felling will be limited to the 70m wide corridor resulting in the requirement to fell 3.15Ha of predominately conifer plantation

12.4.8 The minimum felling requirement in mature and semi-mature trees within the 70m corridor is estimated at 9.98Ha in the Conhess and Alderwell forest plus 3.15Ha at Cadgilhead. The magnitude of the felling and construction effect on windthrow is deemed to be **Minor adverse**

and therefore not significant, due to the size of the forest units through which the proposed OHL is routed and the predicted boundaries of possible wind throw attributable to the project.

Proposed Mitigation Measures

12.4.9 In addition to the good routeing and good practice measures outlined previously, a number of mitigation measures will be implemented within the wayleave (i.e. land over which SPT have control) to reduce the effect of windthrow on forestry, including:

- Utilising existing clearings such as forest roads and rides and also watercourses for the felling boundaries; and
- Reviewing opportunities to positively manage any natural regeneration of low-growing shrub species along the edge of the wayleave that may occur.

12.4.10 Whilst SPT or it's Contractor will seek to employ further measures, such as extending the felling to a 'wind-firm' edge, this aspiration requires the agreement of the landowner, it cannot form 'committed mitigation' and therefore cannot be applied to mitigate the likely effects for this assessment.

12.4.11 With consent from landowners, felling outwith the wayleave corridor would extend to the nearest practical windfirm edge, applying Forest Landscape Design principles. These are: shape, scale, diversity, visual force, unity and 'spirit of the place': in creating a new boundary edge appreciation of these principles and their practical applications would be employed to effect visual improvements where visible by the public.

12.4.12 With regard to the forest landholding, mitigation measures as outlined above, whilst not 'committed' are considered likely.

Residual Effects

12.4.13 The measures likely to be most successful in mitigating windthrow effects are those relating to the implementation of works outside the wayleave corridor. However, as outlined, at this stage they do not form 'committed mitigation' and cannot be taken account of in assessing residual effect. Therefore the residual effect remains as **Minor adverse** and therefore not significant.

Likely Effects- Forestry Management

12.4.14 Current and future forestry management is likely to be affected by the introduction of the OHL and associated felling requirements. This is likely to require forest managers to amend current objectives, plans and techniques for the relevant forest, in particular, the incorporation of felling requirements into their long-term felling and landscape design plans.

12.4.15 The sensitivity of the forest is assessed taking into account the stage of development of the crop, and the topography of the forest site.

12.4.16 The magnitude of the operational effects on forest management are defined as minor having assessed the scale of the whole forest area, relative to the area of that forest where operations are likely to be affected. This assessment is based on a review of the size of forest unit affected by the route (and the relatively small area where there is likely to be a direct operational effect on forest management from the presence of the overhead line).

12.4.17 On the basis that the effects on the forest are considered to be **Minor adverse**, the effect is not significant.

Proposed Mitigation Measures

12.4.18 In addition to the good forestry practice measures outlined previously, a number of further measures are proposed to mitigate the effect on forestry management including:

- Retaining new and upgraded access tracks for landowner use (where requested, and subject to separate planning consent);
- Creating new temporary access tracks where the presence of the new OHL would result in difficulties in accessing forest areas isolated by the overhead line. Isolation can be as a result topography, the presence of a watercourse, or the lack of brash for timber extraction following the removal of trees within the wayleave;
- Provision of forwarder access from new and upgraded roads into adjacent forest blocks;
- Erection of 'goal-posts' to show maximum safe working height for forestry traffic;
- Creating alternative timber transfer areas, where the route precludes the use of existing facilities;
- Management of natural regeneration within the wayleave to assist managers in their objectives to increase woodland diversity;
- wildlife corridor management; and
- Monitoring and removal of windblown trees.

Residual Effects

12.4.19 Whilst the mitigation measures will be of benefit to future forest management, they do not alter the predicted significance of effect. The residual operational effect on forest management therefore remains as **Minor adverse** and not significant.

EWE HILL SUBSTATION TO NEWFIELD SUBSTATION

Felling and Construction

12.4.20 The sensitivity of the forests and woodlands, being commercial forest accustomed to the effects of the commercial felling cycle, is considered slight.

12.4.21 Overall, the effect prior to mitigation is considered **Minor adverse** and therefore not significant.

Likely Effects – Windthrow outwith the 70m wayleave

12.4.22 The creation of the 70m wide corridor through mid rotation and mature conifer trees within the study area will result in the creation of a "brown edge" to the forest. The risk of windthrow in this situation following felling of the minimum operational line corridor was reviewed in consultation with the private landowners and /or their agents. Areas were identified where the forest was deemed to be at high risk of windthrow on the basis of exposure, tree height, soils and drainage systems. The predicted area of forest outwith the 70m wayleave which would be subject to windthrow as a direct result of the minimum felling within the 70m corridor has been estimated at approximately 15.23Ha in the Castlemilk and Corrie Estate.

12.4.23 The minimum felling requirement in mature and semi-mature trees within the 70m corridor is estimated at 3.86Ha in Castlemilk and Corrie Estate. A further 4.93Ha of young restocked woodland at Castlemilk and Corrie Estate will also require to be cleared within the 70m wayleave. The magnitude of the felling and construction effect on windthrow is deemed to be minor due to the size of the forest units through which the proposed OHL is routed and the predicted boundaries of possible wind throw attributable to the project.

Proposed Mitigation Measures

12.4.24 In addition to the good routeing and good practice measures outlined previously, a number of mitigation measures will be implemented within the wayleave (i.e. land over which SPT have control) to reduce the effect of windthrow on forestry, including:

- Utilising existing clearings such as forest roads and rides and also watercourses for the felling boundaries; and
- Reviewing opportunities to positively manage any natural regeneration of low-growing shrub species along the edge of the wayleave that may occur.

12.4.25 Whilst SPT will seek to employ further measures, such as extending the felling to a 'wind-firm' edge, this aspiration requires the agreement of the landowner, it cannot form 'committed mitigation' and therefore cannot be applied to mitigate the likely effects for this assessment.

12.4.26 With consent from landowners, felling outwith the wayleave corridor would extend to the nearest practical windfirm edge, applying Forest Landscape Design principles. These are: shape, scale, diversity, visual force, unity and 'spirit of the place': in creating a new boundary edge appreciation of these principles and their practical applications would be employed to effect visual improvements where visible by the public.

12.4.27 With regard to the forest landholding, mitigation measures as outlined above, whilst not 'committed' are considered likely.

Residual Effects

12.4.28 The measures likely to be most successful in mitigating windthrow effects are those relating to the implementation of works outside the wayleave corridor. However, as outlined, at this stage they do not form 'committed mitigation' and cannot be taken account of in assessing residual effect. Therefore the residual effect remains as **Minor adverse** and therefore not significant.

Likely Effects- Forestry Management

12.4.29 Current and future forestry management is likely to be affected by the introduction of the OHL and associated felling requirements. This is likely to require forest managers to amend current objectives, plans and techniques for the relevant forest, in particular, the incorporation of felling requirements into their long-term felling and landscape design plans.

12.4.30 The sensitivity of the forest is assessed taking into account the stage of development of the crop, and the topography of the forest site.

12.4.31 The magnitude of the operational effects on forest management are defined as minor having assessed the scale of the whole forest area, relative to the area of that forest where operations are likely to be affected. This assessment is based on a review of the size of forest unit affected by the route (and the relatively small area where there is likely to be a direct operational effect on forest management from the presence of the overhead line).

12.4.32 On the basis that the effects on the forest are considered to be **Minor adverse**, the effect is not significant.

Proposed Mitigation Measures

12.4.33 In addition to the good forestry practice measures outlined previously, a number of further measures are proposed to mitigate the effect on forestry management including:

- Retaining new and upgraded access tracks for landowner use (where requested, and subject to separate planning consent);
- Creating new temporary access tracks where the presence of the new overhead line would result in difficulties in accessing forest areas isolated by the overhead line. Isolation can be as a result topography, the presence of a watercourse, or the lack of brash for timber extraction following the removal of trees within the wayleave.
- Provision of forwarder access from new and upgraded roads into adjacent forest blocks.
- Erection of 'goal-posts' to show maximum safe working height for forestry traffic;

- Creating alternative timber transfer areas, where the route precludes the use of existing facilities;
- Management of natural regeneration within the wayleave to assist managers in their objectives to increase woodland diversity;
- wildlife corridor management; and
- Monitoring and removal of windblown trees.

Residual Effects

12.4.34 Whilst the mitigation measures will be of benefit to future forest management, they do not alter the predicted significance of effect. The residual operational effect on forest management therefore remains as **Minor adverse** and not significant.

12.5 FURTHER SURVEY OR MONITORING REQUIREMENTS

12.5.1 No additional survey or monitoring is proposed.

12.6 SUMMARY OF LIKELY SIGNIFICANT EFFECTS

12.6.1 Table 12.5 below summarises the likely residual effects associated with the proposed scheme. These effects are all of long term duration.

Table 12.5: Likely Residual Effects

Forest Receptor	Significance of Residual Likely Effect
Felling and Construction	
Predicted Loss of Forest due to Windthrow	Minor and therefore not significant
Overhead Lines as a Whole	
Net Loss of Forest within wayleave (ha)	Minor, therefore not significant
Net Loss of ASNW woodland (0 ha)	Minor, therefore not significant
Cumulative effects: Net loss of forest resource	Minor, therefore, not significant

12.7 SUMMARY

12.7.1 The main potential effects of the proposed scheme within forest plantations and woodlands are:

- those which relate to the creation of a clearance corridor (windthrow, shelter, ecological and visual effects); and
- effects caused by disruption to woodland management during the operation of the line; and
- future restrictions on the management of the corridor.

12.7.2 Mitigation primarily takes the form of careful routeing to avoid forestry plantations or woodlands, where significant effects could occur, followed by various measures to reduce the effect such as felling to a windfirm edge, retaining low growing trees and shrubs within the OHL corridor or restructuring for visual and nature conservation reasons.

12.7.3 Where mitigation measures are identified on land outwith the wayleave corridor, for example additional felling to deliver a more natural landscaped and windfirm edge, then these measures can only be undertaken with the agreement of the affected landowner.

12.7.4 Where routeing cannot avoid passing through woodland, the proposed route would pass through 2.92km of woodland, and affect 89.67Ha of woodland.

12.7.5 The loss of 89.67Ha of predominately coniferous woodland equates <0.007% of the woodland cover in Scotland, the effect of which is **None**, and therefore, not significant.

12.7.6 As a result of careful routeing and surveying there is no net loss through clear felling, of ASNW-designated mature broadleaved woodland.

12.7.7 Following detailed and careful routeing and given the opportunity to implement mitigation measures detailed in this document, it is considered that, of the identified woodland sites affected or potentially affected by the construction and operation of the OHLs, the residual effect after mitigation would be **Minor adverse** and therefore, not significant.

Table 12.6: Summary of Effects Table for Forestry: Study Area 1: Gretna – Ewe Hill

Description of Likely Significant Effects	Significance of Effects					Summary of Mitigation / Enhancement Measures	Significance of Residual Effects					Relevant Policy	Relevant Legislation
	Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		
Construction													
Windthrow out with 70m wayleave	Local	Minor Negative	T	D	MT	▪ Appropriate routeing of OHL. ▪ Extend to the nearest practical windfirm edge (in agreement with landowner).	Local	Minor Negative	T	D	MT	Scottish Planning Policy	N/A
Operation													
Forestry management	Local	Minor Negative	P	D	LT	▪ Retain new and upgraded access tracks (where requested, and subject to separate planning consent). ▪ Create new temporary access tracks required. ▪ Erect 'goal-posts' to show maximum safe working height	Local	Minor Negative	P	D	LT	Scottish Planning Policy	N/A

Description of Likely Significant Effects	Significance of Effects					Summary of Mitigation / Enhancement Measures	Significance of Residual Effects					Relevant Policy	Relevant Legislation
	Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		
						for forestry traffic; ■ Create alternative timber transfer areas, where required.							

■

Table 12.7: Summary of Effects Table for Forestry: Study Area 2: Ewe Hill to Newfield

Description of Likely Significant Effects	Significance of Effects					Summary of Mitigation / Enhancement Measures	Significance of Residual Effects					Relevant Policy	Relevant Legislation
	Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		
Construction													
Windthrow out with 70m wayleave	Local	Minor Negative	T	D	MT	■ Appropriate routeing of OHL. ■ Extend to the nearest practical windfirm edge (in agreement with landowner).	Local	Minor Negative	T	D	MT	Scottish Planning Policy	N/A
Operation													

Description of Likely Significant Effects	Significance of Effects					Summary of Mitigation / Enhancement Measures	Significance of Residual Effects					Relevant Policy	Relevant Legislation
	Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		
Forestry management	Local	Minor Negative	P	D	LT	■ Retain new and upgraded access tracks (where requested, and subject to separate planning consent). ■ Create new temporary access tracks required. ■ Erect 'goal-posts' to show maximum safe working height for forestry traffic; ■ Create alternative timber transfer areas, where required.	Local	Minor Negative	P	D	LT	Scottish Planning Policy	N/A

Key to table:

P/T = Permanent or Temporary, D/I = Direct or Indirect, ST/MT/LT = Short Term, Medium Term or Long Term

N/A = Not Applicable

13 Traffic and Transportation

13.1 INTRODUCTION

13.1.1 This chapter assesses the likely environmental effects arising from the anticipated levels of traffic movements associated with the construction and operation of the proposed Ewe Hill Wind Farm Substation. It is based on the findings of the Transport Assessment undertaken by Scott Wilson for the substation in 2009 (Appendix 13.1).

13.1.2 The proposed wind farm substation is located 1.2km to the north of Crawthat Farm. Access for construction traffic, plant, and ongoing management / maintenance will be via the B7068 which travels east-west and links the communities of Lockerbie and Langholm.

13.1.3 From the B7068, the substation will be accessed via a new track with the junction located 280m west of the Grange Quarry Access, as illustrated on Figure 3.4. The proposed access track will be used to access both the substation and the proposed Wind Farm.

13.1.4 It is not proposed that this assessment include the movements associated with construction of the proposed OHLs. Due to the nature and design of the OHLs, and the rate of construction, it is anticipated that vehicle movements at any one pole location would be limited to three or four visits over the course of the construction period. Therefore it is unlikely to yield any significant effects arising from traffic and transport on the local road network.

13.1.5 A number of borrow pits are proposed in the Section 36 application for the Ewe Hill Wind Farm in order to provide appropriate aggregate for the construction of internal access roads within the wind farm and connecting to the substation. If practicable, aggregate from these borrow pits will also be used to construct the access road connecting the substation to the B7068. However, this will be subject to agreement between the Principal Contractor for the proposed substation and the Ewe Hill Wind Farm developer and its Principal Contractor.

13.2 LEGISLATION, POLICY AND GUIDANCE

Legislative Framework

13.2.1 No specific legislation exists in order to assess and address the potential environmental impacts of traffic movements on sensitive receptors. Relevant planning policies and guidelines have therefore been referred to throughout this assessment, as described below.

Planning Policy

13.2.2 The transport and access issues described in the following planning advice and guidance documents have been taken into account in assessing the potential impact of the proposed wind farm substation and access track on the existing public road network during construction and operational phases:

- Scottish Planning Policy (SPP), February 2010;
- Planning Advice Note (PAN) 75: Planning for Transport;
- Dumfries & Galloway Structure Plan, 1999; and
- Adopted Annandale and Eskdale Local Plan, October 2006.

SPP: Strategic Transport Network

13.2.3 Paragraph 175 of the SPP notes that:

"Providing for the safe and efficient movement of traffic on the strategic road network requires the implications of development proposals on the traffic and road safety to be taken into account in development plans and development management decisions. New junctions onto the motorway

and trunk road network are not normally acceptable, but the case for such junctions will be considered where significant economic growth or regeneration benefits can be demonstrated. Direct access onto any strategic road should be avoided as far as practicable. Access should be from a secondary road unless there is no alternative."

PAN 75: Planning for Transport

13.2.4 It is noted that PAN 75 refers to the superseded SPP 17, however the principles outlined within remain relevant.

Dumfries & Galloway Structure Plan

13.2.5 Policy S4 of the Structure Plan states that development proposals which would generate significant travel activity should, where possible, be located on sites where they are capable of being well served by a variety of means of transport including public transport, walking and cycling.

Annandale and Eskdale Local Plan

13.2.6 It is noted that the purpose of the Local Plan was to identify effective opportunities for development and exert a positive influence over land use decisions. This includes policies relating to traffic and transport and integrated transport issues.

Guidance

13.2.7 The following guidance has been referred to where required and is detailed throughout this assessment as appropriate:

- Transport Assessment and Implementation: A Guide, SEDD August 2005; and
- Guidelines for the Environmental Assessment of Road Traffic, Institute of Environmental Assessment (IEA), 1993.

Transport Assessment and Implementation: A Guide

13.2.8 Paragraph 4.1 of the guide notes that: *"An early indication of the scale of any potential transport impact arising from a development will influence the type of analysis required. A simple Transport Assessment Form will provide sufficient information to indicate the extent of further steps required. In most cases the completion of the Transport Assessment Form will provide a clear indication of whether or not further analysis is required."*

13.2.9 A formal Transport Assessment under the terms of the above guidance is not required for proposed OHLs, as the guide principally relates to developments that generate significant increases in travel as a direct consequence of their function, such as retail parks. This section does however address the local transport impacts of the development during construction and operation.

13.3 ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

Key Issues for Consideration in the EIA

13.3.1 The assessment of traffic and transportation issues focuses specifically on the potential environmental effects of:

- The increase in traffic along the public road network in general; and
- The significance of the effects on sensitive receptors.

Extent of Study Area

13.3.2 To define baseline conditions in terms of access and transportation, baseline studies have comprised desktop route reviews of the B7068 for site access from Lockerbie to the west and from Eaglesfield (via the B722) to the southeast.

Method of Baseline Data Collection

13.3.3 In terms of baseline information surveyed for assessing potential traffic effects, 2 way traffic count data for the B7068 was acquired at the point of the proposed access track junction for seven days from the 25th September 2009.

13.3.4 Given the rural location of the proposed access track junction, it is assumed that the levels of traffic at the monitoring site are generally consistent along the B7068 corridor, acknowledging that there may be slight deviations along the route in respect to specific sources / destinations of traffic (i.e. on approaches to villages or larger towns, and access and egress from the adjacent quarry).

Significance Criteria

13.3.5 The Guidelines for the Environmental Assessment of Road Traffic (GEART) suggest that two broad rules can be used as a screening process to determine the scale and extent of a proposed development and related traffic flows. These are:

- Rule 1 - Include highway links where traffic flows will increase by more than 30% (or the number of HGVs will increase by more than 30%); and
- Rule 2 - Include any other specifically sensitive areas where traffic flows will increase by 10% or more.

13.3.6 Where the predicted increase in traffic flow is lower than these thresholds, the significance of the effects will be considered insignificant.

13.3.7 These guidelines are intended for the assessment of the environmental impact of road traffic associated with major new developments. The assessment is therefore more pertinent to the operational phase of a wind farm than the construction phase of a wind farm substation. However, in the absence of other guidance, it shall also be used to assess the associated short term construction phase effects.

13.3.8 The significance level attributed to each effect will be assessed based on the magnitude of change due to the proposals and the sensitivity of the affected receptor. Magnitude of change and the sensitivity of the affected receptor will both be assessed on a scale of high, medium, low and none, as previously described in Table 4.1.

13.3.9 The following terms will be used to determine the significance level of effects predicted to occur:

Major positive or negative effect – where the proposed scheme would result in a significant improvement (or deterioration) to the existing environment;

Moderate positive or negative effect – where the proposed scheme would result in a noticeable improvement (or deterioration) to the existing environment;

Minor positive or negative effect – where the proposed scheme would result in a small improvement (or deterioration) to the existing environment; and

None – where the proposed scheme would result in no discernible improvement (or deterioration) to the existing environment.

13.4 BASELINE CONDITIONS

13.4.1 The B7068 is the main link road between Lockerbie and Langholm. The following baseline 2 way traffic count data was obtained at the proposed access location over a seven day period from 25th of September 2009.

13.4.2 Table 13.2 below provides a summary of the baseline traffic data for that seven day period.

Table 13.2 Baseline 2 way traffic counts for the B7068

Road	Date	Location	Duration	Cars	OGV1	OGV2	HGV Total	HGV %	Total
B7068	September 2009	280m west of Grange Quarry	12 Hour	270	58	10	68	20	338

13.4.3 The B7068 connects the Gretna to Ewe Hill and Ewe Hil to Newfield EIA study areas and therefore the above traffic count data is considered relevant for both sections.

13.5 ASSESSMENT OF EFFECTS, MITIGATION AND RESIDUAL EFFECTS.

Potential Construction Effects

13.5.1 The substation construction phase will comprise the following operations:

- Stripping and stockpiling of topsoil and overburden along the track alignment and the hardstand.
- Excavation of material at the substation hardstand location.
- Rough formation of the access track.
- Installation of culverts and other drainage components.
- Crushing and sorting of material excavated at the substation hardstand site.
- Formation of the structural earthworks slopes and track subbase.
- Redistribution of the stockpiled topsoil over earthworks slopes.
- Locally regrade approaches from existing farm access tracks to tie in with new access track.
- Import and distribute track and hardstand surfacing material.
- Pour the substation concrete foundations.
- Construct the substation control building / facilities.
- Erect the substation electrical components and commission.

13.5.2 During the 6 month construction period, the following vehicles will access the site:

- Low loaders and HGVs, to deliver equipment and materials;
- Dump trucks, to deliver stone for access track and hardstand surfacing;
- Flat-bed trucks, to deliver control building components;
- Concrete trucks;
- Road crane;
- Fuel tanker; and
- Construction personnel, by private car

13.5.3 The total number of vehicle movements generated during the construction of the proposed substation and access road is estimated as 11,073 (total 2 way movements) over a 6 month period as shown in Table 13.3. This takes account of all vehicle movements generated by the above activities, and assumes 1.3 construction personnel per vehicle.

13.5.4 Geological mapping and site investigations suggest suitable material to construct the substation and access track subbase can be won and processed on site. As discussed previously in Section 13.1, confirmation of the suitability and availability of the material at the detailed design stage will be subject to agreement between the Principal Contractor for the proposed substation and the Ewe Hill Wind Farm developer and its Principal Contractor, but could result in up to 60% of the required construction movements being contained within the site.

13.5.5 If agreement cannot be reached between the Principal Contractor for the proposed substation and the Ewe Hill Wind Farm developer and its Principal Contractor, then it is assumed that an alternative borrow pit will require to be developed by the Principal Contractor for the proposed substation in close proximity to the substation and its access road. However it is acknowledged that this will be subject to separate planning consent with associated planning conditions from D&GC.

13.5.6 For the purposes of this assessment, it is assumed that suitable aggregate material will be made available from those borrow pits developed as part of the Ewe Hill Wind Farm Section 36 planning consent.

13.5.7 Therefore, it is assumed that of the 11,073 total movements, 6,818 are internal and therefore do not impact on the public road network.

13.5.8 Deliveries of equipment and materials to the site (HGV's) are likely to result in 566 movements to and from site, with the remainder (3,689) being construction personnel (cars).

13.5.9 As seen in Table 13.3, the 2 way traffic movements are not uniform throughout the construction period, and the maximum number of vehicle movements (1,102) occurs during month three. This equates to 51 vehicle movements per day, assuming a 5 day working week. Of these 51 vehicle movements, 39 movements are cars and 12 movements are HGVs.

13.5.10 Peak HGV traffic occurs with the delivery of track and hardstand surfacing during month 3 with an average of 12 movements per day.

13.5.11 Assuming that construction traffic will be spread evenly over a 12 hour period the following worst case scenarios are predicted:

- An increase in car numbers of 14.2% on the B7068 due to the departure and arrival of personnel (39 average vehicle movements per day) during month 3.
- An increase in HGV traffic of 17.1% on the B7068; based on 12 average HGV movements per day during month 3 of construction.
- A total increase in traffic of 14.8% on the B7068 (based on the average 12 hour baseline count of daily vehicle movements) during month 3 of construction.

Table 13.3 Predicted traffic levels associated with the construction of the access track and substation hardstand.

Activity	Number Of Vehicles Per Month						
	1	2	3	4	5	6	Total
Construction of access track and hardstand earthworks and subbase	1,848	1,848	1,374				5,070
Site Restoration				1748			1,748
Total Site Movements (HGV`s)	1,848	1,848	1,374				6,818
Pre construction (mobilisation)	120						120
Track and Hardstand Surfacing			252				252
Concrete				108			108
Materials/Equipment Deliveries	28	4		10	8	18	68
Fuel Deliveries	4	4	4	4	2		18
Activity	*Number Of Vehicles Per Month*						
Total Movements to/from Site (HGV`s)	152	8	256	122	10	18	566
Site personnel to/from Site (1.3 per car)	643	643	846	677	508	372	3689
Total Vehicle Movements to/from Site per Month	795	651	1102	799	518	390	4255
Average Daily Car Movements	29.2	29.2	**38.5**	30.8	23.1	16.9	
Average Daily HGV's Movements	6.9	0.4	**11.6**	5.5	0.5	0.8	
Average Daily Movements	36.1	29.6	**50.1**	36.3	23.5	17.7	
Percentage Change in Total Daily Car Flow (%)	10.8	10.8	**14.2**	11.4	8.5	6.3	
Percentage Change in Total Daily HGV Flow (%)	10.2	0.5	**17.1**	8.2	0.7	1.2	
Percentage Change in Total Daily Traffic Flow (%)	10.7	8.8	**14.8**	10.7	7.0	5.2	

13.5.12 The significance of the above increases in terms of the two sensitivity rules in the GEART guidelines are detailed in Table 13.4.

Table 13.4 Summary of Construction Traffic Effects

Road	Type of Traffic	30% threshold, applied to non-sensitive areas	10% threshold, applied to sensitive areas
B7068	Overall	Below threshold Not significant	**Above threshold** (Months 1, 3, and 4)
	Cars	Below threshold Not significant	**Above threshold** (Months 1 - 4)
	HGV	Below threshold Not significant	**Above threshold** (Months 1 and 3)

13.5.13 For the purposes of this assessment, roadside properties are considered to have a Medium sensitivity to changes in traffic volumes and movement. The magnitude of the effect of the predicted increase in traffic, based on the findings presented in Table 13.4 above, is considered to be Medium. Therefore there is predicted to be a short-term, temporary adverse effect of **Moderate** significance, prior to the implementation of mitigation measures.

Mitigation of Construction Traffic Effects

13.5.14 The appointed Contractor will be required to develop and agree with the relevant departments of Dumfries and Galloway Council (including Roads), an Environmental Management Plan (EMP) for the construction phase, which will consider a broad range of environmental issues related to construction, including:

- The delivery of materials and the removal of surplus materials at non-peak periods for vehicular and pedestrian traffic to avoid disruption to other road users;
- If required, the delivery of special loads at night or outside peak times as far as reasonably practicable, and consultation with the roads authority and the Police prior to such deliveries to minimise disruption to other road users;
- The need for sheeting of loads and wheel and body washing where there is a risk of construction traffic carrying or dispersing fugitive material, principally mud and dust, onto public roads; and
- The routing of traffic to and from the construction site to avoid the busiest routes beyond the immediate vicinity of the site.

13.5.15 This plan will then be adopted and will form part of the construction contract, and the measures within it implemented to ensure that traffic and transport impacts as a result of the project are appropriately mitigated.

13.5.16 In addition, upon confirmation of the SPT preferred construction schedule, the Contractor will be required to produce a traffic management plan (TMP) to minimise effects on the road network. TMP will be produced in consultation with Dumfries and Galloway Council Combined Services, and ultimately providing the following information (as required):

- Restrictions and approved access routes;
- Road condition survey information for routes to the site prior to commencement;
- Removal and replacement of street furniture such as bollards and handrails and road signs;
- Arrangements with Police for escort of oversized abnormal loads;
- Signage warning other users of oversized load movements;
- Ground preparation including protection of services and lowering of pavements;
- Arrangements for road maintenance and cleaning;
- Timing of deliveries (taking into account identified sensitive receptors);
- Arrangements for parking restrictions along access route;
- Road maintenance and cleaning; and
- Wheel cleaning arrangements.

13.5.17 In order to further reduce traffic effects from construction of the proposed substation, construction personnel will be encouraged to car-share where practicable.

13.5.18 A further reduction in effect could be gained by obtaining the track and hardstand surfacing material, as required over and above that gained from the Ewe Hill Wind Farm borrow pits, from the adjacent Grange Quarry. In doing so, less than a mile of public road would be

trafficked per lorry load (an estimated 252 total lorry loads are required). This will be subject to commercial discussions with the quarry operator.

13.5.19 In construction of the access within the site, excavated materials where suitable will be re-used in the formation of the track to minimise off site material import. Unsuitable material will be redistributed over fill slopes to negate the requirement for materials to be taken off site.

13.5.20 Maximum side slopes to earthworks should be 1 in 3, although flatter gradients should be achieved where possible. The stockpiled topsoil will be used to dress the embankment faces to aid in vegetation reinstatement.

13.5.21 All construction works, whilst complying with the appropriate deemed planning, will take cognisance of best practice in terms of control of pollution as defined in the following documents:

- CIRIA Report C532 - Control of Water Pollution from Construction Sites
- SEPA Pollution Prevention Guidelines:
  - PPG01 General guide to the prevention of water pollution
  - PPG02 Above ground oil storage tanks
  - PPG03 The use and design of oil separators
  - PPG05 Works in near or liable to affect watercourses
  - PPG06 Working at construction and demolition sites
  - PPG07 Refueling Facilities
  - PPG08 Storage and disposal of used oils
  - PPG21 Pollution Incident Response Planning
  - PPG26 Pollution Prevention Storage and Handling of Drums & Intermediate Bulk Containers

Residual Construction Effects

13.5.22 No significant residual effects on traffic, disruption or amenity are predicted as a result of traffic movements generated by construction workers or daily deliveries to site by light vehicles. Taking account of the mitigation measures committed to above, and in particular the proposed EMP, it is not predicted that HGV traffic associated with construction of the access track and substation will have significant residual effects on traffic flows and movements along the road network. Severance and intimidation effects on pedestrians and cyclists as a result of HGV traffic are not predicted to be significant. This is justified by:

- The B7068 having sufficient capacity to cater for the predicted levels of construction and operational traffic;
- The increase in site traffic will be short term with the highest levels concentrated during month 3; and
- Although HGV movements will have a short term impact on the road network in month 3, this can be reduced to 1 mile of public road by sourcing surfacing material from the adjacent quarry.

13.5.23 The residual effect is therefore predicted to be a short-term, temporary effect of **minor negative** significance as a result of the increased number of HGVs using the local road network and therefore not significant.

Potential Operational Effects

13.5.24 It is predicted that during the operational phase of the wind farm substation there will only be a slight increase in traffic due to operation and maintenance. No more than an average of 12 No. two way vehicle movements per month is predicted. This represents an increase in traffic movements of 3.6% on the B7068 over a 12-hour working day.

13.5.25 These traffic levels fall substantially below Rule 1's 30% increase considered significant in non-sensitive areas, and below Rule 2's 10% increase considered significant in sensitive areas.

13.5.26 For the purposes of this assessment, roadside properties are considered to have a Medium sensitivity to changes in traffic volumes and movement. The magnitude of the effect of the predicted increase in traffic, based on the findings presented in Table 13.4 above, is considered to be Low. Therefore there is predicted to be a short-term, temporary adverse effect of **Minor** significance, and therefore not significant.

Potential Decommissioning Effects

13.5.27 Decommissioning of existing plant would comprise either complete removal of the facility, or replacement of substations key components to extend the operation lifespan.

13.5.28 Where complete decommissioning is proposed, removal of plant and associated installations will be required, incorporating demolition activities and partial or total removal of the access track.

13.5.29 Replacement of key components will involve supply and construction activities of a lesser extent than those of initial commissioning. The levels of traffic associated with decommissioning are however likely to be lower than those required during construction.

13.5.30 For the purposes of this assessment, roadside properties are considered to have a Medium sensitivity to changes in traffic volumes and movement. The magnitude of the effect of the predicted increase in traffic, based on the findings presented in Table 13.4 above, is considered to be Low to Medium. Therefore there is predicted to be a short-term, temporary adverse effect of **Minor to Moderate** significance.

Mitigation of Decommissioning Traffic Effects

13.5.31 Prior to decommissioning, a further traffic assessment will be carried out and traffic management procedures agreed with the appropriate authorities and the local communities.

Residual Decommissioning Effects

13.5.32 Decommissioning effects would potentially be of a similar nature to Construction Effects but of reduced magnitude. This is principally in recognition of the fact that the majority of the trips generated during the construction phase are the result of the import of suitable surfacing material, concrete deliveries, and construction personnel. Decommissioning would mainly comprise the removal of materials from site on wagons.

13.5.33 Substation components would be removed from site in a controlled manner similar to their delivery.

13.5.34 Culverts would be removed with the stream beds and channels returned to a more natural configuration.

13.5.35 The access track and hardstand would be either partially regraded to provide a path for farm or recreation access, or completely regraded to match the existing ground profile.

13.5.36 As a majority of the decommissioning work would be contained within the site, the effects on the road network are to be minimal and below the threshold of significance.

13.5.37 The residual effect is therefore predicted to be a short-term, temporary effect of **minor negative** significance as a result of the temporarily increased number of HGVs using the local road network and therefore not significant.

13.6 MONITORING AND FOLLOW UP

13.6.1 Various road condition surveys will be required to be undertaken in line with Dumfries and Galloway Council Roads department policy.

13.7 LIMITATIONS AND ASSUMPTIONS

13.7.1 Detailed estimates of construction vehicle movements are not available at this time and therefore assessment of impacts from construction traffic has been necessarily qualitative in nature.

13.8 SUMMARY

13.8.1 There is predicted to be a short-term, temporary increase in traffic levels at the location of any sensitive receptors on the B7068 approaching the site. The increase is associated with construction of the substation access track and hardstand and will occur over a period of 6 months, with the greatest increase in month 3 of the construction programme.

13.8.2 In accordance with the EIA significance criteria, these increases are predicted to be a short-term, temporary adverse effect of Moderate significance, prior to the implementation of mitigation measures, due to the current low levels of traffic on the public road network in the area including the B7068.

13.8.3 The greatest concentration of traffic will be associated with the site personnel entering and exiting the site.

13.8.4 The assessment demonstrated that increases in traffic on the B7068 will be below the thresholds of significance for non-sensitive receptors. However, the increase in traffic over months 1 – 4 is above the acceptable 10% threshold of significance for sensitive receptors.

13.8.5 Following implementation of mitigation measures including the requirement for the Contractor to prepare Environmental and transport Management Plans, in agreement with Dumfries and Galloway Council, the significance of these effects is predicted to be **Minor**.

13.8.6 The busiest period of construction will be during months 3 and 4 where approximately 25 personnel are expected to be on-site.

13.8.7 Traffic generated during the operation and maintenance of the substation is minimal and will not result in any significant impact.

13.8.8 Traffic generated during decommissioning of the substation is likely to be lower than the levels associated with construction and will be managed through the implementation of a Traffic Management Plan to be agreed with Dumfries and Galloway Council.

Table 13.5: Summary of Effects Table for Traffic and Transportation

Description of Likely Significant Effects	Significance of Effects					Summary of Mitigation / Enhancement Measures	Significance of Residual Effects					Relevant Policy	Relevant Legislation
	Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		
Construction													
Construction traffic effects	Local	Moderate Negative	T	I	ST	■ Prepare an appropriate TMP and EMP, in agreement with D&GC. ■ Obtain aggregate material from internal borrow pits (dependent on agreement between Principal Contractor and Ewe Hill Wind Farm developer/contractor). ■ Follow best practice pollution control measures.	Local	Minor Negative	T	D	ST	Scottish Planning Policy; D&GC Structure and Local Plans.	N/A
Decommissioning													
Decommissioning effects	Local	Minor Negative	T	I	ST	■ Traffic assessment and agreement of	Local	Minor Negative	T	I	ST	Scottish Planning	N/A

Description of Likely Significant Effects	Significance of Effects					Summary of Mitigation / Enhancement Measures	Significance of Residual Effects					Relevant Policy	Relevant Legislation
	Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		
						traffic management procedures with D&GC.						Policy; D&GC Structure and Local Plans.	

Key to table:

P/T = Permanent or Temporary, D/I = Direct or Indirect, ST/MT/LT = Short Term, Medium Term or Long Term

N/A = Not Applicable

14 Construction Noise

14.1 INTRODUCTION

14.1.1 This chapter presents an assessment of the effects of predicted noise impacts of the construction phase of the proposed scheme on human receptors and identifies the mitigation measures that would apply to remove or reduce those effects. Effects associated with Operational Noise has been considered separately in Chapter 15 of this ES.

14.1.2 The construction noise assessment has been based on a number of assumptions relating to the programme and activities involved. These assumptions have been made with regard to plant and construction specification and methodology and have been applied to this project through information provided by SPT.

14.1.3 This chapter considers the following aspects of noise and vibration impact pertinent to the proposals:

- the potential effects of noise from construction processes associated with the proposed scheme on existing sensitive receptors in the vicinity of the preferred route;
- appropriate mitigation measures where required; and
- the predicted residual effect of construction noise and vibration following the implementation of recommended mitigation measures.

14.1.4 This assessment has been largely undertaken in a qualitative manner for the following reasons:

- Construction noise is temporary and will only occur at any given location along the proposed route for a limited period of time;
- One of the constraints applied as part of the routeing process for the schemewas buffer areas of 150m around residential properties. This was predominantly for visual amenity reasons, however has indirectly resulted in minimising the potential for noise disturbance during the construction process. For this reason, construction vibration has also been scoped out as a potential source of adverse effects; and
- Any potential effects associated with construction noise will be controlled by the restriction of construction hours in the vicinity of sensitive receptors, as stipulated by D&GC. It is also expected that the Contractor will work in accordance with the principles of Best Practicable Means. This will be discussed in more detail later in this Chapter.

14.1.5 Further, more detailed background to the process of interpreting and assessing noise and vibration impacts is provided in Appendix 14.1. This chapter is necessarily technical in nature, and to assist the reader a glossary of terminology relating to noise and vibration is contained as Appendix 14.2.

14.2 LEGISLATION, POLICY AND GUIDANCE

Legislative Framework

14.2.1 No specific all-encompassing legislation exists in order to assess and address the potential impacts of construction noise on multiple sensitive receptors. Relevant standards and guidelines have therefore been referred to throughout this assessment. The following documents have been used for guidance:

- British Standard (BS) 5228: 2009: Code of Practice for Noise and Vibration Control on Construction and Open Sites: Part 1: Noise;
- The Institute of Acoustics (IoA)/Institute of Environmental Management and Assessment (IEMA) Working Party: Guidelines for Noise Impact Assessment (2002); and
- Control of Pollution Act (CoPA) (1974)

Planning Policy

14.2.2 Planning Advice Note 56: Planning and Noise (PAN56) is relevant as it sets out the approach to monitoring and control of construction noise.

Guidance

14.2.3 Additional guidance has been referred to where required and is detailed throughout this assessment as appropriate.

14.3 ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

Key Issues for Consideration in the EIA

14.3.1 The scope of the assessment has been determined in the following way:

- consultation with SPT to confirm the proposed construction methodology;
- discussion with D&GC Department of Environmental Health;
- a desktop review of the proposed scheme and nearest potential noise sensitive receptors;
- gathering of other data pertinent to the works.

Extent of Study Area

14.3.2 The proposed scheme has been considered in two sections: Gretna to Ewe Hill and Ewe Hill to Newfield. For each section, contours at 50, 100 and 200m from the proposed OHLs have been marked out (Figures 14.1 and 14.2) to identify the likelihood of adverse effects on the nearest existing noise sensitive receptors (residential properties) during the construction phase and the number of properties likely to be affected.

Consultation

14.3.3 A representative from D&GC Department of Environmental Health has been consulted to confirm the suitability of the proposed assessment methodology. It was confirmed that a predominantly qualitative assessment was acceptable for the assessment of potential construction noise impacts associated with the proposed works. It was also confirmed that there is no separate requirement for the assessment of construction vibration due to the distance of any identified receptors from the works.

Method of Baseline Data Collection

14.3.4 No baseline noise survey has been undertaken as part of this assessment. The reason for this is that any potential noise impacts associated with the construction works will be temporary and controlled by allowable hours of working as stipulated by D&GC and in accordance with the principles of Best Practicable Means, as discussed in detail in this chapter.

Significance Criteria

14.3.5 The significance of effects reflects judgements as to the importance or sensitivity of the affected receptors and the nature and magnitude of the predicted changes. For example, a major adverse impact on a feature or site of low importance will be of lesser significance than the same

impact on a feature or site of high importance. The nature of the predicted effects will also be relevant i.e. whether they are short or long term, beneficial or adverse, reversible or irreversible.

14.3.6 Residential dwellings are assumed to have high sensitivity to noise.

14.3.7 It should be noted that the available official guidance on the assessment of noise impacts is very fragmented, with various standards being applicable to one particular type of noise but not to others. Guidance relating to the significance of changes in noise levels specifically may be taken from the draft findings of the Institute of Acoustics (IoA) and Institute for Environmental Management and Assessment (IEMA).

14.3.8 Adapted from this study, Table 14.1 below relates the subjective response to the significance of impact. For the purposes of this assessment, this scale has been used to assess the likely magnitude of impact and significance of effect of various construction activities associated with the proposed scheme at dwellings of varying distance from the works along the proposed OHL routes.

Table 14.1 Relating significance of Effect to subjective response

Significance of effect	Subjective response
None	Imperceptible change in noise level at any dwelling
Minor impact	A small but barely perceptible increase in noise level, as assessed in accordance with the relevant standards, at any dwelling
Moderate impact	A noticeable increase in noise level, as assessed in accordance with the relevant standards, at any dwelling
Major impact	A considerable increase in noise level, as assessed in accordance with the relevant standards, at any dwelling

14.3.9 This table has been referred to in evaluating the significance of impact of construction noise on the sensitive receptors assessed.

Assessment Criteria

14.3.10 Due to the wide range of environments through which the proposed OHLs would pass, the approach adopted has assessed the predicted noise impacts in a qualitative manner and not in comparison to notional background levels. Certain areas, where the population is sparse, would have extremely low background noise levels and therefore the noise from construction or transport sources would be audible over a greater distance although this in itself would not necessarily constitute a significant effect due to the distance of potential receptors from the works. In more urban areas, it is likely that the noise impacts of construction would be less as a higher background noise level from other sources would mask the construction noise, reducing audibility at greater distances.

14.3.11 It is inevitable that, with the construction of any new development, there will be some disturbance caused to those nearby during the site preparation and construction phases. However, disruption due to construction is a localised phenomenon and is temporary in nature. In general, only people living within a hundred metres of a construction site have the potential to be seriously bothered by noise.

14.3.12 Although there are techniques available to accurately predict the likely noise effects from site preparation and construction operations, such as those contained within BS5228 Part 1: Noise, they are necessarily based on detailed information on the type and number of plant being used, their location and the length of time they are in operation. The construction of the OHLs will

be a linear process and, as such, works will only affect any given receptor for a short period, controlled by the management procedures put in place.

14.3.13 For a site of this magnitude, it is not possible to accurately predict, the noise levels that are likely to impact on nearby receptors. As such, a detailed quantitative assessment is considered surplus to requirements in terms of determining the likelihood of significant adverse effects from construction noise.

14.3.14 However, Annex E Paragraph E2 of BS5228 Part 1 provides guidance on maximum daily noise limits at noise sensitive receptors likely to be affected by construction noise. These levels have been adopted into BS5228 from Advisory Leaflet (AL) 72 which, albeit dated, provides what is still considered to be useful guidance for maximum acceptable noise levels from temporary and necessary construction works such as these. It states:

> *"Noise levels…outside the window of the nearest occupied room to the site boundary should not exceed:*

- *70dB(A) in rural suburban and urban areas away from main road traffic and industrial noise, and*
- *75dB(A) in urban areas near main roads in heavy industrial areas."*

14.3.15 These recommended levels should be taken as representative of the LAeq,T (dB) for the core working day.

14.3.16 It is considered that both sections of the route fall into the former category and 70dB LAeq,T should be notionally accepted as the recommended maximum noise level for construction noise over the core working day at these receptors.

14.3.17 However, a pragmatic approach should be adopted when considering likely noise levels from works such as these. Some phases of the works may generate a significant adverse effect under worst case conditions and at worst case times i.e. where works are taking place at the location closest to the receptor. Under average case conditions however, the effects from site clearance and construction activities as a whole, providing they are properly managed, would be expected to be negligible or, at worst, slight adverse. It is also important to recognise that the proportion of the works which will generate 'worst case' noise levels at any given receptor will be very small.

14.3.18 The approach adopted has therefore been to undertake indicative calculations of the worst case LAeq,1h (dB) at 100m and 200m from the proposed works and to compare this against the recommended LAeq,T for the core working day reproduced above from BS5228 Part 1. This is considered representative of a robust assessment.

14.3.19 The following Table 14.2 and Figures 14.1 and 14.2 detail the number of properties along each section of the route which fall into the distance contours assessed.

Table 14.2 Proximity of residential properties to the proposed scheme

Section of route	Distance from preferred route		
	0-50m	50-100m	100-200m
Gretna to Ewehill	1	0	4
Ewehill to Newfield	0	0	0

14.3.20 This information has been referred to in the following assessment of effects of construction noise on sensitive receptors. The potential for significant effects associated with

construction noise has been assessed separately along each section of the proposed scheme. However, ss the same mitigation would apply along both sections, this has been dealt with as a single entity and is discussed subsequent to the assessment of effects.

14.4 ASSESSMENT OF EFFECTS, MITIGATION AND RESIDUAL EFFECTS

Gretna to Ewe Hill

14.4.1 It is evident from the distance contours (Figure 14.1) considered that very few properties are likely to be affected by construction noise and that there is only one property (Cadgillhead Farmhouse) within 100m of the works. Nonetheless, a high level quantitative assessment of the likely worst case construction noise levels along the route of the OHL between Gretna to Ewe Hill has been carried out.

14.4.2 To provide an overview of the likelihood of various activities resulting in adverse effects at these few receptors within 200m of the proposed route, the methodology provided by SPT has been used to summarise the sequence of events. For each stage of the works, the guidance provided in BS5228 Part 1 has been used to predict the likely worst case noise level at 100m and 200m from source.

14.4.3 The assumed noise levels for activities associated with each stage of the works have been integrated over a one hour period to give a worst case noise level (LAeq,1h (dB)). This is more stringent than the requirement to integrate noise levels over a core working day (see Paragraph 14.3.15 above) however it assists in the identification of any construction activities during which a disturbance is likely to occur.

14.4.4 The following construction stages have been considered in this assessment:

- Prepare access
- Install pole foundations
- Erect poles
- String conductors
- Reinstate pole sites and remove temporary accesses

14.4.5 The following Table 14.3 details the results of these calculations.

Table 14.3 Predicted worst case LAeq,1h (dB) at 100m and 200m from source (based on BS5228 Part 1)

Construction activity	Predicted worst case $L_{Aeq,1h}$ (dB)	
	100m from source	200m from source
Preparing access	57	51
Install pole foundations	56	50
Erect poles	60	54
String conductors	61	55
Reinstate pole sites and remove temporary accesses	57	51

Construction of new Ewe Hill substation

14.4.6 It is proposed to build a new substation at Ewehill, as discussed in the introduction to this section. There are no sensitive receptors in the immediate vicinity of the proposed substation site, however calculations have been undertaken to predict the worst case construction noise LAeq,1h (dB) at the nearest sensitive receptors – Briary Cottage and Crawthat Farm. Both

receptors are at a distance of approximately 1.2km from the proposed construction works. The predicted noise level has been assessed against the core working day construction noise limit of 70dB LAeq,T recommended in BS5228 Part 1 previously discussed.

14.4.7 Information provided by Scott Wilson, who have undertaken a Transport Assessment for construction of the proposed Ewe Hill substation and access road, has confirmed the proposed location of the substation and road and calculations have been undertaken to predict the worst case LAeq,1h (dB) level from these construction works, assuming aggregate materials can be obtained from borrow pits used as part of the construction of the Ewe Hill Wind Farm. It is acknowledged that the import of some materials to the site will result in additional movements past Briary Cottage and Crawthat Farm, however it is not considered that these occasional movements require to be considered as a separate source. It should additionally be noted that approximately 250m to the west of the proposed junction of the access road onto the B7068 is an operational quarry. There is therefore already a precedent for heavy vehicles using this stretch of road. The following Table 14.4 details the results of the construction noise calculations.

Table 14.4 Predicted worst case LAeq,1h (dB) at nearest noise sensitive receptors (based on BS5228 Part 1)

Construction activity	Predicted worst case $L_{Aeq,1h}$ (dB) at Briary Cottage / Crawthat Farm
Construction of Ewe Hill substation	43.6

Summary of effects

14.4.8 The results of the calculations detailed in the Table above shows that effects associated with construction noise are likely to be **Minor** at the nearest sensitive receptors and therefore not significant. Noise from construction may still be audible at certain times. Care should be taken to minimise disturbance from construction noise wherever practicable. Recommended mitigation measures are discussed later in this chapter.

Ewe Hill to Newfield

14.4.9 As shown in Table 14.2 above, there are no properties within 200m of the preferred route between Ewe Hill and Newfield. The results of the calculations detailed in Table 14.3 above shows that effects associated with construction noise are likely to be **None** at the nearest sensitive receptors and therefore not significant.

Mitigation

14.4.10 It is clear from the results of the calculations presented for the proposed scheme that noise levels are extremely unlikely to exceed 70dB LAeq,T over a core working day at any of the identified nearest sensitive receptors, as mentioned in BS5228 Part 1. The effects associated with construction noise are considered to be **Minor** and therefore not significant, at all identified noise sensitive receptors.

14.4.11 It is therefore considered that any potential for occasional noise disturbance from the construction works will be addressed through the practices adopted and equipment utilised by the Princapal Contractor and controlled by the requirements of D&GC Department of Environmental Health, for example, by restricting hours of noisy activity in the vicinity of identified sensitive receptors.

14.4.12 Similarly noise from additional traffic movements or the import of unusual loads will be managed in so far as is reasonably practicable to minimise noise disturbance, particularly during night time hours (2300 – 0700h). These restrictions will be implemented through the Environmental Management Plan (EMP).

14.4.13 The onus will be upon the Principal Contractor to reduce ambient noise levels in so far as is reasonably practicable by the implementation of Best Practicable Means.

Noise Mitigation to Protect the Neighbouring Community during Construction – Best Practicable Means

14.4.14 The assessment has ascertained that construction noise may be audible at certain times and locations along both sections of the route, albeit of short duration. It is therefore necessary to consider the available measures to reduce the levels of noise that will arise during the works, in so far as is reasonably practicable.

14.4.15 Several safeguards exist to minimise the effects of construction noise and these will operate during the construction of the proposed scheme. These safeguards include:

- The various EU Directives and UK Statutory Instruments that limit the noise emissions of a variety of construction plant
- The guidance set out in BS 5228: Parts 1 & 2: 2008 which covers noise and vibration control on construction sites
- The powers that exist for local authorities under sections 60 and 61 of the 'Control of Pollution Act 1974' and section 80 of the 'Environmental Protection Act 1990' to control environmental noise and pollution on construction sites.

14.4.16 Contract documents supplied to contractors will require that the effects of environmental noise are considered during the design and execution of the works. Such an assessment will result in a noise control plan that provides a noise management system tailored to the specific needs of the construction works, the site and the surrounding area. As a minimum, any noise control plan will cover:

- Procedures for ensuring compliance with statutory or other identified noise control limits
- Procedures for ensuring that all works are carried out according to the principle of Best Practicable Means as defined in the Control of Pollution Act 1974
- General induction training for site operatives and specific training for staff having responsibility for particular aspects of controlling noise from the site
- Liaison with D&GC and the local community
- Provision of a contact telephone number and responsible person to whom any complaints or concerns with regard to noise, vibration and other environmental issues should be put as a first port of call. This affords the Contractor the opportunity to address any issues prior to D&GC involvement.

14.4.17 The adoption of Best Practicable Means is considered the most effective way of controlling noise from construction sites and will be enforced rigorously by the Principal Contractor and SPT. In order to demonstrate the adoption of Best Practicable Means to control noise emission from the site, the following conditions and measures could be imposed on the construction works.

14.4.18 As far as is reasonably practicable, the contractors will bring to site and employ on the works only the most environmentally acceptable and quietly operating plant and equipment compatible with the safe and efficient execution of the works. Equipment will be well maintained and fit for purpose. The noise emitted by any plant item will not exceed the limits quoted in either the relevant EC Directive / UK Statutory Instrument and will be no greater than the relevant values quoted in the current version of BS 5228. All items of plant operating on the site in intermittent use will be shut down in the intervening periods between uses.

14.4.19 In particular:

- All pneumatic tools will be fitted with silencers or mufflers, where practicable;
- Deliveries will be programmed to arrive during daytime hours only;
- Care will be taken when unloading vehicles to minimise noise;
- Where possible, delivery vehicles will be routed so as to minimise disturbance to local residents;
- Delivery vehicles will be prohibited from waiting on the highway or within the site with their engines running; and
- No radios or music will be played on the site.

14.4.20 All plant items will be properly maintained and operated according to manufacturers recommendations in such a manner as to avoid causing excessive noise. All plant will be sited so that the noise impact at nearby noise sensitive properties is minimised. Local hoarding, screens or barriers will be erected as necessary to shield particularly noisy activities.

14.4.21 Problems concerning noise from construction works can sometimes be avoided by taking a considerate and neighbourly approach to relations with the local residents. Works will not be undertaken outside of the core daytime hours, unless absolutely necessary.

14.4.22 Experience from other sites has shown that by implementing the measures discussed above, typical noise levels from construction works can be significantly reduced.

14.4.23 All neighbours will be informed well in advance of such works using a leaflet drop giving full details of the hours during which the works are scheduled to be undertaken and also providing an appropriate contact name and number to whom complaints should be addressed.

14.4.24 The residual noise effect after mitigation during construction will be **None** and therefore not significant, although noise from the works may be audible at certain times.

14.5 MONITORING AND FOLLOW UP

14.5.1 It is not considered that routine noise monitoring will be particularly useful or necessary. It may be that, should complaints be received, ad hoc monitoring would be required to ascertain the source of the disturbance and provide recommendations for mitigation.

14.6 LIMITATIONS AND ASSUMPTIONS

14.6.1 The assessment of effects from Construction Noise has been largely undertaken in a qualitative manner for the reasons provided in Section 14.1 above.

14.7 SUMMARY

14.7.1 An assessment of the potential significant effects associated with the construction phase of the proposed scheme between the Gretna to Ewe Hill and Ewe Hill to Newfield sections has been carried out.

14.7.2 It is considered unlikely that any significant effects will arise associated with construction works at the nearest noise sensitive receptors. However it is likely that noise from the proposed works will be audible at certain locations and during certain activities. It is therefore considered that noise associated with the works should be managed through the use of Best Practice construction methods.

14.7.3 The control measures that are recommended for mitigating noise from this source are outlined in this chapter. They include restricting hours of noisy activity in the vicinity of sensitive receptors in accordance with the requirements of D&GC and the implementation of Best

Practicable Means as defined in CoPA. It may be considered beneficial to incorporate these recommendations into an overarching Environmental Management Plan (EMP) to which the Contractors will be contractually bound.

14.7.4 Providing that the works are appropriately managed, it is anticipated that the residual effect of construction noise will be **None** and therefore not significant.

Table 14.5: Summary of Effects Table for Construction Noise: Study Area 1: Gretna – Ewe Hill

Description of Likely Significant Effects	Significance of Effects					Summary of Mitigation / Enhancement Measures	Significance of Residual Effects					Relevant Policy	Relevant Legislation
	Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		
Construction													
Construction noise effects	Local	Minor Negative	T	D	ST	▪ Adoption of best practicable means for reduction of construction noise.	Local	Minor Negative	T	D	ST	PAN56	N/A

Table 14.6: Summary of Effects Table for Construction Noise: Study Area 2: Ewe Hill to Newfield

Description of Likely Significant Effects	Significance of Effects					Summary of Mitigation / Enhancement Measures	Significance of Residual Effects					Relevant Policy	Relevant Legislation
	Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		Receptor Value	Degree of effect and Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		
Construction													
Construction noise effects	Local	Minor Negative	T	D	ST	▪ Adoption of best practicable means for reduction of construction noise.	Local	Minor Negative	T	D	ST	PAN56	N/A

Key to table:

P/T = Permanent or Temporary, D/I = Direct or Indirect, ST/MT/LT = Short Term, Medium Term or Long Term

N/A = Not Applicable

15 Operational Noise and Electric Magnetic Fields

15.1 INTRODUCTION

15.1.1 The following chapter sets out a general summary of both the operational noise and Electric and Magnetic Fields (EMFs) associated with proposed scheme, as described in Chapter 3, and suggests, where relevant, appropriate mitigation measures. Where appropriate this also sets out how the scheme will comply with the relevant UK Government and Health Protection Agency standards.

15.2 OPERATIONAL NOISE

15.2.1 Overhead line noise is generated when the conductor surface electric stress exceeds the inception level for corona discharge activity. Transmission and distribution line conductors are designed to operate below this threshold. Surface contamination on conductors will, however, cause a local enhancement of electric stress and possibly initiate discharge activity. At each discharge site a limited electrical breakdown of the air occurs. A portion of the energy associated with the corona process is released as acoustic energy and radiates into the air as sound pressure waves.

15.2.2 The highest noise levels generated by a line generally occur during rain. Water droplets collect on the surface of the conductor and may initiate corona discharge. The number of droplets, and hence the noise level will depend primarily on the rate of rainfall.

15.2.3 Substation noise is mainly generated by the transformers within the substation and is approximately constant as a low frequency hum occurring at the harmonics of the supply frequency (100 to 200Hz). Transformer coolers generate more broadband noise although they are not in continual operation.

Mitigation

15.2.4 Since audible-noise levels due to the OHLs and substation will be imperceptible at the nearest property, no mitigation measures are necessary.

15.3 EMF RADIATION

15.3.1 Electric and magnetic fields and the electromagnetic forces they represent are an essential part of the natural world. Their sources are the charged fundamental particles of matter (principally electrons and protons). Electromagnetic forces are responsible for the physical properties of materials and they mediate all the processes of chemistry, including those of life itself. Measurable electric and magnetic fields occur naturally within the body in association with nerve and muscle activity. We are also exposed to natural electric fields in the atmosphere as well as the natural magnetic field of the Earth (to which a magnetic compass responds).

15.3.2 Electric-field strengths are measured in volts per metre (V/m). The natural atmospheric electric field at ground level is normally about 100V/m in fine weather and may rise to many thousands of volts per mere during thunderstorms. Magnetic fields are (for practical purposes) measured in microtesla (μT). The Earth's natural magnetic field is approximately 50 μT in this country.

15.3.3 Transmission substations do not produce very large fields themselves (generally less than a microtesla); the fields close by are mainly produced by the power lines and cables entering them.

15.3.4 The power-frequency electric and magnetic fields generated near energized high-voltage power transmission and distribution equipment add to (or modulate) the Earth's steady natural

fields. The strength (or amplitude) of the electro-field modulation depends on the voltage of the equipment, which remains more or less constant. The strength of the magnetic-field modulation depends on the current carried by the equipment, which varies according to the demand for power at any given time.

15.3.5 There are no statutory regulations in the UK which limit the exposure of people to power-frequency electric or magnetic fields. However, the Heath Protection Agency (HPA) has recommended to the Government that the UK follow the exposure guidelines published by the International Commission on Non-Ionizing Radiation Protection (ICNIRP). For electric fields, the guideline level for human exposure 5000 volts per metre and for magnetic fields it is 100 microteslas.

15.3.6 Power-frequency field strengths near ground level in the vicinity of high voltage power lines and substations should not exceed the guidelines recommended by the ICNIRP.

Field Magnitudes

15.3.7 The power-frequency field strengths near overhead power lines and underground cables are in many circumstances readily calculable. They depend on factors such as the distance from the line, the height (or depth) and arrangement of the conductors and the voltage and currents they carry.

15.3.8 The power-frequency electric field near ground level beneath an overhead power line is strongest where the conductors are closest to the ground (i.e. at minimum clearance – normally at mid-span).

15.3.9 The ground-level magnetic field of an overhead line is also strongest where the conductors are closest to the ground. However unlike the electric field, the magnetic field is not much screened by poles, vegetation or buildings.

15.3.10 One difference between electric and magnetic fields is that electric fields are very easily screened – by buildings, hedges, fences and trees. So inside a house there will be very little electric field from a power line outside. By contrast, magnetic fields pass readily through most buildings.

15.3.11 Buried cables produce no electric fields in their vicinity, because the conductors are enclosed in an earthed metal sheath, which acts as an efficient screen, as does the earth itself. Buried cables do however, produce magnetic fields. For the proposed 132kV routes, the field strengths above ground will be relatively low, because the conductors are in closely spaced trefoil array, with relatively large mutual cancellation of fields due to the individual phases.

Effects of Electric Fields

15.3.12 A person standing in the electric field beneath a 132kV power line would have an alternating surface charge induced on his or her body and an associated alternating current induced within the body. The induced surface charge could interact with the electric field to cause vibration of body hair, although the vibration would be too feeble to notice. In a power-frequency electric field of about 1500 V/m, the induced current in the body could reach approximately 20 microamperes – about ten thousand times less than is needed to power a small flashbulb and also far too small to be directly perceptible (most people cannot perceive currents less than about 500 microamperes).

Effects of Magnetic Fields

15.3.13 The ground-level magnetic field of an overhead line will normally induce a much smaller current in a person's body than the current induced by the electric field of the line. In a magnetic field of strength 5 microtesla, the total induced current could reach approximately 1.5

microamperes. The magnetic fields near overhead power lines have no other potentially perceptible effects on the body.

15.3.14 Over the past 20 years, however, it has been suggested that exposure to power-frequency magnetic fields of this magnitude could be linked with various health problems, ranging from headaches to Alzheimer's disease. The most persistent of these suggestions relates to childhood cancers.

15.3.15 A number of epidemiological studies have suggested an association between the incidence of childhood cancers and the proximity of homes to power transmission and distribution lines or power-frequency magnetic-field strengths in the home. Other studies, notably the world's largest ever study of its type, the UK Childhood Cancer Study (UKCCS) conducted during the 1990s and published in 1999, have failed to confirm such associations. The Childhood Cancer Research Group (CCRG) produced a study (also known as the "Draper" study) in 2005 which found an association between childhood leukemia and 275kV/400kV power lines. This association extended too far from the lines to be caused by magnetic fields or other factors and so there is no satisfactory explanation for the findings.

15.3.16 No causal link has been established between cancer (or any other disease) and magnetic of electric fields and indeed there is no established mechanism by which these fields could cause or promote the disease. Scientists recognise the possibility of a risk associated with high exposure to magnetic fields but it is no more than a possibility.

15.3.17 Any suggestion of a possible health risk is taken seriously by the electricity industry and the industry is continuing to support high quality research to help to gain a clearer picture of EMFs.

Mitigation

15.3.18 SPT considers that even a remote possibility of a health risk must be taken seriously, because very large numbers of people are exposed to power-frequency fields from both overhead and underground power lines and from many other sources, including domestic appliances. Further studies are in progress in this country and elsewhere to establish whether or not there is any genuine health risk. SPT will continue to act upon the current advice of the Government and HPA in this matter.

15.3.19 Since EMF levels occuring due to the OHL and substation will be imperceptible at the nearest property, no mitigation measures are necessary.

16 Cumulative Effects

16.1 INTRODUCTION

16.1.1 The following cumulative assessment has been undertaken to identify potential significant effects associated with development of the proposed wind farms, the proposed scheme and any other live planning applications and other committed developments in the study area in tandem. A review of the archived applications for Annandale and Eskdale, going back to the start of June 2010, were checked and applications associated with energy infrastructure (OHLs, photovoltaics, mini hydroelectric scheme) were noted as well as an application for Gritstone extraction. In addition it has been noted that there is an application for a planned 9 turbine wind farm between Gretna and Longtown, which falls within the jurisdiction of Carlisle City Council.

16.1.2 Of the seven applications that were identified, any that fell outwith the defined study zone have not been considered as part of this cumulative exercise.

16.1.3 Five applications have therefore been excluded leaving two applications that were considered further. The remaining two applications are:

- Erection of 14 wind turbines and associated infrastructure at Solwaybank, Allfornought Hill, Langholm; and
- Erection of a 15m tall (20m to the blade tip) wind turbine at Minsca Farm, Waterbeck

16.1.4 The visual impacts of the Minsca windfarm have already been taken into consideration as part of the main assessment and the inclusion of one additional turbine is unlikely to alter the conclusions of the Landscape and Visual Assessement.

16.1.5 Therefore, this cumulative section will also assess the likely additional effects of the proposed Solwaybank windfarm application as well as the Ewe Hill and Newfield wind farms which the proposed scheme would support.

16.1.6 Following consideration of the various topics assessed as part of the EIA (i.e. Chapters 6 to 15), it has been concluded that Landscape and Visual interactions are the only ones likely to result in significant cumulative effects. Therefore, this chapter focuses on cumulative Landscape and Visual effects as these are considered the effects most likely to be Moderate or Major.

16.1.7 Cumulative effects are those that occur or are experienced in combination and could be physical impacts on the ground or where more than one development is visible within the same field of view. This cumulative section assesses the effects of both the proposed scheme on landscape resources and visual receptors should the scheme and the associated windfarms be constructed.

16.1.8 The impacts and effects on the Landscape Character Areas (LCA), as identified in Chapter 6 are very localised and the Zones of Theoretical Visibility (ZTV) – see Figures 6.2 and 6.3 indicate that there is extremely limited intervisibility between the two proposed OHL's.

16.1.9 Upland Pasture is the only LCA that would be affected both physically and by visual intervisibility of both the OHL's and this LCA would also be affected by the proposed Ewe Hill Windfarm.

16.1.10 The two separate areas of Transitional Farmland LCA will be directly affected by the proposed windfarm at Newfield and the proposed Solwaybank windfarm and the Upland Heath LCA will also be physically affected by the Solwaybank windfarm. Whilst there are no physical implications by the windfarms on the remaining LCA's, there will be visual implications on these landscape character areas.

16.1.11 With regards to the visual receptors, the ZTV's indicate that, in the main, it is the hilltops that would be affected by the implementation of both OHL's. There are very few residential properties that could potentially be affected by cumulative effects, should both OHL's be constructed and effects experienced when travelling along the roads are brief and in passing with only a very few locations on the road between Boreland and Crawthat that could experience views of both OHL's. The receptors, therefore, that will be assessed within the cumulative section are:

- Pyatshaws Rigg, 231m (NY 215,845)
- Newhall Hill, 272m (NY 249,864)
- Newland Hill, 307m (NY 238,836)
- Whitcastles Hill, 278m (NY 227,876)
- Burnt Hill, 304m (NY 261,843)
- Crawthat Hill, 280m (NY 247,836)
- Craighousesteads Hill (NY 237,853)
- Grange Fell / Birrens Hill Settlement (NY 244,819)
- Picnic Site (NY 214,873)
- Dunnabie Farm (NY 256,811)
- Crossbankhead (NY 255,801)
- Crawthat (NY 252,824)
- Whiteleys (NY 249,789)

16.1.12 The Landscape and Visual Assessments for the individual OHL's took into consideration any existing overhead lines and other infrastructure (e.g. masts, existing Minsca windfarm, overhead BT lines) when determining the residual effects and therefore do not form part of the cumulative assessment, to avoid unnecessary repetition.

16.1.13 The cumulative assessment will consider the additional implications on all the LCA's and the identified visual receptors that will be affected by the implementation of both the south and the north OHL's. In addition, the two proposed windfarms that the new OHL's will support and the proposed Solwaybank windfarm will be taken into consideration in so far that the presence of the turbines will be acknowledged as also having physical impacts on the LCA's or being visible within a view.

16.1.14 Whilst the impacts of the OHL's have been mitigated through the routeing process by ensuring, as far as possible, they follow the lowest lying ground, avoid double climbing and utilise woodland and trees to act as backdrop, the windfarms necessarily require to be located on the highest ground, require substantially more access requirements and are significantly larger structures – they are likely to be at least 125m to the highest point, compared with 14m of the tallest OHL structures. Any impacts and residual effects of the windfarms will, therefore, be substantially greater and be much more visible over a wider area.

16.1.15 An EIA for each of the windfarms will require to be carried out by the respective developers, implementing these, which will provide a detailed assessment of the landscape and visual effects of the turbines and the cumulative effects with other existing and proposed windfarms within a 60km radius.

Significance Criteria

16.1.16 The assessment of potential impacts, as a result of the two proposed OHL's, underground cables, substation, access track and two windfarms has taken into account both the

construction phases and completion of the developments. The significance level attributed to each impact has been assessed based on the magnitude of change due to the proposals, and the sensitivity of the affected receptor / receiving environment to change. A detailed explanation of the rating and scale of these are explained in Chapter 6: Landscape Character and Visual Assessment.

Significance of Effects

16.1.17 Effects may be either beneficial or adverse and are determined by cross referencing the sensitivity of a receptor by the likely magnitude of change. Explanation of the effect ratings giving rise to the significance of effects on the receptor or receiving environment is provided in Chapter 6: Landscape and Visual Assessment.

16.1.18 In terms of ratings for sensitivity, magnitude and effects, the thresholds represent points on a continuum. Where appropriate, intermediate ratings are used to indicate effects at the higher or lower ends of a particular threshold. For example, minor to moderate would represent an effect towards the lower end of the range, whilst moderate to major would represent an effect towards the higher end of the range. Table 16.1 sets out the matrix determining the significance of effects.

Table 16.1: Matrix for Determining the Significance of Effects

Magnitude of Change	Sensitivity of Receptor / Receiving Environment to Change			
	High	Medium	Low	Negligible
High	Major	Moderate to Major	Minor to Moderate	None
Medium	Moderate to Major	Moderate	Minor	None
Low	Minor to Moderate	Minor	Minor	None
Negligible	None	None	None	None

16.1.19 Where residual effects are assessed as being Moderate or Major, the result is considered to be Significant. Unless otherwise stated the assessment will conclude that the effects would be adverse.

16.2 LANDSCAPE ASSESSMENT OF CUMULATIVE IMPACTS

Landscape Character Assessment

16.2.1 Section 6.6 within Chapter 6 set out full descriptions of each of the LCA's within the study area. These LCA's are indicated on Figure 6.7. Below is a summary of the characteristics of each of the LCA's, there sensitivity to change and the likely magnitude of change due to the cumulative impacts. Table 16.2 sets out the likely cumulative effects.

Local Character Area 1 – Lowland Farmland

Local Character Area 1 (LCA 1) is located to the south of the study area. This landscape is characterised by its flat topography, scattered farmsteads, minor road network, woodland copses and field boundaries; hedgerows; hedgerow trees; post and wire fencing; and drystone walls. A network of major overhead transmission lines, also criss-cross the landscape and the Gretna Sub-Station is located within this LCA. Despite the flat topography, views around the area, particularly from roads, are often fragmented or partially screened due to the hedgerow boundaries and tree groups. Where the ground rises and views are not interrupted, long distant and expansive views of the Solway Firth are afforded.

Sensitivity to Change – Medium

Landscape Scenic Quality and Value – Overall: Good

Magnitude of Change – Medium – Approximately 5.5km of proposed OHL would pass through this landscape character area. There would be no additional physical or visual effects should both OHL's be constructed. There would no additional physical effects from the construction of either of the two windfarms. The existing Minsca windfarm is not visible from this LCA, and it is unlikely that the proposed windfarms will be visible from this LCA.

Local Character Area 2 – Transitional Farmland

Local Character Area 2 (LCA 2) is a transitional landscape taking characteristics from the lowland farmland and upland pasture landscape character areas. The topography is more undulating in nature however there are numerous small tributaries and watercourses which create localised incised valleys. The predominant land cover is rough pasture with some semi-improved areas. There has also been significant commercial woodland activity over the years and plantation woodland blocks at varying stages of growth characterise this area. Due to its upland nature longer distance views are obtainable, however these are dependant on the topography and woodland cover.

Sensitivity to Change – Medium

Landscape Scenic Quality and Value – Overall: Good

Magnitude of Change – Medium to High - Approximately 6km of proposed OHL would pass through this landscape character area (2km of the southern route and 4km of the northern route). There would be no cumulative effects as a result of the entire scheme being implemented as the locations are completely distinct and there are no visual inter-relationships due to the topography and landscape features. However, the proposed Newfield windfarm would physically and visually affect this LCA within the northern part of the study area and it is possible that there would be intervisibility with the proposed Ewe Hill windfarm.

Local Character Area 3 – Upland Heath

Local Character Area 3 (LCA 3). This landscape character area is located to the northeast of the proposed transmission line and broadly replicates the coverage of the SNH Foothills Landscape Character Type. The landscape is upland and undeveloped and the majority of the land cover is heath with some scattered locations of unimproved grassland. The topography is varied and due to the elevated, undeveloped nature of the area panoramic long distance views are available from the summits and plateaux.

Sensitivity to Change – Medium

Landscape Scenic Quality and Value – Overall: Very Attractive

Magnitude of Change – Medium to High – neither of the proposed OHL's and associated infrastructure (as described in Chapter 3) pass through this local landscape character area and therefore do not directly affect it. The complexity of the landform and frequent tree and hedgerow groups, reducing intervisibility, means that there would be limited visual effects – only the most south-westerly part of this LCA having intervisibility with the southern OHL as it passes through the neighbouring Transitional Farmland LCA. However, both the Ewe Hill and Newfield windfarms would be visible from this LCA, particularly in the northern part of the study area and from the higher areas of ground.

Local Character Area 4 – Plantation Woodland

Local Character Area 4 (LCA 4) is located to the north and centre of the study area. These landscape character areas are characterised by a monoculture of commercial woodland. There are access tracks for maintenance and forestry workers. Some recreation access is possibly but a lack of views is likely to reduce the appeal - views are enclosed and limited to the surrounding woodland. Areas of clear felling and replacement planting are currently taking place and will continue on a phased cycle.

Sensitivity to Change – Low

Landscape Scenic Quality and Value – Overall: Ordinary

Magnitude of Change – Overall: Low to Medium – Approximately 1.25km of the OHL would pass through the Plantation Woodland, at Kirtleton and a similar length would pass immediately to the west of the plantation. A further 1.5km of OHL passes through the woodland to the north of Corrie Common. There would be no cumulative effects of both OHL's being constructed as they are completely distinct physically and neither would there be any intervisibility of the two lines. Views are however likely of the Ewe Hill windfarm from the southern part of this LCA and the northern part of the LCA would likely experience intervisibility with both windfarms.

Local Character Area 5 – Upland Pasture

Local Character Area 5 (LCA 5): Two areas are located towards the centre of the study area, separated by the LCA 6: Intimate River Corridor. These landscape character areas are sparsely settled and the majority of the land is characterised by rough pasture. The topography is varied and the landform is undulating with gently rounded summits and rolling valleys. Woodland cover is limited to small isolated pockets of plantation woodland which provide shelter for sheep and cattle, grazing this area. As a result of the topography, limited woodland cover and a lack of development, views from this area are elevated and long distance. However, due to the lack of access most views are not available to the public. Notable features upon the summits within this landscape are the hill forts associated with Iron Age settlers, particularly the settlement on the east slope of Newhall Hill.

Sensitivity to Change – Medium

Landscape Scenic Quality and Value – Overall: Good

Magnitude of Change – Overall: Medium to High - Approximately 2km of the southern OHL and 2.5km of the northern OHL would pass through this landscape character type. The Ewe Hill Sub Station is proposed, to the north of Crawthat Hill, and there would be a permanent access track to the sub station from the B7068 along the southern slopes of Newhall Hill and Crawthat Hill. The Ewe Hill windfarm would physically impact on this LCA and it is likely that there would be intervisibility with the Newfield windfarm.

Local Character Area 6 – Intimate River Corridor

Local Character Area 6 (LCA 6) is located towards the northwest of the study area this landscape character area, separating areas of Transitional Farmland and Upland Pasture. This landscape character area is focused around the Water of Milk and Corrie Water river valleys. The landscape is characterised by incised valleys, broadleaf woodlands and meandering watercourses. Views from individual properties are enclosed by the topography and woodland cover creating a sense of isolated intimacy. There are glimpsed views south of the existing Minsca windfarm.

Sensitivity to Change – Medium

Landscape Scenic Quality and Value – Overall: Very Attractive

Magnitude of Change – Overall: Low to Medium – This LCA is not physically affected by the southern OHL and only one short section (approximately 0.5km) of the northern OHL physically impacts on this LCA. The landform of this LCA does limit distant views, but it is likely that there will be views of both the proposed windfarms from within this LCA in various locations.

Regional Scenic Area

The Regional Scenic Area (RSA) around Langholm is approximately 1km to the east of the study area and just over 8km east of the Ewe Hill Substation and Ewe Hill windfarm. Neither of the two OHL's physically affects the RSA and the L&V assessment demonstrated that over a distance of 8km there were no visual effects. There would however be visual effects, particularly from within western parts of the RSA as a result of both the proposed windfarms.

Sensitivity to Change – High

Landscape Scenic Quality and Value – Overall: Very Attractive

Magnitude of Change – Low (primarily due to intervisibility with the windfarms), but views will be over a distance and only likely to be experienced from the western parts of the RSA.

Cumulative Effects

16.2.2 The impacts and mitigation measures with respect to the proposed scheme is, in the main, consistent for each of the landscape areas, as the components and method of construction will be the same, and these were set out in detail in Chapter 6. Detailed mitigation measures for the windfarms will be prepared by the respective EIA's but there are limited means of reducing the visual impacts of turbines due to their size and the requirements to site them on high ground. Keeping access tracks to a minimum, reinstating damaged ground, avoiding groups of turbines which visually overlap and best practice construction methods can minimise the physical impacts of windfarms.

16.2.3 Table 16.2 summarises the cumulative effects and on each of the LCA's and the Regional Scenic Area. It should be noted that where an effect has been assessed as being moderate to minor, it has been presented in the summary table as being of moderate effect. Equally, if the effect has been assessed as minor to moderate, an effect of minor has been presented.

TABLE 16.2 Summary of assessment of cumulative effects on landscape character areas

LANDSCAPE CHARACTER AREA / REGIONAL SCENIC AREA	CUMULATIVE EFFECTS			
	None	Minor Adverse	Moderate Adverse	Major Adverse
1. Lowland Farmland			◆	
2. Transitional Farmland			◆	
3. Upland Heath			◆	
4. Plantation Woodland		◆		
5. Upland Pasture			◆	
6. Intimate River Corridor		◆		
7. Regional Scenic Area	◆			

16.3 VISUAL ASSESSMENT OF CUMULATIVE IMPACTS

Receptor Locations

16.3.1 The receptor locations from the Landscape and Visual Assessment in Chapter 6 that are identified as likely experiencing cumulative impacts were set out in Section 16.1 of this chapter.

16.3.2 Table 16.3 assesses the cumulative impacts arising from the implementation of both the proposed OHL's and two proposed windfarms on the identified receptors. It should be noted that where an effect has been assessed as being moderate to minor, it would be considered a significant effect. Equally, if the effect has been assessed as minor to moderate, it would be considered to be a not significant effect.

TABLE 16.3 Cumulative Assessment of receptors

RECEPTOR	SENSITIVITY	CHANGES TO VIEW	MAGNITUDE (IF ALL ELEMENTS CONSTRUCTED)	RESIDUAL CUMUILATIVE EFFECTS	SIGNIFICANT EFFECT
Buildings (Residential and/or Farm Premises)					
Dunnabie Farm (NY 256,811)	High	South OHL within 1.5km to E. North OHL & Ewe Hill SS within 2.5km to N. Property nestles in amongst mature trees. Trees & landform to E would screen all views of proposed lines and windfarm at Newfield but there could be views of tops of turbines at Ewe Hill.	Low	Minor to Moderate	No
Crossbankhead (NY 255,801)	High	South OHL within 2.25km NE round to E. North OHL & Ewe Hill SS 4km to N. Views of rolling agricultural land with hedgerows & tree lines. Coniferous plantation in distance would backdrop the south OHL line, landform precludes views of SS, north OHL & windfarm at Newfield, but there is likely to be views of turbines at Ewe Hill.	Medium	Moderate to Major	Yes
Crawthat (NY 252,824)	High	OHL within 1km, extending round to SE. Ewe Hill SS & north OHL 1.25km to N. Property tucked in amongst trees & steep valley sides. No views of either OHL or SS. Unlikely to experience views of Newfield windfarm, but may see tops of some turbines at Ewe Hill.	Low	Minor to Moderate	No
Whiteleys (NY 249,789)	High	South OHL within 3km to N & E. North OHL & Ewe Hill SS within 5km to north. Views of rolling agricultural land with hedgerows & tree lines. Coniferous plantation in distance would backdrop the south line or screen entirely. Unlikely to have any views of north line or windfarm at Newfield, but would likely have views of windfarm at Ewe Hill.	Medium	Moderate to Major	Yes

RECEPTOR	SENSITIVITY	CHANGES TO VIEW	MAGNITUDE (IF ALL ELEMENTS CONSTRUCTED)	RESIDUAL CUMUILATIVE EFFECTS	SIGNIFICANT EFFECT
Outdoor Locations					
Pyatshaws Rigg, 231m (NY 215,845)	Med	North OHL, Ewe Hill SS & start of south OHL approx 4km to the SE. There may be glimpsed views of the top parts of the north OHL & short section of the access track, but Newhall Hill & Crawthat Hill will screen the majority of the north line & the track. No views of the SS as screened by Crawthat Hill. Glimpsed views of south OHL but receding. Would likely experience views of both proposed windfarms.	High	Moderate to Major	**Yes**
Newhall Hill Settlements, 272m (NY 237,838)	Med	Ewe Hill Sub Station 1 km E. North OHL 1.5km from E round to NW. Crawthat Hill screens SS & majority of north OHL – top of line visible. Landform & plantation groups would screen majority of access track. Glimpses of top of south OHL at distance of 2km, at nearest point. Likely to experience views of both windfarms, particularly Ewe Hill.	High	Moderate to Major	**Yes**
Newland Hill, 307m (NY 238,836)	Med	North OHL within 1.5km to SSE with views extending from S round to W. Pike Knowe (289m) will partially screen some views of OHL to SSE & forestry at Corrie Common screens views beyond 2.5km. South OHL within 1.5km to SSE receding. Very likely to experience views of both windfarms	High	Moderate to Major	**Yes**
Whitcastles Hill, 278m (NY 227,876)	Med	North OHL within 1.5km to south with views extending round to SE up to 4.5km. Forestry screens views from S round to W. Likely to experience views in fore to distance of approx 3.5km. Unlikely to have views of Ewe Hill SS or south OHL due to rolling land form. Landform & trees may screen Newfield windfarm but would see Ewe Hill windfarm	Med	Moderate	**Yes**

RECEPTOR	SENSITIVITY	CHANGES TO VIEW	MAGNITUDE (IF ALL ELEMENTS CONSTRUCTED)	RESIDUAL CUMUILATIVE EFFECTS	SIGNIFICANT EFFECT
Burnt Hill, 304m (NY 261,843)	Med	South OHL & SS within 1km to SW with views SW round to SSE for approx 3km. Beyond this views are extremely oblique & rolling landform and forestry at Kirtleton would likely screen any longer distant views. Foreground views look down on OHL which is in valley. North OHL within 1km to SW receding west. First section visible but landform and trees would obscure distant parts. Both windfarms likely to be visible and Ewe Hill windfarm likely to extend on to Burnt Hill.	High	Moderate to Major	Yes
Crawthat Hill, 280m (NY 247,836)	Med	The Ewe Hill SS is located here and both OHL's start / terminate. The access to the SS rises up the hill from the road. The windfarm at Ewe Hill will form part of close views and parts of the windfarm at Newfield will also be visible.	High	Moderate to Major	Yes
Craighousesteads Hill Settlement (NY 237,853)	Med	Proposed Ewe Hill SS 2km SE. North OHL passes immediately to the north of the hill. Views of south OHL visible but receding. Both windfarms would be visible, particularly at the windfarm at Ewe Hill.	High	Moderate to Major	Yes
Grange Fell / Birrens Hill Settlement (NY 244,819)	Med	Grange Fell is the highest point within the study area at 319m AOD & Birrens Hill settlement is approx 1km S at 250m AOD. Both locations would have panoramic views NE to SE over the valley to both OHL's and to both windfarms.	High	Moderate to Major	Yes

RECEPTOR	SENSITIVITY	CHANGES TO VIEW	MAGNITUDE (IF ALL ELEMENTS CONSTRUCTED)	RESIDUAL CUMUILATIVE EFFECTS	SIGNIFICANT EFFECT
Picnic Site (NY 214,873)	Med	Picnic site set within former quarry site with primary views to W & N. North OHL within 1km SSW round to SW. Remaining views obscured to S & E by plantation woodland & by woodland groups & landform to SW. Parts of windfarm at Newfield would be visible. South OHL and windfarm at Ewe Hill would be obscured by the trees.	Med	Moderate	**Yes**

17 Schedule of Environmental Commitments

17.1.1 Best practice in EIA recommend the use of a Schedule of Environmental Commitments, which can act as a quick reference for anyone interested in the mitigation measures to which the applicant has committed to implementing and upon which the assessment of residual effects presented in this ES has been based. It will be utilised by the design team throughout development of the detailed design, and the appointed contractors will be required to allow for, and ultimately implement, each of the measures in this schedule as a minimum at the construction stage.

17.1.2 Table 17.1 presents a Schedule of Environmental Commitments for the Proposed scheme between Gretna and Ewe Hill substations. Table 17.2 presents a Schedule of Environmental Commitments for the proposed scheme between Ewe Hill and Newfield Substations; both are listed according to the relevant environmental topic area.

Table 17.1 Schedule of Environmental Commitments- Gretna to Ewe Hill

Environmental Subject Area	Environmental Commitments
Landscape and Visual	<u>Construction</u> Mitigation measures to reduce physical disturbance and perception of activity in the landscape, would be as follows: ■ Prescribed construction routes along roads already capable of accommodating construction traffic; ■ Utilising existing tracks and field access points for access track requirements, wherever possible; ■ Ensuring construction working areas are kept to a minimum; ■ Restricted working hours e.g. no night time working to reduce noise being carried across the landscape; ■ Directional, mobile lighting units to avoid light spillage across the landscape; ■ Any trees / hedges, to be retained (within the working corridors, are to be protected by fencing positioned to encompass, at the least, the crown spread of trees. No materials are to be stored within the fenced off areas (or under any other trees / hedges) <u>Operation</u> Mitigation measures, on completion, would include: ■ Replacement of lost / damaged trees, hedgerows and other vegetation; ■ Reduction in width of any permanently remaining access tracks; ■ Planting with 5 year monitoring period to ensure successful establishment <u>Dismantling</u> No mitigation required/As above

Ecology and Ornithology	Construction Details of the mitigation will be transferred to an EMP, the implementation and monitoring of which will be overseen by an Environmental Manager, who will be responsible for the safe retention of the sensitive ecological areas. The success of protective measures will be reviewed every two months to ensure that all areas are adequately protected. All Site staff will receive tool box talks on the various ecological sensitivities of the proposed route as part of their site induction. Generic mitigation and standard best practice methods in construction will be implemented to avoid, reduce and offset effects as follows: *Avoid* ■ ensure that work compounds and access routes, etc. are not located in, adjacent to (if potentially damaging to the adjacent habitats), or across areas of habitat with significant ecological value or where valued species are present. Access routes will be selected based on avoidance of these key habitat areas and known locations of key species, or timing of access will be taken to minimise damage/disturbance; ■ vehicle tracking or construction within 30m of badger setts will be avoided (unless setts are by public roads/tracks, where disturbance by vehicles is the norm); ■ establish site fencing as appropriate to prevent access to ecologically sensitive areas adjacent to working areas; ■ pre-construction species surveys of effected areas, with attention paid to changes in programme timetables; ■ covering of pits or provision of mammal ramps in all excavations over 0.5m in depth to prevent animals, such as badger and otter falling in holes and becoming trapped; and ■ follow SEPA Pollution Prevention Guidelines (PPGs) to prevent pollution of watercourses and standing water through siltation or chemicals. ■ refuelling will take place as far away from key ecological features as possible and should only take place in a securely bunded area within the proposed works area, with spill kit on site. No chemicals or fuels will be stored outside of this bund; ■ any mechanical vegetation clearance within 100m of setts should always be done prior to November (the badger breeding season is November to May), and within 50m should be done by hand. Note: A licence is needed for works within 30m of a sett. Use of heavy vibration or pile driving equipment will be restricted to no closer than 100m to any active badger sett between November and June (badger breeding season); ■ badger gates may need to be installed in any perimeter fencing that could form an obstruction to badger passage; if so, specialist advice should be sought; and ■ water sources where badgers may potentially drink should always be safeguarded. *Reduce*

	▪ restrict workforce to clearly demarcated working areas through the erection of suitable fencing to prevent unnecessary damage; ▪ timing of works to minimise disturbance i.e. not during the breeding seasons for key species resident near to the route of the proposed powerline where the work could cause a significant disturbance, or within an hour of dusk/dawn or at night time; and ▪ lighting to be sensitively designed to avoid light spill, where lighting is necessary for night-time security. *Offset* ▪ in collaboration with Landscape and Visual mitigation, any new landscape planting required will comprise native species of local origin in appropriate locations to tie in with existing semi-natural habitat. In addition to a commitment to and transferral of the mitigation outlined above, there will be pre-construction and further surveys to prevent/minimise direct mortality and disturbance to protected species within the site, particularly otter, badger and breeding birds as follows: ▪ Further badger monitoring/survey work will be completed within six months prior to construction commencing, targeted on setts within 100m of the proposed route. If any sett may be subject to disturbance then a developmental licence may be required from Scottish Natural Heritage if a protection zone of 30m cannot be retained around each badger sett; ▪ Pre-construction surveys will also be carried out for otter within six months prior to construction for watercourses where their presence has been identified; ▪ Finally, the success of all the mitigation would require monitoring, which may be required over the entire construction and post construction period; and ▪ Nesting bird surveys will be required for areas where off-track access, vegetation removal, material storage, and locations for transmission line poles are required between 15th April and 31st July. Operation No mitigation required Dismantling No mitigation required/As above
Archaeology	Construction As there has been significant consideration of the visual effect and the inter-visibility of archaeological features through routeing to avoid hill tops, ridgelines and built archaeological resources, no further mitigation is considered necessary. Operation No mitigation required Dismantling No mitigation required

Geology and Soils	Construction The contractor will produce an Environmental Management Plan (EMP) containing a construction method statement that must be agreed with the Local Authority and SEPA. This will include information on: ■ best practices in soil handling and storage, and particular measures to be undertaken with respect to protection of peat, concerns related to peat stability, and protection of watercourses from siltation; ■ soil handling and storage. All earth bunds and soil storage areas will be well managed to minimise runoff and erosion through the use of temporary covers for short term stockpiles and reseeding with grass for long term stockpiles; ■ chemical and fuel handling and storage, management of maintenance activities on site and emergency response in the case of a leak or spill. All fuel and other chemicals will be stored in accordance with relevant best practice, including: - In line with manufacturer's recommendations; - In appropriate impermeable bunded areas; - Away from extremes in temperature; and - Only until the end of shelf life. Vehicles and plant will be regularly maintained and all maintenance will be undertaken on impermeable surfaces in order to minimise risks of leaks to soil. Operation No mitigation required Dismantling No mitigation required/As above
Hydrology	Construction *Pollution Impact from Silt-laden Runoff* The contractor will produce a Environmental Management Plan (EMP) which contains a construction method statement that includes: ■ A detailed breakdown of the phasing of construction activities; ■ A pollution risk assessment of the site and the proposed activities; ■ Identification of all Controlled Waters that may be affected by the works and temporary discharge points to these watercourses; ■ Planning and design of appropriate pollution control measures during earthworks and construction; ■ Management of the pollution control system, including dewatering of excavations away from watercourses; ■ Contingency planning and emergency procedures; and ■ On-going monitoring of construction procedures to ensure management of risk is maintained.

	All earth moving works or similar operations will be carried out in accordance with BSI Code of Practice for Earth Works BS6031:1981. While it is acknowledged that best practice to minimise run-off would be to undertake construction and dismantling during the driest period of the year, given the location of the OHL in southern Dumfries and Galloway, there are likely to be significant periods of rainfall throughout the year. Therefore, construction staff will ensure that all excavations within 10m of watercourses are excavated away from the watercourse and backfilled immediately following placement or removal of wood poles and any dewatering will be pumped away from watercourses to allow filtration to the ground. All temporary stockpiles associated with excavations for wood poles will be located a minimum of 10m from the edge of watercourses. All excavations will be backfilled as soon as practicable. Where topography dictates that working platforms are needed, these will be formed to allow surface water to drain away from watercourses. *Pollution Impact from Chemical Contaminated Runoff* All fuel and other chemicals will be stored in accordance with best practice procedures, including in a designated fuelling site located at a safe distance from existing watercourses and in appropriate impermeable bunded containers/areas which will be defined within the EMP. These will be designed to capture any leakage, whether from a tank or from associated equipment such as filling and off-take points, sighting gauges etc, all of which will be located within the bund; Oil booms and soakage pads will be maintained in site compounds and spill kits kept in all vehicles to enable a rapid and effective response to any accidental spillage or discharge. All construction staff will be trained in the effective use of this equipment; Construction vehicles and plant will be regularly maintained and all maintenance, fuelling and vehicle washing will be undertaken on appropriate impermeable surfaces away from watercourses in order to minimise risks of leaks to soil and surface waters. No permanent access tracks will be constructed to provide access to the wood pole locations. A permanent access road will be constructed, connecting the Ewe Hill substation to the B7068, to the east of Grange of Tundergarth. This will require the installation of culverts to allow the bridging of three small watercourses, following discussion with SEPA. It will also be designed to allow the free drainage of surface waters either below or above the track. All construction vehicles will, where practicable, be fitted with low ground pressure tracks and will be tracked to pole locations keeping as great a distance as practicable from watercourses. Construction traffic will use the same haul routes and parking areas as specified within the EMP at all times, where practicable, to reduce compaction and associated run-off in the wider area. Areas of soft or boggy ground or of significant depths of peat will be avoided where practicable.

	Construction vehicles and construction working areas will, where practicable, maintain a minimum stand-off distance of 10m from the edge of watercourses. At those pole locations within 10m of the edge of watercourses, construction vehicles will be positioned on the far side of the excavation from the watercourse to minimise the risk of affecting the integrity of the bank. Where level sections of watercourses need to be crossed occasionally by construction vehicles, they will be crossed by placing bog mats across the watercourse to avoid any damage being caused to the bank or bed in line with General Binding Rule (GBR) 6. Repeated crossings of watercourses for erection of the wood poles will be avoided where practicable. Where plant or vehicles have to make repeated crossings of a watercourse, a temporary haul road bridge or flumed / culverted crossing will be erected, in line with GBR 6 and following consultation with SEPA. Should any drainage ditches become damaged or blocked as a result of construction vehicles crossing them, these will be repaired or cleared by construction staff immediately. *Direct discharge of untreated foul drainage* Welfare facilities will either connect directly to the foul sewer or to a septic tank, subject to approval from Scottish Water and SEPA. If septic tanks are to be used, these will be maintained and emptied on a regular basis by a suitably licensed contractor. *Damage to Private Water Supplies* Prior to any construction works being undertaken, the Principal Contractor (PC) will meet with each PWS users to identify the source, means of conveyance (pipe etc) and location of all receptors of the water supply (human, farm, livestock field etc). The PC will then identify all construction activities to take place in or near the source, catchment and means of conveyance of the PWS. The PC will then prepare a Risk Assessment to identify any potential effects that could occur to the PWS. If risks are identified, the PC will take tap water samples to identify baseline drinking water quality and water pressure and put in place mitigation measures such as fencing, cut-off ditches etc following agreement with the PWS users to ensure that the PWS is protected throughout the construction works. Should damage occur to the PWS as a result of the construction works (to be verified through comparison with tap water quality and pressure baseline conditions), the PC will either repair this damage immediately to the satisfaction of the PWS users or, if the supply cannot be repaired, provide an alternative water supply following agreement with the PWS users. During any repairs to the PWS, the PC will provide an alternative water supply that is satisfactory to the PWS users. <u>Operation</u> Mitigation measures will be monitored by an Environmental Manager

	appointed by SPT and an Ecological Clerk of Works. Dismantling No mitigation required/ As above
Agriculture and Sporting Interests	Construction The agreed mitigation measures relating to agriculture and sporting activity as described within this ES are to be incorporated into the Environmental Management Plan. Monitoring of the implementation of mitigation measures during construction is to be undertaken by the Site Clerk of Works/Wayleaves Officer to ensure compliance *Impact on Agricultural Activities* The mitigation proposals relating to agriculture and sporting are based on the premise of: ■ Prevent: routeing to prevent effects ■ Reduction: provision of measures to minimise effect ■ Offset: provision of works or compensation, including provision of measures to improve agricultural activity ■ Enhancement: provision of measures to improve agricultural activity. The permanent loss to agriculture will be reduced by micro-siting of wood poles, planning of access routes and careful development of access tracks in consultation with the land interest. Access for the land interests to their agricultural land will be provided at all times during the construction process and post construction. Damage to the agricultural capability of soils would be avoided by adoption of procedures relating to soil stripping, handling and storage during construction. Existing field drainage systems would be reinstated where encountered to ensure that land capability is maintained and flooding issues would not be worsened. Financial compensation would be provided for the loss of any area of land that would be lost to agriculture, according to the SPT wayleave agreement. Detailed mitigation measures to prevent, reduce and where possible offset effects on agriculture are listed in Appendix11.5. Details of specific mitigation measures to be employed on a farm-by-farm basis are detailed in Appendix 11.4. *Impact on Sporting Activities* The effect on sporting activities will be mitigated during construction by ensuring land owners are consulted with regards to the construction programme and that access routes area maintained. The permanent loss to agriculture will be reduced by micro-siting of wood poles, planning of access routes and careful development of access tracks in consultation with the land interest. Detailed mitigation measures to prevent, reduce and where possible offset

	effects on sporting activities are listed in Appendix 11.5. Details of specific mitigation measures to be employed on a farm-by-farm basis are detailed in Appendix 11.4. Operation No mitigation required Dismantling No mitigation required/ As above
Forestry	Construction A number of mitigation measures will be implemented within the wayleave (i.e. land over which SPT have control) to reduce the effect of windthrow on forestry, including: ▪ Utilising existing clearings such as forest roads and rides and also watercourses for the felling boundaries; and ▪ Reviewing opportunities to positively manage any natural regeneration of low-growing shrub species along the edge of the wayleave that may occur. Whilst SPT or it's Contractor will seek to employ further measures, such as extending the felling to a 'wind-firm' edge, this aspiration requires the agreement of the landowner, it cannot form 'committed mitigation' and therefore cannot be applied to mitigate the likely effects for this assessment.With consent from landowners, felling outwith the wayleave corridor would extend to the nearest practical windfirm edge, applying Forest Landscape Design principles. These are: shape, scale, diversity, visual force, unity and 'spirit of the place': in creating a new boundary edge appreciation of these principles and their practical applications would be employed to effect visual improvements where visible by the public. The mitigation measures outlined above, whilst not 'committed' are considered likely. A number of further measures are proposed to mitigate the effect on forestry management including: ▪ Retaining new and upgraded access tracks for landowner use (where requested, and subject to separate planning consent); ▪ Creating new access tracks where the presence of the new OHL would result in difficulties in accessing forest areas isolated by the overhead line. Isolation can be as a result topography, the presence of a watercourse, or the lack of brash for timber extraction following the removal of trees within the wayleave; ▪ Provision of forwarder access from new and upgraded roads into adjacent forest blocks; ▪ Erection of 'goal-posts' to show maximum safe working height for forestry traffic; and ▪ Creating alternative timber transfer areas, where the route precludes the use of existing facilities;

	Operation ■ Management of natural regeneration within the wayleave to assist managers in their objectives to increase woodland diversity; ■ wildlife corridor management; and ■ Monitoring and removal of windblown trees. Dismantling No mitigation required.
Traffic and Transportation	Construction The appointed Contractor will be required to develop and agree with the relevant departments of Dumfries and Galloway Council (including Roads), an Environmental Management Plan (EMP) for the construction phase, which will consider a broad range of environmental issues related to construction, including: ■ The delivery of materials and the removal of surplus materials at non-peak periods for vehicular and pedestrian traffic to avoid disruption to other road users; ■ If required, the delivery of special loads at night or outside peak times as far as reasonably practicable, and consultation with the roads authority and the Police prior to such deliveries to minimise disruption to other road users; ■ The need for sheeting of loads and wheel and body washing where there is a risk of construction traffic carrying or dispersing fugitive material, principally mud and dust, onto public roads; and ■ The routing of traffic to and from the construction site to avoid the busiest routes beyond the immediate vicinity of the site. This plan will then be adopted and will form part of the construction contract, and the measures within it implemented to ensure that traffic and transport impacts as a result of the project are appropriately mitigated. In addition, upon confirmation of the Scottish Power's preferred construction schedule, the Contractor will be required to produce a traffic management plan (TMP) to minimise effects on the road network. TMP will be produced in consultation with Dumfries and Galloway Council Combined Services, and ultimately providing the following information (as required): ■ Restrictions and approved access routes; ■ Road condition survey information for routes to the site prior to commencement; ■ Removal and replacement of street furniture such as bollards and handrails and road signs; ■ Arrangements with Police for escort of oversized abnormal loads; ■ Signage warning other users of oversized load movements; ■ Ground preparation including protection of services and lowering of pavements;

- Arrangements for road maintenance and cleaning;
- Timing of deliveries (taking into account identified sensitive receptors);
- Arrangements for parking restrictions along access route;
- Road maintenance and cleaning; and
- Wheel cleaning arrangements.

In order to further reduce traffic effects from construction of the proposed substation, construction personnel will be encouraged to car-share where practicable.

A further reduction in effect could be gained by obtaining the track and hardstand surfacing material from the adjacent Grange Quarry. In doing so, less than a mile of public road would be trafficked per lorry load (an estimated 252 total lorry loads are required). This will be subject to commercial discussions with the quarry operator.

In construction of the access within the site, excavated materials where suitable will be re-used in the formation of the track to minimise off site material import. Unsuitable material will be redistributed over fill slopes to negate the requirement for materials to be taken off site.

Maximum side slopes to earthworks should be 1 in 3, although flatter gradients should be achieved where possible. The stockpiled topsoil will be used to dress the embankment faces to aid in vegetation reinstatement.

All construction works, whilst complying with the appropriate planning consents, will take cognisance of best practice in terms of control of pollution as defined in the following documents:

- CIRIA Report C532 - Control of Water Pollution from Construction Sites
- SEPA Pollution Prevention Guidelines:
  - PPG01 General guide to the prevention of water pollution
  - PPG02 Above ground oil storage tanks
  - PPG03 The use and design of oil separators
  - PPG05 Works in near or liable to affect watercourses
  - PPG06 Working at construction and demolition sites
  - PPG07 Refueling Facilities
  - PPG08 Storage and disposal of used oils
  - PPG21 Pollution Incident Response Planning
  - PPG26 Pollution Prevention Storage and Handling of Drums & Intermediate Bulk Containers

A further reduction in HGV impact could be achieved by lengthening the construction programme, or by spreading out delivery of track and hardstand surfacing material. However, in doing so, the material would have to be stockpiled on site and therefore require double handling which has an increased impact on the environment.

	Operation No mitigation required Dismantling Prior to decommissioning, a further traffic assessment will be carried out and traffic management procedures agreed with the appropriate authorities and the local communities.
Construction Noise	Construction Any potential for occasional noise disturbance from the construction works will be addressed through the practices adopted and equipment utilised by the Contractor and controlled by the requirements of D&GC Department of Environmental Health, for example, by restricting hours of noisy activity in the vicinity of identified sensitive receptors. Similarly noise from additional traffic movements or the import of unusual loads will be managed in so far as is reasonably practicable to minimise noise disturbance, particularly during night time hours (2300 – 0700h). These restrictions will be implemented through the project Environmental Management Plan (EMP). The onus will be upon the Contractor to reduce ambient noise levels in so far as is reasonably practicable by the implementation of Best Practicable Means. *Protecting the Neighbouring Community during Construction – Best Practicable Means* Several safeguards exist to minimise the effects of construction noise and these should operate during the construction of the OHLs and the Ewe Hill substation and access road. These safeguards include: ■ The various EU Directives and UK Statutory Instruments that limit the noise emissions of a variety of construction plant ■ The guidance set out in BS 5228: Parts 1 & 2: 2008 which covers noise and vibration control on construction sites ■ The powers that exist for local authorities under sections 60 and 61 of the 'Control of Pollution Act 1974' and section 80 of the 'Environmental Protection Act 1990' to control environmental noise and pollution on construction sites. Contract documents supplied to contractors will require that the effects of environmental noise are considered during the design and execution of the works. Such an assessment will result in a noise control plan that provides a noise management system tailored to the specific needs of the construction works, the site and the surrounding area. As a minimum, any noise control plan will cover: ■ Procedures for ensuring compliance with statutory or other identified noise control limits ■ Procedures for ensuring that all works are carried out according to the principle of Best Practicable Means as defined in the Control of Pollution Act 1974 ■ General induction training for site operatives and specific training for staff

	having responsibility for particular aspects of controlling noise from the site ■ Liaison with D&GC and the local community ■ Provision of a contact telephone number and responsible person to whom any complaints or concerns with regard to noise, vibration and other environmental issues should be put as a first port of call. This affords the Contractor the opportunity to address any issues prior to D&GC involvement. In order to demonstrate the adoption of Best Practicable Means to control noise emission from the site, the following conditions and measures could be imposed on the construction works. ■ as far as is reasonably practicable, the contractors should bring to site and employ on the works only the most environmentally acceptable and quietly operating plant and equipment compatible with the safe and efficient execution of the works; ■ equipment should be well maintained and fit for purpose. The noise emitted by any plant item should not exceed the limits quoted in either the relevant EC Directive / UK Statutory Instrument and should be no greater than the relevant values quoted in the current version of BS 5228; ■ all items of plant operating on the site in intermittent use should be shut down in the intervening periods between uses. In particular: ■ All pneumatic tools should be fitted with silencers or mufflers ■ Deliveries should be programmed to arrive during daytime hours only. Care should be taken when unloading vehicles to minimise noise. Where possible, delivery vehicles should be routed so as to minimise disturbance to local residents. Delivery vehicles should be prohibited from waiting on the highway or within the site with their engines running ■ No radios or music should be played on the site. All plant items should be properly maintained and operated according to manufacturers recommendations in such a manner as to avoid causing excessive noise. All plant should be sited so that the noise impact at nearby noise sensitive properties is minimised. Local hoarding, screens or barriers should be erected as necessary to shield particularly noisy activities. Problems concerning noise from construction works can sometimes be avoided by taking a considerate and neighbourly approach to relations with the local residents. Works should not be undertaken outside of the core daytime hours, unless absolutely necessary. All neighbours should be informed well in advance of such works using a leaflet drop giving full details of the hours during which the works are scheduled to be undertaken and also providing an appropriate contact name and number to whom complaints should be addressed. It may be that, should complaints be received, ad hoc monitoring would be required to ascertain the source of the disturbance and provide recommendations for mitigation.

	Operation No mitigation required. Dismantling As above
Operational Noise and Electric Magnetic Fields	Operation *Operational noise* Since audible-noise levels due to the line will be imperceptible at the nearest property, no mitigation measures are necessary *EMF Raditaion* SPT considers that even a remote possibility of a health risk must be taken seriously, because very large numbers of people are exposed to power-frequency fields from both overhead and underground power lines and from many other sources, including domestic appliances. Further studies are in progress in this country and elsewhere to establish whether or not there is any genuine health risk. SPT will continue to act upon the current advice of the Government and HPA in this matter.

Table 17.2 Schedule of Environmental Commitments- Ewe Hill to Newfield

Environmental Subject Area	Environmental Commitments
Landscape and Visual	Construction Mitigation measures to reduce physical disturbance and perception of activity in the landscape, would be as follows: ■ Prescribed construction routes along roads already capable of accommodating construction traffic; ■ Utilising existing tracks and field access points for access track requirements, wherever possible; ■ Ensuring construction working areas are kept to a minimum; ■ Restricted working hours e.g. no night time working to reduce noise being carried across the landscape; ■ Directional, mobile lighting units to avoid light spillage across the landscape; ■ Any trees / hedges, to be retained (within the working corridors, are to be protected by fencing positioned to encompass, at the least, the crown spread of trees. No materials are to be stored within the fenced off areas (or under any other trees / hedges) Operation Mitigation measures, on completion, would include: ■ Replacement of lost / damaged trees, hedgerows and other vegetation; ■ Reduction in width of any permanently remaining access tracks;

	■ Planting with 5 year monitoring period to ensure successful establishment Dismantling No mitigation required/As above
Ecology and Ornithology	Construction Details of the mitigation will be transferred to a CEMP, the implementation and monitoring of which will be overseen by an Environmental Manager, who will be responsible for the safe retention of the sensitive ecological areas. The success of protective measures will be reviewed every two months to ensure that all areas are adequately protected. All Site staff will receive a tool box talk on the various ecological sensitivities of the proposed route as part of their site induction. Generic mitigation and standard best practice methods in construction will be implemented to avoid, reduce and offset effects as follows: *Avoid* ■ ensure that work compounds and access routes, etc. are not located in, adjacent to (if potentially damaging to the adjacent habitats), or across areas of habitat with significant ecological value or where valued species are present. Access routes will be selected based on avoidance of these key habitat areas and known locations of key species, or timing of access will be taken to minimise damage/disturbance; ■ vehicle tracking or construction within 30m of badger setts will be avoided (unless setts are by public roads/tracks, where disturbance by vehicles is the norm); ■ establish site fencing as appropriate to prevent access to ecologically sensitive areas adjacent to working areas; ■ pre-construction species surveys of effected areas, with attention paid to changes in programme timetables; ■ covering of pits or provision of mammal ramps in all excavations over 0.5m in depth to prevent animals, such as badger and otter falling in holes and becoming trapped; and ■ follow SEPA Pollution Prevention Guidelines (PPGs) to prevent pollution of watercourses and standing water through siltation or chemicals. ■ refuelling will take place as far away from key ecological features as possible and should only take place in a securely bunded area within the proposed works area, with spill kit on site. No chemicals or fuels will be stored outside of this bund; ■ any mechanical vegetation clearance within 100m of setts should always be done prior to November (the badger breeding season is November to May), and within 50m should be done by hand. Note: A licence is needed for works within 30m of a sett. Use of heavy vibration or pile driving equipment will be restricted to no closer than 100m to any active badger sett between November and June (badger breeding season); ■ badger gates may need to be installed in any perimeter fencing that could form an obstruction to badger passage; if so, specialist advice should be sought; and

	▪ water sources where badgers may potentially drink should always be safeguarded. *Reduce* ▪ restrict workforce to clearly demarcated working areas through the erection of suitable fencing to prevent unnecessary damage; ▪ timing of works to minimise disturbance i.e. not during the breeding seasons for key species resident near to the route of the proposed powerline where the work could cause a significant disturbance, or within an hour of dusk/dawn or at night time; and ▪ lighting to be sensitively designed to avoid light spill, where lighting is necessary for night-time security. *Offset* ▪ in collaboration with Landscape and Visual mitigation, any new landscape planting required will comprise native species of local origin in appropriate locations to tie in with existing semi-natural habitat. In addition to a commitment to and transferral of the mitigation outlined above, there will be pre-construction and further surveys to prevent/minimise direct mortality and disturbance to protected species within the site, particularly otter, badger and breeding birds as follows: ▪ Further badger monitoring/survey work will be completed within six months prior to construction commencing, targeted on setts within 100m of the proposed route. If any sett may be subject to disturbance then a developmental licence may be required from Scottish Natural Heritage if a protection zone of 30m cannot be retained around each badger sett; ▪ Pre-construction surveys will also be carried out for otter within six months prior to construction for watercourses where their presence has been identified; ▪ Finally, the success of all the mitigation would require monitoring, which may be required over the entire construction and post construction period; and ▪ Nesting bird surveys will be required for areas where off-track access, vegetation removal, material storage, and locations for transmission line poles are required between 15th April and 31st July. Operation No mitigation required Dismantling No mitigation required/ As above
Archaeology	Construction As there has been significant consideration of the visual effect and the inter-visibility of archaeological features through routeing to avoid hill tops, ridgelines and built archaeological resources, no further mitigation is considered necessary.

	Operation No mitigation required Dismantling No mitigation required
Geology and Soils	Construction The contractor will produce a Environmental Management Plan (EMP) containing a construction method statement that must be agreed with the Local Authority and SEPA. This will include information on best practices in soil handling and storage, and particular measures to be undertaken with respect to: ■ protection of peat, concerns related to peat stability, and protection of watercourses from siltation; ■ soil handling and storage. All earth bunds and soil storage areas will be well managed to minimise runoff and erosion through the use of temporary covers for short term stockpiles and reseeding with grass for long term stockpiles; ■ chemical and fuel handling and storage, management of maintenance activities on site and emergency response in the case of a leak or spill. All fuel and other chemicals will be stored in accordance with relevant best practice, including: - In line with manufacturer's recommendations; - In appropriate impermeable bunded areas; - Away from extremes in temperature; and - Only until the end of shelf life. Vehicles and plant will be regularly maintained and all maintenance will be undertaken on impermeable surfaces in order to minimise risks of leaks to soil. Operation No mitigation required Dismantling No mitigation required/ As above
Hydrology	Construction The contractor will produce a Environmental Management Plan (EMP) which contains a construction method statement that includes: ■ A detailed breakdown of the phasing of construction activities; ■ A pollution risk assessment of the site and the proposed activities; ■ Identification of all Controlled Waters that may be affected by the works and temporary discharge points to these watercourses; ■ Planning and design of appropriate pollution control measures during earthworks and construction; ■ Management of the pollution control system, including dewatering of

	excavations away from watercourses; ■ Contingency planning and emergency procedures; and ■ On-going monitoring of construction procedures to ensure management of risk is maintained. *Pollution Impact from Silt-laden Runoff* All earth moving works or similar operations will be carried out in accordance with BSI Code of Practice for Earth Works BS6031:1981. Construction staff will ensure that all excavations within 10m of watercourses are excavated away from the watercourse and backfilled immediately following placement or removal of wood poles and any dewatering will be pumped away from watercourses to allow filtration to the ground. All temporary stockpiles associated with excavations for wood poles will be located a minimum of 10m from the edge of watercourses. All excavations will be backfilled as soon as practicable. Where topography dictates that working platforms are needed, these will be formed to allow surface water to drain away from watercourses. *Pollution Impact from Chemical Contaminated Runoff* All fuel and other chemicals will be stored in accordance with best practice procedures, including in a designated fuelling site located at a safe distance from existing watercourses and in appropriate impermeable bunded containers/areas which will be defined within the EMP. These will be designed to capture any leakage, whether from a tank or from associated equipment such as filling and off-take points, sighting gauges etc, all of which will be located within the bund; Oil booms and soakage pads will be maintained in site compounds and spill kits kept in all vehicles to enable a rapid and effective response to any accidental spillage or discharge. All construction staff will be trained in the effective use of this equipment; Construction vehicles and plant will be regularly maintained and all maintenance, fuelling and vehicle washing will be undertaken on appropriate impermeable surfaces away from watercourses in order to minimise risks of leaks to soil and surface waters. *Mitigation Measures: Impact from Soil Compaction* No permanent access tracks will be constructed to provide access to the wood pole locations. All construction vehicles will, where practicable, be fitted with low ground pressure tracks and will be tracked to pole locations keeping as great a distance as practicable from watercourses. Construction traffic will use the same haul routes and parking areas as specified within the EMP at all times, where practicable, to reduce compaction and associated run-off in the wider area. Areas of soft or boggy ground or of significant depths of peat will be avoided where practicable.

	Impact on Integrity of Banking Construction vehicles and construction working areas will, where practicable, maintain a minimum stand-off distance of 10m from the edge of watercourses. At those pole locations within 10m of the edge of watercourses, construction vehicles will be positioned on the far side of the excavation from the watercourse to minimise the risk of affecting the integrity of the bank. Where level sections of watercourses need to be crossed occasionally by construction vehicles, they will be crossed by placing bog mats across the watercourse to avoid any damage being caused to the bank or bed in line with General Binding Rule (GBR) 6. Repeated crossings of watercourses for erection of the wood poles will be avoided where practicable. Where plant or vehicles have to make repeated crossings of a watercourse, a temporary haul road bridge or flumed / culverted crossing will be erected, in line with GBR 6 and following consultation with SEPA. Should any drainage ditches become damaged or blocked as a result of construction vehicles crossing them, these will be repaired or cleared by construction staff immediately. *Direct discharge of untreated foul drainage* Welfare facilities at compounds will either drain to a portable septic tank or connect directly to the foul sewer. If portable septic tanks are to be used, these will be maintained and removed from site on a regular basis by a suitably licensed supplier/contractor. *Damage to Private Water Supplies* Prior to any construction works being undertaken, the Principal Contractor (PC) will meet with each PWS users to identify the source, means of conveyance (pipe etc) and location of all receptors of the water supply (human, farm, livestock field etc). The PC will then identify all construction activities to take place in or near the source, catchment and means of conveyance of the PWS. The PC will then prepare a Risk Assessment to identify any potential impacts that could occur to the PWS. If risks are identified, the PC will take tap water samples to identify baseline drinking water quality and water pressure and put in place mitigation measures such as fencing, cut-off ditches etc following agreement with the PWS users to ensure that the PWS is protected throughout the construction works. Should damage occur to the PWS as a result of the construction works (to be verified through comparison with tap water quality and pressure baseline conditions), the PC will either repair this damage immediately to the satisfaction of the PWS users or, if the supply cannot be repaired, provide an alternative water supply following agreement with the PWS users. During any repairs to the PWS, the PC will provide an alternative water supply that is satisfactory to the PWS users.

	Operation Mitigation measures will be monitored by an Environmental Manager appointed by SPT and an Ecological Clerk of Works. Dismantling No mitigation required/ As above
Agrilcuture and Sporting Interests	Construction The agreed mitigation measures relating to agriculture and sporting activity as described within this ES are to be incorporated into the Environmental Management Plan. Monitoring of the implementation of mitigation measures during construction is to be undertaken by the Site Clerk of Works/Wayleaves Officer to ensure compliance. *Impact on Agricultural Activities* The mitigation proposals relating to agriculture and sporting are based on the premise of: ■ Prevent: routeing to prevent effects ■ Reduction: provision of measures to minimise effect ■ Offset: provision of works or compensation, including provision of measures to improve agricultural activity ■ Enhancement: provision of measures to improve agricultural activity. The permanent loss to agriculture will be reduced by micro-siting of wood poles, planning of access routes and careful development of access tracks in consultation with the land interest. Access for the land interests to their agricultural land will be provided at all times during the construction process and post construction. Damage to the agricultural capability of soils would be avoided by adoption of procedures relating to soil stripping, handling and storage during construction. Existing field drainage systems would be reinstated where encountered to ensure that land capability is maintained and flooding issues would not be worsened. Financial compensation would be provided for the loss of any area of land that would be lost to agriculture, according to the SPT wayleave agreement. Detailed mitigation measures to prevent, reduce and where possible offset effects on agriculture are listed in Appendix 11.5. Details of specific mitigation measures to be employed on a farm-by-farm basis are detailed in Appendix 11.4. Operation No mitigation required Dismantling No mitigation required/ As above

Forestry	<u>Construction</u> A number of mitigation measures will be implemented within the wayleave (i.e. land over which SPT have control) to reduce the effect of windthrow on forestry, including: ■ Utilising existing clearings such as forest roads and rides and also watercourses for the felling boundaries; and ■ Reviewing opportunities to positively manage any natural regeneration of low-growing shrub species along the edge of the wayleave that may occur. Whilst SPT will seek to employ further measures, such as extending the felling to a 'wind-firm' edge, this aspiration requires the agreement of the landowner, it cannot form 'committed mitigation' and therefore cannot be applied to mitigate the likely effects for this assessment. With consent from landowners, felling outwith the wayleave corridor would extend to the nearest practical windfirm edge, applying Forest Landscape Design principles. These are: shape, scale, diversity, visual force, unity and 'spirit of the place': in creating a new boundary edge appreciation of these principles and their practical applications would be employed to effect visual improvements where visible by the public. The mitigation measures as outlined above, whilst not 'committed' are considered likely: A number of further measures are proposed to mitigate the effect on forestry management including: ■ Retaining new and upgraded access tracks for landowner use (where requested, and subject to separate planning consent); ■ Creating new access tracks where the presence of the new overhead line would result in difficulties in accessing forest areas isolated by the overhead line. Isolation can be as a result topography, the presence of a watercourse, or the lack of brash for timber extraction following the removal of trees within the wayleave. ■ Provision of forwarder access from new and upgraded roads into adjacent forest blocks. ■ Erection of 'goal-posts' to show maximum safe working height for forestry traffic; and ■ Creating alternative timber transfer areas, where the route precludes the use of existing facilities; <u>Operation</u> ■ Management of natural regeneration within the wayleave to assist managers in their objectives to increase woodland diversity; ■ wildlife corridor management; and ■ Monitoring and removal of windblown trees <u>Dismantling</u> No mitigation required

Traffic and Transport	Construction The appointed Contractor will be required to develop and agree with the relevant departments of Dumfries and Galloway Council (including Roads), an Environmental Management Plan (EMP) for the construction phase, which will consider a broad range of environmental issues related to construction, including: ■ The delivery of materials and the removal of surplus materials at non-peak periods for vehicular and pedestrian traffic to avoid disruption to other road users; ■ If required, the delivery of special loads at night or outside peak times as far as reasonably practicable, and consultation with the roads authority and the Police prior to such deliveries to minimise disruption to other road users; ■ The need for sheeting of loads and wheel and body washing where there is a risk of construction traffic carrying or dispersing fugitive material, principally mud and dust, onto public roads; and ■ The routing of traffic to and from the construction site to avoid the busiest routes beyond the immediate vicinity of the site. This plan will then be adopted and will form part of the construction contract, and the measures within it implemented to ensure that traffic and transport impacts as a result of the project are appropriately mitigated. In addition, upon confirmation of the Scottish Power's preferred construction schedule, the Contractor will be required to produce a traffic management plan (TMP) to minimise effects on the road network. TMP will be produced in consultation with Dumfries and Galloway Council Combined Services, and ultimately providing the following information (as required): ■ Restrictions and approved access routes; ■ Road condition survey information for routes to the site prior to commencement; ■ Removal and replacement of street furniture such as bollards and handrails and road signs; ■ Arrangements with Police for escort of oversized abnormal loads; ■ Signage warning other users of oversized load movements; ■ Ground preparation including protection of services and lowering of pavements; ■ Arrangements for road maintenance and cleaning; ■ Timing of deliveries (taking into account identified sensitive receptors); ■ Arrangements for parking restrictions along access route; ■ Road maintenance and cleaning; and ■ Wheel cleaning arrangements. In order to further reduce traffic effects from construction of the proposed substation, construction personnel will be encouraged to car-share where practicable.

	A further reduction in effect could be gained by obtaining the track and hardstand surfacing material from the adjacent Grange Quarry. In doing so, less than a mile of public road would be trafficked per lorry load (an estimated 252 total lorry loads are required). This will be subject to commercial discussions with the quarry operator. In construction of the access within the site, excavated materials where suitable will be re-used in the formation of the track to minimise off site material import. Unsuitable material will be redistributed over fill slopes to negate the requirement for materials to be taken off site. Maximum side slopes to earthworks should be 1 in 3, although flatter gradients should be achieved where possible. The stockpiled topsoil will be used to dress the embankment faces to aid in vegetation reinstatement. All construction works, whilst complying with the appropriate planning consents, will take cognisance of best practice in terms of control of pollution as defined in the following documents: ■ CIRIA Report C532 - Control of Water Pollution from Construction Sites ■ SEPA Pollution Prevention Guidelines: – PPG01 General guide to the prevention of water pollution – PPG02 Above ground oil storage tanks – PPG03 The use and design of oil separators – PPG05 Works in near or liable to affect watercourses – PPG06 Working at construction and demolition sites – PPG07 Refueling Facilities – PPG08 Storage and disposal of used oils – PPG21 Pollution Incident Response Planning – PPG26 Pollution Prevention Storage and Handling of Drums & Intermediate Bulk Containers A further reduction in HGV impact could be achieved by lengthening the construction programme, or by spreading out delivery of track and hardstand surfacing material. However, in doing so, the material would have to be stockpiled on site and therefore require double handling which has an increased impact on the environment. <u>Operation</u> No mitigation required <u>Dismantling</u> Prior to decommissioning, a further traffic assessment will be carried out and traffic management procedures agreed with the appropriate authorities and the local communities.
Construction Noise	<u>Construction</u> Any potential for occasional noise disturbance from the construction works will be addressed through the practices adopted and equipment utilised by the Contractor and controlled by the requirements of D&GC Department of

Environmental Health, for example, by restricting hours of noisy activity in the vicinity of identified sensitive receptors.

Similarly noise from additional traffic movements or the import of unusual loads will be managed in so far as is reasonably practicable to minimise noise disturbance, particularly during night time hours (2300 – 0700h). These restrictions will be implemented through the project Environmental Management Plan (EMP).

The onus will be upon the Contractor to reduce ambient noise levels in so far as is reasonably practicable by the implementation of Best Practicable Means.

Protecting the Neighbouring Community during Construction – Best Practicable Means

Several safeguards exist to minimise the effects of construction noise and these should operate during the construction of the OHLs and the Ewe Hill substation and access road. These safeguards include:

- The various EU Directives and UK Statutory Instruments that limit the noise emissions of a variety of construction plant
- The guidance set out in BS 5228: Parts 1 & 2: 2008 which covers noise and vibration control on construction sites
- The powers that exist for local authorities under sections 60 and 61 of the 'Control of Pollution Act 1974' and section 80 of the 'Environmental Protection Act 1990' to control environmental noise and pollution on construction sites.

Contract documents supplied to contractors will require that the effects of environmental noise are considered during the design and execution of the works. Such an assessment will result in a noise control plan that provides a noise management system tailored to the specific needs of the construction works, the site and the surrounding area. As a minimum, any noise control plan will cover:

- Procedures for ensuring compliance with statutory or other identified noise control limits
- Procedures for ensuring that all works are carried out according to the principle of Best Practicable Means as defined in the Control of Pollution Act 1974
- General induction training for site operatives and specific training for staff having responsibility for particular aspects of controlling noise from the site
- Liaison with D&GC and the local community
- Provision of a contact telephone number and responsible person to whom any complaints or concerns with regard to noise, vibration and other environmental issues should be put as a first port of call. This affords the Contractor the opportunity to address any issues prior to D&GC involvement.

In order to demonstrate the adoption of Best Practicable Means to control noise emission from the site, the following conditions and measures could be

	imposed on the construction works. ■ as far as is reasonably practicable, the contractors should bring to site and employ on the works only the most environmentally acceptable and quietly operating plant and equipment compatible with the safe and efficient execution of the works; ■ equipment should be well maintained and fit for purpose. The noise emitted by any plant item should not exceed the limits quoted in either the relevant EC Directive / UK Statutory Instrument and should be no greater than the relevant values quoted in the current version of BS 5228; ■ all items of plant operating on the site in intermittent use should be shut down in the intervening periods between uses. In particular: ■ All pneumatic tools should be fitted with silencers or mufflers ■ Deliveries should be programmed to arrive during daytime hours only. Care should be taken when unloading vehicles to minimise noise. Where possible, delivery vehicles should be routed so as to minimise disturbance to local residents. Delivery vehicles should be prohibited from waiting on the highway or within the site with their engines running ■ No radios or music should be played on the site. All plant items should be properly maintained and operated according to manufacturers recommendations in such a manner as to avoid causing excessive noise. All plant should be sited so that the noise impact at nearby noise sensitive properties is minimised. Local hoarding, screens or barriers should be erected as necessary to shield particularly noisy activities. Problems concerning noise from construction works can sometimes be avoided by taking a considerate and neighbourly approach to relations with the local residents. Works should not be undertaken outside of the core daytime hours, unless absolutely necessary. All neighbours should be informed well in advance of such works using a leaflet drop giving full details of the hours during which the works are scheduled to be undertaken and also providing an appropriate contact name and number to whom complaints should be addressed. It may be that, should complaints be received, ad hoc monitoring would be required to ascertain the source of the disturbance and provide recommendations for mitigation. <u>Operation</u> No mitigation required. <u>Dismantling</u> As above
Operational Noise and Electric Magnetic Fields (EMF)	<u>Operation</u> *Operational noise* Since audible-noise levels due to the line will be imperceptible at the nearest property, no mitigation measures are necessary

	EMF Raditaion SPT will continue to act upon the current advice of the Government and HPA in this matter.

18 Summary of Predicted Residual Effects

18.1 The following tables provides a quick reference to each of the significant residual environmental effects identified in the technical sections of this ES, as well as a cross reference to the relevant mitigation measures identified.

Table 18.1 – Summary of Residual Effects: Gretna to Ewe Hill

Potential Environmental Impact	Sensitivity of Receptor	Magnitude of Impact	Mitigation Measures	Residual Effect		
				Duration (Short or Long term)	Magnitude	Effect
Landscape and Visual						
Views from 13 residential receptors	High	Medium to High	Reduce physical disturbance and perception of activity	Long	Medium to High	Moderate to Major Adverse
Views from 3 outdoor receptors	Medium	Medium	reduce physical disturbance and perception of activity	Long	Medium	Moderate Adverse
Ecology and Ornithology						
Breeding birds – loss of habitat and mortality of birds	Medium	High	Identification of least damaging access routes, clearance of vegetation outwith breeding season or inspection of vegetation prior to removal.	Long	Medium to High	Minor to Moderate Adverse
Archaeology						
No significant residual effects						
Geology and Soils						
No significant residual effects						
Hydrology						
No significant residual effects						
Agriculture and Sporting Interests						
Loss of agricultural land at Greenwrae Farm	Medium	Medium	micro-siting of wood poles, planning of access routes and careful development of access	Long	Low to Medium	Minor to Moderate Adverse
Loss of agricultural land at Cadgillfoot Farm	Medium	Medium	micro-siting of wood poles, planning of access routes and careful development of access	Long	Low to Medium	Minor to Moderate Adverse
Forestry						
No significant residual effects						

Potential Environmental Impact	Sensitivity of Receptor	Magnitude of Impact	Mitigation Measures	Residual Effect		
				Duration (Short or Long term)	Magnitude	Effect
Traffic and Transportation						
No significant residual effects						
Construction Noise						
No significant residual effects						
Operational Noise and Electric Magnetic Fields						
No significant residual effects						

Table 18.2 – Summary of Residual Effects: Ewe Hill to NewField

Potential Environmental Impact	Sensitivity of Receptor	Magnitude of Impact	Mitigation Measures	Residual Effect		
				Duration (Short or Long term)	Magnitude	Effect
Landscape and Visual						
Transitional Farmland	Medium	Medium to High	reduce physical disturbance and perception of activity	Long	Medium generally but High locally	Moderate Adverse
Upland Pasture	Medium	Medium	reduce physical disturbance and perception of activity	Long	Medium	Moderate Adverse
Views from 10 residential receptors	High	High	reduce physical disturbance and perception of activity	Short to Long	Medium	Moderate to Major Adverse
Views from 4 outdoor locations	Medium	Medium	reduce physical disturbance and perception of activity	Long	Medium (but effects experienced infrequently and by few members of the public)	Moderate Adverse
Ecology and Ornithology						
Breeding birds – loss of habitat and mortality of birds	Medium	High	Identification of least damaging access routes, clearance of vegetation outwith breeding season or inspection of vegetation prior to removal.	Long	Medium to High	Minor to Moderate Adverse
Archaeology						
No significant residual effects						
Geology and Soils						
No significant residual effects						

Potential Environmental Impact	Sensitivity of Receptor	Magnitude of Impact	Mitigation Measures	Residual Effect		
				Duration (Short or Long term)	Magnitude	Effect
Hydrology						
No significant residual effects						
Agriculture and Sporting Interests						
No significant residual effects						
Forestry						
No significant residual effects						
Traffic and Transportation						
No significant residual effects						
Construction Noise						
No significant residual effects						
Operational Noise and Electric Magnetic Fields						
No significant residual effects						

Appendices

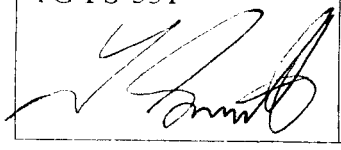
Appendix 2.1 Holford Rules

ELECTRICITY TRANSMISSION DEVELOPMENT PROPOSALS IN SCOTLAND

THE SCOTTISH HYDRO-ELECTRIC TRANSMISSION LIMITED (SHETL) APPROACH

HIGH VOLTAGE STEEL LATTICE TOWER TRANSMISSION LINES

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

TG-PS-531 	Authorised By J.Smith – Head of Major Projects	Issue Date October 2004	Revision No. 1.01

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

RULES 1-7

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 the effect of remaining on this route must be considered in terms of the effect of a new route avoiding the area.*

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

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

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

Rule 2

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

Note on Rule 2

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

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

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

Rule 3

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

Note on Rule 3

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

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

Rule 4

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

Rule 5

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

Notes on Rules 4 and 5

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

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

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

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

Rules 6

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

Note on Rule 6

a) In all locations minimise confusing appearance.

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

Rule 7

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

Note on Rule 7

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

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

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

Explanatory Note on Rule 7

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

Supplementary Notes

a) Residential Areas

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

b) Designations of Regional and Local Importance

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

c) Alternative Lattice Steel Tower Designs

In addition to adopting appropriate routeing, evaluate where appropriate the use of alternative lattice steel tower designs available where these would be advantageous visually, and where the extra cost can be justified [*Note : SHETL have reviewed the visual and landscape arguments for the use of lattice steel towers in Scotland and summarised these in a document titled 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 houses, farms or other small-scale settlements.

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

SUPPLEMENTARY NOTES ON THE SITING OF SUBSTATIONS

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

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

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

d Alternative designs of substations may also be considered, eg 'enclosed', rather than 'open', where additional cost can be justified.

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

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

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, of 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 licence 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 NPPG 5 : 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: Archeology and Planning refers to the setting of scheduled ancient monuments and NPPG 18 : Planning and the Historic Environment refers to the setting of Listed Buildings. None of these documents define setting.

APPENDIX B

ENVIRONMENTAL AND PLANNING DESIGNATIONS – EXAMPLES OF DESIGNATIONS TO BE TAKEN INTO ACCOUNT 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 Planning 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	*(NPGG 18)*
Historic Gardens and Designed 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 be 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.*

4 *Area of Historic, Archaeological or Architectural Value*

Certain designations covering more limited areas are of relevance to the protection of views and the settings of towns, villages, buildings of 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 Designed Landscapes included in the Inventory of Gardens and Designed Landscapes of Scotland

Green Belts

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

Appendix 2.2 Public Consultation Report

Gretna Substation to Ewe Hill and Newfield Windfarms 132kV Transmission Line

Public Consultation Report

SP TRANSMISSION

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Preface

Proposal

SP Transmission Ltd (SPT) intends to connect the proposed Ewe Hill and Newfield windfarms to its existing grid substation at Gretna, via two new overhead transmission lines; a northern line connecting the proposed Newfield and Ewe Hill substations and a southern line between the proposed Ewe Hill substation and the existing substation at Gretna. Given the load expected to be generated from each windfarm, SPT have concluded that new single circuit 132,000 volt (132kV) transmission line will be required.

Consultation Document

This document has been prepared in order to inform those with an active interest in selection of the preferred routes for the Gretna Substation to Ewe Hill and Newfield Windfarm connections. Once consultation is concluded and opinions collated, SPT will make an informed decision and found upon proposed routes.

Preferred Route Options

SPT has identified preferred routes to Ewe Hill and Newfield. This involved consultation with a range of authorities and other interested parties to identify constraints in the study area. The examination of alternative routes and analysis and evaluation of the preferred route options against a range of established criteria and methodology is set out in this document.

The preferred routes seek to minimise the environmental impact on a range of physical, environmental and socio-economic considerations (including the landscape, woodland, flora and fauna, agriculture, people, settlements, properties and historical features) whilst remaining economically and technically viable.

Consent Procedure

SPT intends to prepare and submit an application for each of the two routes to the Scottish Ministers under Section 37 of the Electricity Act 1989. These applications will be accompanied by an Environmental Statement.

Consultation

Copies of the Consultation Document have been sent to a number of key consultees who include:
Dumfries and Galloway Council (DGC)
Scottish Natural Heritage (SNH)
Historic Scotland (HS)
Scottish Environment Protection Agency (SEPA).

A public exhibition, where copies of this document will be available for public review and details of the project will be on display, at Waterbeck Hall between August 31st and September 3rd 2009.

Section 1: Introduction

1.1 Background

SP Transmission Ltd (SPT), are responsible for the transmission network from the English/Scottish border to just north of Stirling, an area of some 23,000 square kilometres. As the licence holder, SPT is required under the Electricity Act 1989 "to develop and maintain an efficient, co-ordinated and economical system of electricity transmission."

SPT proposes to construct a heavy duty wood pole 132kV overhead transmission line between Gretna Substation and the proposed Ewe Hill Windfarm Substation, with a subsequent wood pole connection to the proposed Newfield Windfarm Substation, refer to **Figure 1** for locations. The transmission line project is required under SPT's duties to connect the two proposed windfarms into the national grid.

The construction of the lines will be dependent upon the success of the two windfarms receiving planning consent. The developer of the Ewe Hill Windfarm site submitted a planning application in June 2006 and the developer of the Newfield Windfarm is in the process of preparing its application. In the event that the Ewe Hill Windfarm application is unsuccessful, but the Newfield Windfarm application is approved, then SPT would be required to construct a transmission line directly from Gretna Substation to the Newfield Windfarm Substation, however, in the event that Newfield's application is unsuccessful, the line will terminate at Ewe Hill. This project has been based on the assumption that both windfarms will be approved.

A routeing study has been prepared which considers the two route sections separately. The corridor options and preferred routes have been described in this report from south to north i.e. the south section (Gretna to Ewe Hill) and the north section (Ewe Hill to Newfield). The report is separated after Section 4 to discuss the corridor options, corridor options appraisal and preferred route corridor for each alignment in Section 5, for Gretna to Ewe Hill, and Section 6 for Ewe Hill to Newfield.

1.2 Purpose of Consultation Document

This Consultation Document has been prepared in order to set out the steps taken in identifying the preferred routes of the wood pole 132kV overhead transmission line between Gretna Substation and the proposed Ewe Hill and Newfield windfarms.

Its purpose is to allow statutory and other interested parties the opportunity to comment on the preferred routes and any other matters in order to inform the selection of the proposed routes. Comments will also inform the preparation of an Environmental Statement for the two lines, which will accompany the applications for consent to construct and operate the lines.

SPT will hold a public exhibition in Dumfries and Galloway, where the background, methodology and evaluation of the preferred options will be on display for stakeholders and the general public to make comment and discuss with members of the professional team. In addition further information on the project can be obtained from a dedicated project email address (ewehillnewfield.projectmanager@sppwersystems.com).

1.3 Scope

The Consultation Document is divided into seven sections which cover:

Section 1 – introduction and background to the requirement for and purpose of this document

Section 2 – a description of the project and a summary of government policy and targets for renewables.

Section 3 – outlines methodologies adopted in the appraisal process for the selection of the preferred routes.

Section 4 – describes baseline landscape and environmental features which are present within the study area and the technical, environmental and landscape constraints that these represent with regard to the identification of route corridor options.

Section 5 – presents the corridor options, appraises the corridor options and presents the selection of a preferred route for the Gretna to Ewe Hill route.

Section 6 – presents the corridor options, appraises the corridor options and presents the selection of a preferred route for the Ewe Hill to Newfield route.

Section 7 - the final section outlines the next steps which will be undertaken following completion of the consultation exercise regarding the preferred route alignments.

1.4 Statutory Consent Procedures

1.4.1 Section 37 Application

Under Section 37 of the Electricity Act 1989, SPT is required to seek consent from the necessary decision making body for the construction of any non-exempted overhead line operating at a voltage greater than 20kV. Two separate applications (one for each connection) will be made by SPT to the Scottish Ministers for Section 37 consent under the Act and at the same time, a request for deemed planning permission will be made under Section 57 of the Town and Country Planning (Scotland) Act 1997.

The development of the proposed overhead lines is defined by the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 (amended 2008) as a 'Schedule 2 Development' as it is "an electric line installed above ground with a voltage of 132 kilovolts or more, the installation of which (or the keeping installed of which) will require a Section 37 consent but which is not Schedule 1 development."

Due to the nature and size of the proposal, it is recognised that the development has the potential to have significant effects on the environment, and on this basis SPT proposes to submit an Environmental Statement with the application for consent for each connection. In accordance with regulation 3(2), this intention to submit an Environmental Statement confirms the development as an EIA development.

Section 2: Project Description

2.1 Government Policy and Targets for Renewables

The Energy White Paper sets out the government targets for renewable energy production and states that 10% of electricity supplies within the United Kingdom should be generated from renewable sources by 2010. Depending on the renewable technology employed, this could require installation of up to 10,000 MW of additional renewable energy generation. In Scotland, the Scottish Parliament has set a target that 18% of electricity supplies in Scotland should be generated from renewable resources by 2010. Furthermore, the Scottish Ministers have recently adopted a target to generate 40% of our energy needs from renewable sources by 2020. If these targets are to be met the necessary electrical transmission infrastructure requires to be put in place.

2.2 Renewable Generation Application

Following the announcement of the Government targets for renewable energy, a considerable volume of connection applications from renewable generators has been received by the electricity transmission utilities. The following table outlines the electricity generating capacity of the two proposed windfarms which would be linked to the national grid through the project, assuming both projects obtain development consent and the output levels currently proposed are not altered:

Windfarm	Output
Ewe Hill	44MW
Newfield	78MW

2.3 The Project

Gillespies and WSP Environmental Ltd (WSPE) were commissioned by SPT in June 2008 to undertake an options appraisal exercise for the proposed 132kV overhead transmission lines in Dumfries and Galloway which would connect Gretna Substation with two proposed windfarms at Ewe Hill and Newfield.

The appraisal has been based on identification and assessment of the baseline landscape and environmental features present within a defined study area, which have formed the key drivers in the identification and analysis of route corridor options and preferred routes. These preferred route alignments have been considered, based on a balanced assessment of a range of factors to have the least overall impact on the natural and built environment.

2.4 SPT's Transmission System

2.4.1 SPT's Statutory Duties

SP Transmission Ltd (SPT) is responsible for the transmission network from the English/Scottish border to just north of Stirling, an area of some 23,000 square kilometers. SPT is required under the Electricity Act 1989 "to develop and maintain an efficient, coordinated and economical system of electricity transmission". For SPT to comply with its licence obligations, it must provide all new forms of electricity generation with access to the electricity network.

All transmission licence holders are required by Schedule 9 of the 1989 Act to take account of the following factors in formulating proposals for the installation of overhead transmission lines:

"(a) to have regard to the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features or special interest and of protecting sites, buildings and objects of architectural, historic or archaeological interest; and

(b) to do what he reasonably can to mitigate any effects which the proposals would have on the natural beauty of the countryside or any such flora, fauna, features, sites, buildings or objects."

As a result, a licence holder is required to consider then balance technical, economic and environmental issues, through the application of a logical process. The exercise of professional judgment involved in weighing the issues results in routes which, on balance, best meet the stated 'routeing objective'. That routeing commitment requires to reflect the licence holder's statutory duties. This is discussed in further detail in Section 3: Study Approach and Methodology.

2.5 Design, Construction and Maintenance

2.5.1 Design

Following identification of the proposed route for the new line, a detailed topographical survey will be carried out. This is required to identify the proposed positions and heights of each individual pole.

The proposed heavy duty wood pole will support three conductors (wires) in a horizontal flat formation (**Figure 2**). Additionally there is an earth conductor suspended beneath the main conductors in order to provide lightning protection. This also includes fibre optic cores for communication purposes.

The proposed design for both connections is the heavy duty wood pole, refer to Figure 2 for details. The nominal height of the poles is likely to be in the range 15m and the spacing between towers will vary depending on topography and altitude, with towers being closer together at higher altitudes to counteract the effects of greater exposure to high winds and other weather events. The height and distance between towers will therefore be determined after the detailing line survey but will be in the range of 90m.

There are basically two main types of pole, a 'line' pole and an 'angle' pole, refer to **Figure 2** The angle pole as its name suggests is used where the line changes direction.

Site surveys will be carried out at proposed tower positions where required to examine the subsoil conditions in order that the tower foundations, can be designed.

2.5.2 Construction

Line construction typically follows a standard sequence of events which are:

- Prepare access
- Install pole foundations
- Erect poles
- String conductors
- Reinstate pole sites and remove temporary accesses

It is preferred to have vehicular access to every pole site for foundation excavation and installation. Additionally, the conductors are winched to/pulled from angle structures and thus access to these sites is required for conductor drums and winch tensioner.

Access can take various forms and is dependent on ground conditions. In poorer conditions more access works may be required which can vary from laying temporary wooden or aluminium matting to, in some cases, installing crushed stone roads. Helicopters may also be used to facilitate access in sensitive or remote areas.

Wood Pole Foundations

Pole foundations are typically 2-3m deep with excavation carried out by mechanical excavator. Prior to excavation the foundations for each tower site will be securely fenced off to ensure the safety of members of the public and livestock.

Once the poles are placed in the excavation this will be back-filled using the original material in layers. Any surplus material is removed from site.

Conductor (wire) stringing

Once a number of sections of poles are erected, conductor stringing can commence, installing conductors between section poles via the line poles. Conductor drums are set up at one end of the section with a winch tensioner at the other end and the conductors pulled from one end to the other utilising a winch bond. This bond can either be pulled by hand or by the use of a low ground pressure vehicle such as a quad bike.

Prior to stringing the conductors, roads and railways which 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.

Materials required for construction are transported around the site by general purpose cross-country vehicles fitted with a lifting device. Excavators are generally of the tracked type to reduce likely damage to, and compaction of, the ground. Materials are delivered to site storage/assembly areas by conventional road transport and then transferred to tower sites by either smaller four-wheel drive lorries or in some cases helicopter.

In all cases every effort is made to cause least disturbance to landowners and local residents during construction. The route of the line is selected to avoid as far as possible communities and individual dwellings. Any ground disturbance during construction of the new line will be reinstated.

2.5.3 Maintenance

In general a transmission line requires very little maintenance. It is periodically inspected to identify any unacceptable deterioration of components so that they can be replaced. From time to time inclement weather, storms or lightning, can cause damage to either the insulators or the conductors. If conductors are damaged short sections may have to be replaced and that would involve winching to or from section towers. Insulators and conductors are normally replaced after about 40 years.

Section 3: Study Approach and Methodology

3.1 Overview

The following has been taken into account in the routeing study:

- SPT's Project Design Requirements (Ewe Hill & Newfield);
- SPT (2002) Overhead Transmission Lines - Routeing and Environmental Assessment;
- The Holford Rules: Guidelines for the Routeing of New High Voltage Overhead Transmission Lines with NGC 1992 and SHETL 2003 Notes;
- Section 9 of the Electricity Act 1989;
- Forestry Authority/Forestry Commission (1994) Forest Landscape Design Guidelines, 2nd Edition;
- Forestry Authority (1998) Forest Design Planning – A Guide to Good Practice.

3.2 Detailed Methodology

3.2.1 SPT's Routing Commitment

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

3.2.2 The Project Routeing Objective

"To identify a technically feasible and economically viable route for an overhead transmission line that meets the technical requirements of the electricity network and causes, on balance, the least disturbance to the environment and the people who live, work and recreate with in it."

3.2.3 Defining the Study Area

The first stage in the routeing assessment process was to establish and define the areas of search for the key environmental and technical constraints. For this project, the following two key areas were defined.

Firstly, a study area was defined. This is the area within which it would be feasible to construct the transmission lines, and to consider alternative alignments, whilst taking into account major topographical and infrastructure constraints such as high ground, ridgelines, slope gradients, settlements or existing transmission lines.

Secondly, a wider buffer area was identified which represents a distance of 5km from the outside of the study area, in which it was recognised that there is potential for the transmission line to indirectly impact upon important designated areas, landscapes and views. This wider buffer area was taken into consideration when defining route corridor options. Refer to **Figure 4** for the study and buffer area extents.

3.2.4 Data Collection

Once the study and buffer areas were defined, the next stage of the process was to identify and collate the baseline for these areas. This process began with initial stakeholder consultation to identify relevant environmental, land use and landscape data and to obtain early views from consultees on constraints and potential effects of the transmission lines.

Baseline information was also obtained from a number of other sources including local authority plans and policies (including local and regional plans), digital datasets, Ordnance Survey maps and site visits.

3.2.5 Constraints Analysis

Analysis of constraints in the study area which have been defined for the project (see Section 4: Baseline Information) is crucial to the understanding of potential environmental effects of route options, and in defining options which avoid areas of highest constraint. Constraints analysis has been used throughout the process, including at the following stages:

- In determining a study area within which potential corridor options can be identified;
- In gathering of high level environmental baseline information relating to the study area;
- In the identification of areas of least constraint which were selected as broad corridors and then narrow route corridors as part of the environmental sieving process; and
- In assessing the potential for corridor options to overlap with, and/or impact upon, areas of environmental constraint.

The constraints identification and analysis process has focused on technical, environmental and landscape constraints in the study area. This has included designated and sensitive areas which have been identified and defined according to a series of guidelines known as the Holford Rules and which has become a commonly accepted means of guiding transmission line routeing studies. The Holford Rules are included in **Appendix 1,** at the end of this report.

The Holford Rules, which form the basis for this routeing study, refer to a hierarchy comprising 'major areas of the highest amenity value' (Rule 1) and smaller areas of 'high amenity value' (Rule 2). No specific guidance is provided on what constitutes major or smaller areas but the rules set out a series of potential designations which may be considered as environmental and landscape constraints. Supplementary notes to the Holford Rules prepared by the National Grid in 1992 (and subsequently reviewed and clarified by Scottish Hydro-Electric Transmission Ltd and Scottish Power Transmission in 2003) also identify residential areas as being important on the grounds of 'general amenity'. It is unclear how 'general amenity' ranks in relation to the terms 'highest' and 'high' amenity which are used to describe features of the natural and cultural environment. Based on the project team's experience with other transmission line projects, particularly for issues of proximity of lines during construction and operation, in this study, residential areas of 5 or more house have been considered in the category of 'highest' amenity for the environment.

The analysis of constraints presented in Section 4: Baseline Information reviews the extent of the areas of highest and high amenity value which have been identified in the project study area. For this project, the analysis of constraints identified that there were relatively few areas of highest (or high) amenity value in the study area, and the approach has therefore required a more detailed analysis of constraints which might not otherwise have been required in more constrained corridors. Hence the study adopted a focus on 'lesser' areas of constraint and, due to the relatively limited numbers of designations and environmental constraints in the area, the approach has drawn very closely on landscape and visual constraints which were identified at an early stage as being significant in the context of the study area and which were likely to provide the basis for a reasonable comparison of the potential impacts of corridor options.

The Holford Rules 3 to 7 refer to the identification of route alignments and where these should be located to minimise environmental impact. These rules, and the accompanying guidance, have been taken into account in the process of identification of a preferred route alignment within the two preferred route corridors.

Section 4: Baseline Information

4.1 Introduction

The purpose of the baseline analysis was to highlight the key landscape, visual and environmental constraints and to identify technical constraints such as steep slopes. Collation of this information included identification of designated and sensitive sites, in order to provide a hierarchy of areas which should be avoided by the transmission line alignments. Collation and assessment of the constraints data at this stage was undertaken with regard to the levels of importance presented within the Holford Rules and referred to as areas of Highest and High Amenity (see Section 3: Study Approach and Methodology).

As the study progressed, an increasing level of detail in baseline information was used to inform the analysis. During the study, it was noted that there are a limited number of Highest Amenity sites within the study area but that it contains a significant number of High Amenity sites, refer to **Figures 5, 6a and 6b.** This has informed the approach adopted in the identification and appraisal of route corridors. Analysis of the constraints data was undertaken using Geographical Information Systems (GIS) to allow the digital data to be mapped and to assist in identification of alternative corridors which provide the necessary environmental, landscape and technical balance.

4.2 Landform

The southern section of the study area, from Gretna Substation to Ewe Hill Windfarm, is generally characterised by flat, agricultural land developing into gently undulating hills as one moves north. Ewe Hill windfarm is located in the higher upland area to the north of this section. The northern section, from Ewe Hill Windfarm to Newfield Windfarm, is more upland in nature and generally comprises gently undulating topography with more varied topography around the incised valleys of the Water of Milk and Corrie Water which dissect the northern part of the study area.

4.3 Landscape Character

The study area broadly falls within three landscape character types within the Dumfries and Galloway Landscape Character Assessment (Scottish Natural Heritage Review No. 94, dated 1998). The extents of each Landscape Character Type (LCT) are shown on **Figure 7**, they are:

- Flow Plateau LCT
- Upland Fringe LCT
- Foothills LCT

The southern section falls mainly within the Flow Plateau Landscape Character Type which is characterised by low lying ground, often in a waterlogged condition, which creates extensive marshy pastures. Areas of higher ground retain rough and improved pastures characterised by hedgerows and tree lined enclosures. This landscape has the following key characteristics:

- Mostly flat and gently rolling topography with an incline towards the Solway;
- Occasional long views over the Solway;
- Waterlogged pastures - ochre, green and brown;
- Large fields with hedgerows in poor condition and fences;
- Cattle grazing;
- Shelterbelts and small informally shaped plantations;
- Riparian woodlands; and
- Scattered farmsteads.

“The flat nature of this landscape can make vertical structures visually very obtrusive with few opportunities for screening”. However due to the uninhabited nature, limited structures may be accommodated where careful design and siting allows a fit with the landscape.

To the north of the Flow Plateau LCT, the study area is dissected by a narrow band of the Upland Fringe LCT, which predominantly lies in altitudes between 120m to 170m above sea

level. This is characterised by high, gently rolling pastures with an uneven topography and numerous minor valleys, ridges and hollows. This landscape type has the following key characteristics:

- Elevated rolling pastures;
- Improved and rough grassland in close proximity;
- Hedgerow banks and tree lines along roads in some lower areas;
- Dry stone dikes;
- Squared forest blocks, increasing forestation evident;
- Contrast between wide open areas and more intimate landform;
- Panoramic views over valley lowlands;
- Small bridges over incised burns; and
- Iron-age fortifications.

"There is limited potential for large scale development due to this areas high visibility from surrounding settled lowlands. Opportunities may exist for small scale developments to use local topography to be screened behind main visual horizons and in local depressions where maximum back clothing and screening effect could be gained".

The majority of the northern section of the study area falls within the Foothills Landscape Character Type. The foothills are generally found at altitudes between 170 and 250m and are characterised by a generally undulating landform with gently rounded summits and craggier peaks in places. This landscape has the following key characteristics:

- Foothills dissected by incised valleys;
- Semi improved pasture enclosed in medium - large fields by stone walls, grazed by sheep and cattle, some rough pasture and heath on higher ground;
- Trees in sheltered pockets with some copses on top of hills;
- Many scattered farmsteads and small settlements;
- Network of minor roads; and
- Numerous archaeological sites particularly Iron Age defensive and Roman monuments.

The scale of this landscape could accommodate the proposed development, however "the elevation and relief is such that sites may be highly visible." In addition, "in this landscape character type 'wild land' values and experience can be very important locally" and development of this nature may compromise this.

In addition to the above, the study area includes small areas of the Coastal Flats, Foothills with Forest and Southern Uplands Landscape Character Types. The report does not contain a description of these latter three Landscape Character Types, as the existing Gretna Substation is already located within the Coastal Flats LCT and less than 9km of the proposed overhead transmission line would pass through it. Although the study area encompasses a small part of the Southern Uplands and Foothills with Forest LCTs, none of the route options pass through it, therefore there are no direct impacts. In addition, route option sF was ruled out on landscape grounds and therefore there are also no indirect impacts on this landscape character type.

For the purposes of this routing study Gillespie's have further sub-divided up the study corridor into the following Local Landscape Character Areas (LCA). These are shown on **Figure 8**.

Lowland Farmland LCA

Located to the south of the study area, crossing in part over the English border, this landscape is characterised by its flat topography, scattered farmsteads, minor road network, woodland copses and field boundaries. Due to its low lying nature the land is of a higher agricultural quality than the rest of the study area and the majority of the land cover is improved grassland with some arable fields. Views around the area are fragmented due to the field boundaries which typically consist of managed hedgerows. A notable feature within this

landscape is the historic feature of Scots' Dike which has a belt of mature native woodland planting.

Transitional Farmland LCA

Located within a central band of the study area this landscape is a transitional landscape taking characteristics from the lowland farmland and upland pasture landscape character areas. The topography is more undulating in nature however there are numerous small tributaries and watercourses which create localised incised valleys. Settlements are generally isolated farmsteads with the notable exceptions of the villages of Corrie Common, Kirtleton and Waterbeck. The predominant land cover is rough pasture with some semi-improved areas. There has also been significant commercial woodland activity over the years and plantation woodland blocks at varying stages of growth characterise this area. Due to its upland nature longer distance views are obtainable, however these are dependant on the topography and woodland cover which can vary greatly as one moves around the area.

Upland Heath LCA

This landscape character area is located to the east of the study area and broadly replicates the coverage of the SNH Foothills Landscape Character Type. The landscape is upland and undeveloped and the majority of the land cover is heath with some scattered locations of unimproved grassland. The topography is varied and due to the elevated, undeveloped nature of the area panoramic long distance views are available from the summits and plateaux.

Plantation Woodland LCA

Located to the centre and the north of the study area these landscape character areas are generally characterised by a monoculture of commercial woodland. There are access tracks for recreation and forestry workers within these extensive swathes of woodland, however due to the nature of these areas, views are enclosed and limited to the surrounding woodland. Areas of clear felling are apparent in both woodland areas.

Upland Pasture LCA

Located towards the centre of the study area this landscape character area is sparsely settled and the majority of the land is characterised by rough pasture. The topography is varied with a range of approximately 100m and the landform is undulating with gently rounded summits and rolling valleys. Woodland cover is limited to small isolated pockets of plantation woodland which provide shelter for sheep, grazing this area. As a result of the topography, limited woodland cover and a lack of development, views from this area are elevated and long distance. However, due to the lack of access most views are not available to the public. Notable features upon the summits within this landscape are the hill forts associated with Iron Age settlers.

Intimate River Corridor LCA

Located to the north west of the study area, this landscape character area is focused around the Water of Milk and Corrie Water river valleys. The landscape is characterised by incised valleys, broadleaf woodlands and meandering watercourses. These areas are reasonably well settled due to the sheltered nature of this landscape and there is a comprehensive minor road network which follows the lower ground within the river floodplains. Views from individual properties are enclosed by the topography and woodland cover creating a sense of isolated intimacy.

4.3.1 Landscape Fit and Constraints

Landscape fit considers the landform of the study area and how it can be used to provide natural screening through sensitive siting. Areas where locating a power line would conflict with the existing landform are consequently avoided. Examples of these include avoiding summits, plateaus and ridgelines where power lines would be highly visible from surrounding areas. In addition, where possible, traversing valleys and steep slopes at right angles has been avoided where locating transmission lines and towers would adversely effect how these features are read at ground level. Points of conflict with the landform occur throughout the study area and the narrow corridors have been located to respond in a positive manner to the landform as far as possible. In addition, the routes will need to consider double climbing,

areas designated as special interest (whether scenically or of natural or cultural value), geological or climatic constraints.

4.3.2 Upland Landscapes

Upland landscape areas have been identified as a key constraint. These areas are generally above 200m altitude and undeveloped in nature. The landscape cover is dominated by heath moorland which contributes to a distinct landscape character within the context of the study area. Due to their upland, exposed and undeveloped nature it is considered that a development of this nature could have a significant negative effect on the character of these areas in addition to the visual effects associated with the prominent location. The main concentration of this landscape character type is located to the east of the large plantation woodland near Kirtleton. Refer to **Figure 9a** for locations.

4.3.3 Intimate Landscapes

The area directly to the south and southeast of Bow Hill (the location of the proposed Newfield Windfarm), between Gillenbie and the B7068, has been identified as an intimate, enclosed landscape. These landscapes are characterised by varied topography, extensive native broadleaf woodland and a higher number of scattered individual properties. These elements combine to create enclosed views from residential receptors where the introduction of a power line is deemed to have a significant visual impact. Refer to **Figures 9a-b** for locations.

4.3.4 Double Climbing

Double climbing is defined as areas where a proposed route would need to cross contours as opposed to following the contours to get from point A to point B when there are obvious opportunities to avoid this. As a general rule, and in accordance with the Holford Rules guidelines, we would seek to route along the lower ground to help minimise views of power lines on the horizon so where climbing upland can be avoided it is anticipated to benefit the receiving environment. Areas which have been identified as unnecessary areas of 'double climbing' include the high ground to the south of the B7068 and around Newland Hill. Further areas are indicated on **Figures 9a-b**.

4.4 Landscape Designations

Regional Scenic Areas (RSA) are areas of scenically valued landscape which form recognisable and comprehensible geographic units and the siting and design of any development should respect the special nature of these areas. The Langholm Hills Regional Scenic Area falls within the study area and is located to the north east, centred on the combination of upland glens and other attractive valley landscapes of Eskdale and the Ewes Water valley, and the adjacent Southern Uplands. The inter-visibility between this area and the proposals is considered as part of the assessment of landscape and visual effects due to the effects a development of this nature would have on the setting of this RSA. Refer to **Figures 9a** for locations.

4.5 Nature Conservation Designations

Bells Flow Site of Special Scientific Interest (SSSI) covers an area of approximately 70 hectares and is designated due to its status as an intermediate bog which supports several species of Sphagnum and the nationally scarce bog rosemary (*Andromeda polifolia*). It is located in the southern section of the study area, to the north of Chapelknowe. There are also two local wildlife sites, both of which are registered as lowland raised bog inventory sites, in the south section. One of these is located to the northeast of Chapelknowe and the other to the north of the Gretna Substation.

Consultation with local wildlife groups indicates that red squirrel, which is a protected species, may be present within the study area. Given the range of habitats, including woodland, hedgerows and watercourses, there is also considered to be potential for other protected species, such as otters, badgers and bats, to be present. Winterhope Reservoir may form a habitat resource for wildfowl, although consultation with local and national ornithological groups has not identified it as an important habitat.

4.6 Archaeology and Cultural Heritage

There are several Scheduled Ancient Monuments located throughout the study area. These comprise mainly former hill forts and are therefore mainly found in the upland areas. There are also 19 Category B and 21 Category C(s) listed buildings within the study area. The locations of these are indicated on **Figure 6a-b**

4.7 Geology and Soils

Geological maps indicate that there are several areas of peat within the study area. There are also several rock outcrops at and near the summits of hills in the upland areas. Soils of a reasonable agricultural quality are indicated to be present in the flatter farmland in the southern part of the south section, near and beyond the border with England.

4.8 Climate and Exposure

The degree of wind exposure and climatic conditions are important considerations in the design of a transmission line. High winds and ice can affect line construction, maintenance and reliability of supply. Therefore, exposed ridgelines and summits at high altitudes, which by their very nature tend to have greater wind speeds and lower temperatures, should be avoided wherever possible when routeing transmission lines.

4.9 Development and Planning

There are two local authorities responsible for the development plans within the study area:

- Dumfries and Galloway Council (most of the study area); and
- Cumbria County Council (for a very small part of the southern end of the study area).

Dumfries and Galloway Council

Structure Plan

The current Dumfries and Galloway Structure Plan was approved in 1999. It aims to "encourage the growth and development of sustainable communities in Dumfries and Galloway." The policies contained within the structure plan focus on supporting the development of the local economy, supporting urban and rural communities, protecting the natural and built environment and making the best use of services and facilities.

The quality of the natural and built environment is recognised as "one of Dumfries and Galloway's greatest assets, making an important contribution to the local economy through tourism and by supporting farming, forestry, fishing and the extraction of minerals. Some of these activities are going through a period of significant change leading to the examination of diversification opportunities in farming, while the scale of past forestry planting could provide opportunities for further wood processing activities. The quality of the local environment is also important to the quality of life of local people".

The structure plan recognises the importance of good service infrastructure which includes electricity to meet the needs of individuals, communities and businesses. It outlines that "proposals for major infrastructure provision on land not allocated for such uses, will be required to satisfy the Council on the following matters:

- the reason for selecting the site or route;
- impact on the landscape and the environment;
- discharges to air and water;
- traffic impact;
- safety, security and noise implication; and
- impact on the amenity of the area."

Local Plans

The Dumfries and Galloway Council area is covered by 4 adopted Local Plans. The current adopted plan relevant to the study area is the Annandale & Eskdale Local Plan which was approved in 2006. The Finalised Local Plan for Annandale & Eskdale has been prepared

within the framework of the Dumfries and Galloway Structure Plan and provides detail policy to support the general principles of the Structure Plan.

4.10 Agriculture and Forestry

The land uses in both sections are predominantly livestock farming. In addition, there are several areas used for shooting. There are several stands of commercial woodland within the study area, with the main stands being located to the east of Kirtleton and to the northeast of Corrie Common. However, it has been noted during site visits that there is significant timber cutting activity occurring, including the felling of a stand indicated as ancient woodland to the south of Little Whitriggs, Several stands of commercial forestry have been felled and some areas replanted in the Kirtleton and Corrie Common. There are also several small stands of ancient woodland, principally Cadgill Wood, near Chapelknowe and Corriehills, to the south of Corrie Common.

4.11 Recreation and Tourism

A caravan site is indicated on maps as being located to the north of Kirtleton and a picnic area is indicated to be located adjacent to woodland to the northeast of Corrie Common. The latter was noted, during a site visit, to be located within a former quarry at the end of a forestry access track and appears to be little used.

A few woodland walks and cycle trails are also indicated on maps, although several site visits have confirmed that there is fairly limited use of these.

4.12 Water Quality

There are several watercourses flowing throughout the study area, the main ones including:

- River Sark;
- Kirtle Water;
- Pokeskine Sike;
- Byre Cleuch;
- Water of Milk;
- Stidriggs Burn; and
- Corrie Water.

SEPA has introduced new water monitoring and classification systems that will provide the data to support the aim of the WFD that all water bodies are of good ecological status, or similar objective, by 2015. The WFD introduces a holistic approach to monitoring for a range of different pressures. The new classification system covers all rivers, lochs, transitional, coastal and groundwater bodies, and is based on a new ecological classification system with five quality classes; High, Good, Moderate, Poor and Bad. It has been devised following EU and UK guidance and is underpinned by a range of biological quality elements, supported by measurements of chemistry, hydrology (changes to levels and flows) and morphology (changes to the shape and function of water bodies).

The status of these watercourses ranges from Poor to Good with a number of unclassified watercourses.

4.13 Settlements

The main settlements within the south section of the study area include Chapelknowe, Evertown, Kirtleton and Waterbeck. The main settlement in the northern section is Corrie Common.

4.14 Individual Residential Receptors

Due to the fixed nature and interest in their surrounding environment, individual residential receptors represent a key landscape and visual constraint to be considered in the assessment of a development of this nature. There are numerous residential receptors located throughout the study area. To minimise the significance of impacts on these receptors a 150m buffer was placed around each property order to establish a zone of influence and to aid in the assessment of likely effects of each corridor. The 150m buffer zone was established

through field work, which determined that this distance would be the minimum acceptable in terms of encroachment of the route, within the vicinity of any residential receptor. In addition the viewing orientation and localised screening around each property is assessed through field work and referred to where appropriate.

4.15 Infrastructure

The main roads within the study area are the B6357, B722 and B7068. A high pressure gas main passes from southeast to northwest through the study area. Various minor electricity distribution lines and telephone lines cross the study area.

Section 5: Gretna to Ewe Hill Corridor Options, Corridor Appraisal and Preferred Route Alignment

5.1 Corridor Options

5.1.1 Definition of Route Options

Consideration of corridor route options connecting the Gretna and Ewe Hill Windfarm substations and the Ewe Hill and Newfield Windfarm Substations have been discussed separately and have been referred to as the south section and north section respectively. Section 5 is concerned with the south section (Gretna to Ewe Hill) only.

5.1.2 Broad Corridor Selection

Following the identification of the study area constraints listed in Section 4: Baseline Information, broad route corridors were initially defined between Gretna Substation and Ewe Hill Windfarm, which excluded all areas of Highest Amenity. It was considered that these broad corridors could be used as an intermediate stage prior to the identification of a preferred route alignment, by identifying the parts of the study corridor where the line could potentially be constructed whilst avoiding and/or minimising impact on the highest level constraints.

However, whilst these broad corridors did allow certain parts of the study area to be discounted as unsuitable due to the potential effect of the project on identified constraints, the identification and analysis of broad corridors did not reveal any clear preferences for route alignments.

Although this method of assessment was found to be inconclusive in identifying a preferred route alignment, the process used in identifying the broad corridors was repeated at a more localised level in the identification of the narrow corridors. This sieving process proved to be more successful and these narrow corridor options are described below.

5.1.3 Narrow Corridor Identification

The process for defining the narrow corridors adopted a similar methodology to that for the broad corridors, however High Amenity constraints were also considered to provide a 'second tier' of constraints to be avoided as far as possible in defining the corridor options. This process also specifically took account of guidance in the Holford Rules, particularly Rules 3 to 7 which require the following issues to be considered:

- Avoiding sharp changes of direction;
- Considering topography, particularly visual effects, associated with hills, ridges and skylines;
- Following open valleys where possible;
- Avoiding other transmission lines; and
- Avoiding recreational and residential land.

Each narrow corridor option is approximately 400m wide, where topographical constraints allow, which was considered to be a sufficient width to route a transmission line allowing for deviations around localised constraints. In certain areas of topographical constraint, however, the nominal 400m corridor had to be widened to accommodate more options for detailed routeing to avoid Highest and High Amenity areas. These corridors sought to avoid areas of Highest Amenity, and although some sections of the corridors crossed small parts of various Highest Amenity areas, it was considered that these could be avoided through detailed routeing of the alignment within the corridors. The identification of these corridors also sought to avoid, where practicable, High Amenity constraints including landscape features such as summits, steep slopes, ridgelines and intimate landscapes. However, given the nature of the topography, ground cover and land uses within the study area, it was not possible to completely avoid all of these constraints, but rather to identify a corridor which balanced all the criteria being considered.

As a result of this process, six narrow corridor options were identified between Gretna Substation and Ewe Hill Windfarm.

These corridor options (sA to sF) are described in the following section. For the locations of the narrow corridors, refer to **Figure 10**.

5.1.4 Gretna to Ewe Hill Narrow Corridors

Route sA

This route leaves Gretna Substation from the north, through a landscape dominated by the presence of existing pylons and heads north through agricultural land, passing scattered individual residential premises. It crosses the B6357 between the population concentrations of Milltown and Chapelknowe before turning northwest towards the southern tip of Bells Flow SSSI. The route briefly heads west to avoid new plantations at Solwaybank, before again continuing northwest through undulating pastureland with scattered tree cover and plantation woodland, towards High Stenries, dipping and climbing as it passes the northern side of High Stenries through a landscape characterised by its undulating land form, before climbing up to some immature plantation woodland around High Muir. It then dips down into the Kirtle Water valley and crosses the B722 to the south of West Linnbridgeford. The route then heads north, passing over open and exposed pasture to the west of Kirtleton, and crosses the B7068 west of Fallford. The route continues to head northwest, following the alignment of the Byre Cleuch burn before climbing over upland pasture and the ridge of Kirtlehead Hill and then dropping down to the location of the proposed Ewe Hill Substation, by Crawthat Hill.

Route sB

This route follows the alignment of Route sA before deviating at a point north of High Stenries, where it heads in a more north-northwesterly direction, passing through a landscape of scattered tree cover and rough pasture. It then passes to the east of Kirtleton, skirting the western edges of a large plantation. To the northeast of Kirtleton it begins to head northwest, crossing the B7068 to the northeast of Setthorns. The route then continues, northwest, following the alignment of Route sA, to the Ewe Hill Substation.

Route sC

This route follows the alignment of Route sA before deviating at a point north of High Stenries, where it heads in a more northerly direction, climbing up into the large plantation woodland to the northeast of Chapelhill. The route continues north-northwest, climbing onto higher ground until mid way through the woodland where it begins to drop down, crossing the Pokeskine Sike and exiting the woodland before crossing the B7068 to the north of Megsfield, through a gap between two groups of woodland planting, adjacent to the Gas Governor building. The route then heads to the northwest, over the summit of Ley Hill, before dropping down towards the Winterhope Reservoir access road and then finally following the alignment of Route sA.

Route sD

This route follows the alignment of Route sA before deviating to the east of High Stenries. The route then continues north, passing to the east of Allfornought, and over an upland, exposed and undeveloped landscape, characterised by heath ground cover. The route traverses three hills and passes through a section of plantation woodland. The route then heads northeast, crossing the B7068 to the south of Callisterhall. It climbs over the northern face of Ley Hill before dropping down to the west and towards the Winterhope Reservoir access road where it continues to follow the alignment of Route sA, to the Ewe Hill Substation.

Route sE

This route follows the alignment of Route sA before deviating to the northeast at the B6357 near Milltown. It then passes through open farmland until it reaches the east of Bogray where it heads north-northwest following the alignment of the River Sark. The landscape is characterised by pasture and is more enclosed along this section of the river and the route passes in close proximity to a number of residential properties and scattered groups of established native woodland. To the north of Barnglieshead, the route turns northwest

passing through an exposed upland landscape with very little development. The route then follows the alignment of route sD at the point southeast of Callisterhall to Winterhope Reservoir, before continuing along the route of sA to Ewe Hill substation.

Route sF

This route leaves Gretna Substation from the northeast, through a flat pasture landscape and passing to the east of Staffer before crossing the River Sark. It continues to cross flat pasture and then crosses Scots' Dike, an historic (and scheduled) linear earthwork, consisting of a substantial earth mound covered in a belt of mature woodland and forming a dominant feature in the surrounding flat landscape. The route continues through flat farmland, before crossing the B6357 to the east of Beckhall, where the route turns to the northwest. The route continues through a landscape characterised by plantation woodland, scattered isolated properties and bogs before following the alignment of route sE at the point north of Barnglieshead.

5.2 Corridor Appraisal

5.2.1 Corridor Assessment

Following a review of the constraints data it was considered that the most appropriate approach to appraising each of the narrow corridor options was through a high level assessment against environmental, landscape and visual, technical and economical criteria in order to filter out less favourable options.

The assessment was recorded using a simple matrix/framework approach. This allowed for a straightforward comparative assessment of the options once the assessment had been completed for each, and a concise means of recording the work undertaken.

This appraisal was undertaken qualitatively but employing professional judgement of the relevant specialists in each case and drawing upon knowledge of the study area and its baseline landscape and environmental conditions.

The following section presents a summary of the appraisal of the narrow corridors for the south section. As previously discussed, the process of identification of narrow corridors sought to avoid Highest Amenity and, where possible, High Amenity constraints. Since there are relatively few environmental constraints in the study area, the options analysis was based predominantly on landscape and visual effects. For the location of the narrow corridors in relation to landscape constraints refer to **Figure 10**.

5.2.2 Gretna to Ewe Hill Corridor Appraisal

All of the route options in the southern section converge to the southwest of Winterhope Reservoir before continuing north east to connect to the proposed location of the Ewe Hill Substation, by Crawthat Hill. Consultation was undertaken with ornithological organisations to identify if the area around the reservoir was a significant habitat for wildfowl and therefore whether there may be ecological impacts associated with a transmission line crossing this area. However, no significant issues were raised during this consultation process.

For the purposes of this section, as Routes sF and sE had the greatest number of constraints these will be discussed first.

Route sF crosses through the Upland Heath LCA as it passes to the east and north of the large plantation woodland within this area at Collin Hags. Whilst this LCA is less densely populated than the more southerly part of the study area, which is likely to lead to fewer residential receptors being affected, routeing the transmission line through this upland, exposed and undeveloped landscape is anticipated to lead to significant landscape and visual impacts, including poor landscape fit, loss of the locally important wild character and the potential for 'skylining' by the wood poles. As this landscape character type is unique to the study area and opportunities exist to preserve this character, it was considered that routeing through this area would be inappropriate.

Furthermore, Route sF crosses the alignment of Scots' Dike, on the English border. This is both a Scheduled Ancient Monument and striking earthwork feature with a mature belt of

broadleaf woodland. The proposed alignment is likely to result in removing a section of woodland which would significantly detract from the historical integrity and visual character of this landscape feature. For these reasons, Route sF was not considered any further.

Route sE also crosses through part of the Upland Heath LCA. In addition, it is anticipated that this route will have significant impacts on the properties, including listed buildings, around Barnglieshead and on the numerous scattered individual properties as the route follows the alignment of the River Sark, where the topography and woodland cover create a localised enclosed and intimate landscape. For these reasons Route sE was not considered any further.

The narrow corridors sA to sD all follow the same alignment before diverging at a point east of High Stenries. From here the routes deviate offering alternative routes between Kirtleton and Callisterhall.

Route sA passes to the west of Kirtleton and whilst the majority of Kirtleton sits within the valley of the Kirtleton Water, potentially screening views of any transmission lines along this alignment, the route crosses the B722 and the landscape in this area is on an open and exposed plateau, and the effects of any power lines on the nearby visual receptors are anticipated to be significant.

Route sB, which uses the plantation woodland as a backdrop, and Route sC, which uses the woodland as a screen, both avoid the Upland Heath LCA and are therefore considered to be the routes of least landscape and visual impact within this section. It has been noted during site visits that felling has taken place within the plantation woodland and further felling may take place in the future. To ascertain the preferred route a number of viewpoints and cross sections were taken through this area, refer to **Figure 11a-d**. (While in the short term any overhead transmission lines within corridor sC would be largely screened by the woodland, should this area be felled (which is considered likely following consultation with the woodland manager), then the transmission line would be clearly visible, over a wider area, and many of the wood poles would skyline' on the horizon. Furthermore, consultation with wildlife groups has indicated that red squirrel, which is a protected species, may use any remaining woodland as habitat. The sections also demonstrate that the optimum location for siting a transmission line with regard to the key view from the settlement of Kirtleton is broadly in line with route sB, as the trees are approximately the same height as the transmission line and would therefore provide a good backdrop.

Route sD also uses the plantation woodland as a screen for viewers from Kirtleton, however, as it passes through the Upland Heath LCA it is likely to result in an poor landscape fit, loss of wild character and 'skylining' due to its elevated nature. This option was, therefore, not considered further.

For the reasons set out above, Route sB is considered to be the route with least environmental and landscape impacts for the southern section.

There are also environmental and economic benefits associated with this corridor with regards to retaining the plantation woodland and limiting impacts on forestry operations. Furthermore, the Holford Rules recommends that all "other things being equal" it is preferable to "choose the most direct line" to reduce the need for sharp changes in direction and therefore requiring fewer angle poles. Route sB is the most direct of all the options considered.

5.3 Preferred Route Alignment

5.3.1 Gretna to Ewe Hill Preferred Route Alignment Criteria

The criteria used to identify these alignments was based on Rules 3 to 7 of the Holford Rules and with due regard to the localised landform and topography within the preferred corridors.

This was an iterative process which involved design, high level assessment and re-design to arrive at an appropriate route within the preferred narrow corridor and the following design principles were considered:

- avoiding where possible shorter than required distances between poles (i.e. minimising the total number of poles on the route alignment);
- minimising the number of changes in direction to reduce the number of angle poles required (which are more complex in design and more visually intrusive as there will be more stays and more pole top steelwork);
- considering the location of each individual pole in an attempt to distance them as far as possible from nearby residential receptors on the route alignment;
- using detailed routing to avoid woodland copses and other landscape features where possible; and
- using detailed routing to avoid encroaching on the 150m trigger zone of individual residential properties within the narrow corridors.

This is not an exhaustive list and the proposed route alignment considered a number of environmental, landscape and visual constraints to arrive at a balanced selection. An overview of the design of each alignment is discussed below.

5.3.2 Gretna to Ewe Hill Preferred Route Alignment

The approximate length of this route alignment is 15 kilometres, refer to **Figure 12**. As one travels from south to north the detailed routing attempts to minimise adverse impacts by:

- following a consistent offset of 80m where the proposed route runs parallel to the existing Scotland – England inter-connector transmission line to help minimise localised cumulative visual impacts in this area;
- avoiding the new plantation at Solwaybank
- avoiding the small summits and high ground as far as possible in the mid section of the route near High Stenries to minimise visual impacts on nearby residential receptors;
- aligning the powerline close to the plantation woodland, to the east of Kirtleton, to minimise visual impacts on this settlement and West Linnbridge; and
- following the Byre Cleuch burn (i.e. the low ground) as the alignment travels upland to meet the Ewe Hill Substation tie in by Crawthat Hill to achieve the best landscape fit.

Section 6: Gretna to Ewe Hill Corridor Options, Corridor Appraisal and Preferred Route Alignment

6.1 Corridor Options

6.1.1 Definition of Route Options

Consideration of corridor route options connecting the Gretna and Ewe Hill Windfarm substations and the Ewe Hill and Newfield Windfarm Substations have been discussed separately and have been referred to as the south section and north section respectively. Section 5 is concerned with the north section (Ewe Hill to Newfield) only.

6.1.2 Broad Corridors

Following the identification of the study area constraints listed in Section 4: Baseline Information, broad route corridors were initially defined between Ewe Hill Windfarm and Newfield Windfarm, which excluded all areas of Highest Amenity. As discussed in Section 5.1.2, the identification and analysis of broad corridors did not reveal any clear preferences for route alignments.

Although this method of assessment was found to be inconclusive in identifying a preferred route alignment, the process used in identifying the broad corridors was repeated at a more find grained level in the identification of the narrow corridors. This sieving process proved more successful and these narrow corridors are described below.

6.1.3 Narrow Corridor Identification

As discussed in Section 5.1.3 the process for defining the narrow corridors adopted a similar methodology to that for the broad corridors. As a result of this process five options were identified between Ewe Hill Windfarm and Newfield Windfarm.

These corridor options (nA to nE) are described in the following section. For the locations of the narrow corridors refer to **Figure 13.**

6.1.4 Ewe Hill to Newfield Narrow Corridors

Route nA

This route leaves Ewe Hill Substation from the northwest before turning southwest on the northern side of the summit of Crawthat Hill. It then descends steeply, passing to the south of a hill fort, on Newhall Hill, where it begins to head west into open farmland and crosses the B7068 to the south of Paddockhole. The route continues west, following the alignment of the Water of Milk through a steep sided valley covered in established native woodland. The route then turns northwest and crosses the Water of Milk, to the north of Linnhall, and climbs through undulating, bleak, pastoral farmland characterised by stone dikes and small tributaries. It passes to the southwest of a hill fort on the summit of Pyatshaws Rig, before descending into the valley between Corrie Common and Corriehalls. It passes through some immature plantation woodland before beginning to descend, skirting to the south of established plantation woodland. The route continues to descend through open pastoral farmland into the floodplain of the Corrie Water. From this point the route would pass through open pastoral farmland to the location of the proposed Newfield Substation, at Hogg Hill.

Route nB

This route leaves Ewe Hill Substation from the west-northwest through a natural dip in the landscape and descends to the north of Crawthat Hill through open pastoral farmland. The route passes Milton House, a listed building, and crosses belts of established native woodland associated with other properties in the vicinity. The route then turns to the northwest and crosses the Water of Milk, before climbing steeply up the side of the river valley. At the top of the slope, the route crosses a narrow road and then passes through a woodland shelter belt before crossing the lower ridgeline north of Birsca and then descending down to Stidriggs Burn. On the western side of the burn, the route begins to climb up through

bleak pastoral farmland and over the plateau of Pyatshaws Rig, with a hill fort located to the south. The route then follows the alignment of Route nA from the base of Pyatshaws Rig.

Route nC

This route leaves Ewe Hill Substation from the northwest, following the alignment of a small burn down the side of Crawthat Hill, passing to the north of Pearsby Hall and through some established belts of native woodland. It then follows the alignment of the contours of Craighousesteads Hill before descending down into the river valley of the Water of Milk. The route crosses the Water of Milk to the south of the meeting point with Booths Burn, before climbing steeply out of the valley. The route then continues to climb through a bleak pastoral landscape, passing to the north of the properties at Stidrigg, before it crosses established plantation woodland and skirts the high ground to the north of Corrie Common. The route follows the hillside down towards the floodplain of the Corrie Water to the west, past some established plantation woodland to the north and some recently felled woodland to the south. On the western side of the Corrie Water, it would follow up the side of the hill and over a small road to the Newfield Substation.

Route nD

This route heads north from the substation, for a short distance, passing to the west of Mid Hill and then follows the line of an existing farm track around to the north-northwest and over the northern side of Craighousesteads Hill, before descending down into the river valley of the Water of Milk. The valley sides of the Water of Milk are less pronounced in this area than in those described previously, with gentler slopes on the western side. The route crosses the Water of Milk, north of Craighousesteads, and continues in a westerly direction for approximately 1.5km, before following route nC to the north and east of Corrie Common.

Route nE

This route leaves Ewe Hill Substation from the north before descending to low ground through pastoral upland farmland. On the eastern side of Pike Knowe, the route turns to the northwest and follows the Capel Burn downwards through a transitional landscape of upland heath and scattered trees to pastoral farmland. The route then follows the base of Newland Hill to the northwest and crosses the Capel Burn and Water of Milk to the north of Capelfoot. The route turns west to the north of Upper Whitcastles and then crosses the ridgeline to the south of Whitcastles. The route then crosses the pronounced valley of Booths Burn, before crossing established plantation woodland and emerging to the south of a picnic area. The route continues to descend to the southwest and follows the alignment of route nC and nD at a point west of the established plantation woodland, by Corrie Common.

6.2 Corridor Appraisal

6.2.1 Corridor Assessment

As discussed in Section 5.2.1, following a review of the constraints data it was considered that the most appropriate approach to appraisal each of the narrow corridors options was through a high level assessment against environmental, landscape and visual and technical criteria in order to filter out less favourable options.

The following section presents a summary of the appraisal of the narrow corridors for the north section. The process of identification of narrow corridors sought to avoid Highest Amenity and, where possible, High Amenity constraints. Since there are relatively few environmental constraints in the study area, the options analysis was based predominantly on landscape and visual effects. For the location of the narrow corridors in relation to landscape constraints refer to **Figure 13**.

6.2.2 Ewe Hill to Newfield Corridor Appraisal

Route nA would impact on views from Corrie Common, which are primarily focused to the south, as it passes to the south of this settlement through an open valley. In addition, Route nA could potentially impact on the setting of two Scheduled Hill Forts at Pyatshaws Rig and to the south of Newhall. There are also a concentration of potential landscape and visual constraints as the route passes through the Intimate River Corridor LCA, near Paddockhole,

including loss of native broadleaved woodland and impacts on close range, enclosed views from properties within this area.

Similarly, Route nB impacts on views from Corrie Common, traverses the edge of two plateaus upon which hill forts are located and contributes to potential landscape and visual effects as it crosses the Water of Milk flood plain. As Corrie Common is the significant settlement within this section and avoiding impacts on views from it is considered a priority, and due to the deeply incised valley sides around the Water of Milk which make achieving a landscape fit with the proposed route difficult, routes nA and nB are not considered viable.

Route nC crosses the Water of Milk at a section where the topography presents difficulties in finding an acceptable landscape fit, due to the steeply incised valley sides, as well as passing in close proximity to three individual properties. Furthermore, the focus of views for properties around the Water of Milk is to the south, resulting in the alignment of this route potentially impacting on views from a number of farmsteads and dwellings further upstream. Although Route nC also passes close to the north of Corrie Common, and a number of the properties do have views to the north, these views are of commercial forestry plantations, including a large area that has recently been felled and replanted. However, due to the section which gives rise to topographical difficulties, this corridor has not been considered further.

Route nD presents fewer topographical conflicts than Route nC, but as the route deviates to the north of Route nC, it crosses the plateau of Craighousesteads Hill which has a hill fort at its summit. However, this area has a number of other man-made interventions in the landscape, including a phone mast, overhead power lines and views of the Minsca Windfarm. Despite the proximity of the proposed route to the setting of the hill fort, this feature is neither visible nor accessible by the public. Between Ewe Hill Substation and the hill fort, Route nD passes through a valley with stands of mixed woodland, before passing between properties at Capelfoot and Craighousesteads, but at distances of approximately 0.5km and these properties benefit from localised screening by existing stands of mature, mixed tree planting. As the route passes to the north of Corrie Common, the issues are the same as set out for Route C, however, the proposed line would be approximately 1km away from the properties and eventually back-dropped, again, by coniferous plantations, following re-planting . The property at Little Whitriggs would experience direct and close views of the proposed route, although this could be alleviated by routeing the line as far back as is possible and the recently re-planted mixed woodland will eventually, provide a backdrop to the line. Despite the issues regarding the proximity to Corrie Common and Little Whitriggs, this route does present a reasonable landscape fit and is more direct than Route nE.

Route nE takes a longer route through an open and attractive upland landscape, which currently has no other significant overhead lines or infrastructure. Shortly after leaving the Ewe Hill Substation the route passes between Newland Hill (with remains of an ancient hill fort) and Pike Knowe which could give rise to some technical constraints due to the steepness of the slopes and the proximity of the gas main. The route also passes to the north of properties at Capelfoot, Upper Whitcastles and Whitcastles, all of which would have close views of the proposed overhead line. The route passes through plantation woodland but consultation with the woodland manager indicates that this section of the woodland is likely to be felled in the near future, so any screening from Corrie Common would be lost (until the new trees had matured sufficiently). This alignment also passes through areas accessible to the public for walking and picnicking and would start to impact on views from properties at Cowburn, Burnfoot Cottage and Wynholm. The same issues as set out for Route nD, regarding Little Whitriggs would also apply to Route nE. The issues regarding the properties at Capelfoot, Upper Whitcastles and Whitcastles would be mitigated by local screening of groups of trees views from Upper Whitcastles and Capelfoot are orientated south.

Both Route nD and Route nE have similar and reasonably equal issues regarding environmental and landscape impacts and both are considered further although other technical constraints are likely to also influence the final selection of the northern route.

6.3 Preferred Route Alignment

6.3.1 Preferred Route Alignment Criteria

Two route alignments were identified for further consideration, within the north section, utilising the same criteria as set out in Section 5.3.1.

6.3.2 Ewe Hill to Newfield Preferred Route Alignment

The approximate length of Route nD is 8km and Route nE is approximately 9.5km. As one travels from east to west the detailed routing for Route nD attempts to minimise adverse impacts through:

- following the valley between Craighousesteads Hill and Pike Knowe and taking advantage of the groups of trees for screening to achieve a good landscape fit;
- routeing the overhead line away from as many properties as possible;
- routeing the overhead line through recently felled coniferous plantation rather than mature woodland groups;
- taking the shortest route practicable.

For Route nE, attempts to minimise adverse impacts were considered by:

- following the low ground as far as possible as the alignment heads towards Capel Burn to achieve a good landscape fit;
- following the direction of the contours as far as possible as the alignment passes through Capel Burn valley to achieve the best landscape fit;
- avoiding the small blocks of plantation woodland to the south of Whitcastles to minimise the effects on landscape features;
- passing through the plantation woodland north of Corrie Common at its narrowest section to minimise the clear felled area required to accommodate the power line thus reducing landscape impacts; and
- using the breadth of the narrow corridor to distance the alignment as far as possible from Corrie Common to minimise visual impacts on this settlement.

After very careful deliberation of all the technical constraints, Route nD **(refer to Figure 14)** was considered, on balance, to be the preferred route, for the following reasons:

- fewer and reduced visual impacts from residential properties;
- route avoids having to cross the gas pipeline, which represents a significant technical and economic constraint;
- route avoids public walking areas within forestry plantation;
- route avoids introducing this form of manmade intervention into an area of upland landscape character which currently has minimal interventions within it;
- shortest route

The preferred route alignments, for both the north and south sections, as shown on **Figure 15** have attempted to select a route of least environmental, landscape, visual and technical constraints based on the information assessed to date. The following section goes on to outline how the preferred routes will become proposed routes following the public consultation process.

Section 7: Next Steps

7.1 The Next Steps

7.1.1 Selection of the Proposed Routes

At the conclusion of the consultation process, proposed routes will be selected by SPT after consideration of:

- all the comments and responses made by statutory and other interested parties during the consultation process;
- the appraisal of options on both route corridors;
- having regard to all other matters that SPT consider to be relevant.

7.1.2 Scoping

Following consultation, it is SPT's intention to submit a Scoping Report to the Scottish Ministers with a written request under Regulation 7 of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 for their opinion as to the information to be provided in the Environmental Statement that SPT intends to prepare. The Scoping Report will set out the proposed structure and content of the Environmental Statement and identify the possible effects on the environment of the proposed route alignments. The scoping report will reference this Consultation Document.

7.1.3 Detailed Studies

Further detailed studies including technical studies will be undertaken for the preparation of the Section 37 application and the Environmental Impact Assessment (EIA). The Environmental Statement, which reports the findings of the EIA, will provide a detailed visual and environmental assessment of the proposed routes and will include all appropriate mitigation measures. Computer aided techniques will be used to assist the evaluation of the visual effects of the proposed routes.

7.1.4 Statutory processes

The Environmental Statement will assess the environmental impact of the proposed route alignments, which will be developed from the preferred route alignments identified in this Consultation Document following public consultation. It is envisaged that this process will identify the main environmental considerations. The Environmental Statement will incorporate relevant information from this document and the consultation process. Following further detailed environmental and technical assessment, it may identify localised deviations from the proposed route alignments in order to mitigate local impacts. The Environmental Statement will identify and describe in detail the environmental effects of line construction and operation and will identify all appropriate mitigation measures.

FIGURES

Legend

- Substations

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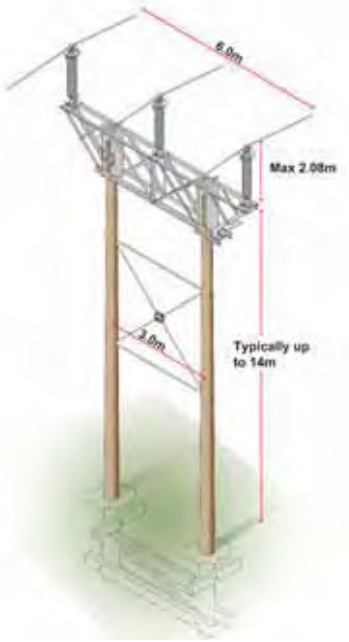
Notes

Figure 1
Project Context Plan

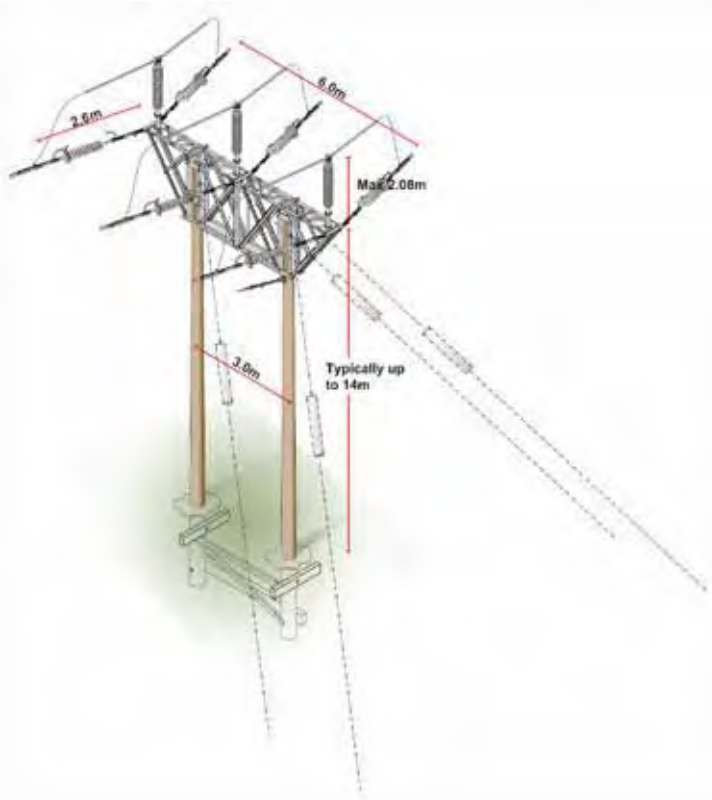
Size: A3
Scale: Not to Scale
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

SP TRANSMISSION

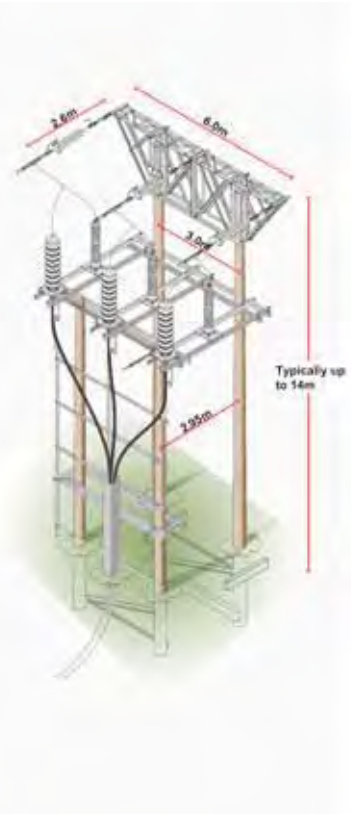
Date: 12.08.09
Revision: -
Drawn by: AR
Checked by: SI



Straight line poles



20-30 degree angle poles



Terminal structure

Legend

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Notes

Images provided by
CAPITA LOVEJOY

Figure 2
Typical Heavy Duty Wood Pole Construction Images

Size: A3
Scale: Not to Scale
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

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Legend

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Notes

Figure 3
Typical Heavy Duty Wood Pole Construction Images

Size: A3
Scale: Not to Scale
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

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Legend

- Study Area
- Buffer Area

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Notes

Figure 4
Study Area and Buffer Area

Size: A3
Scale: Not to Scale
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

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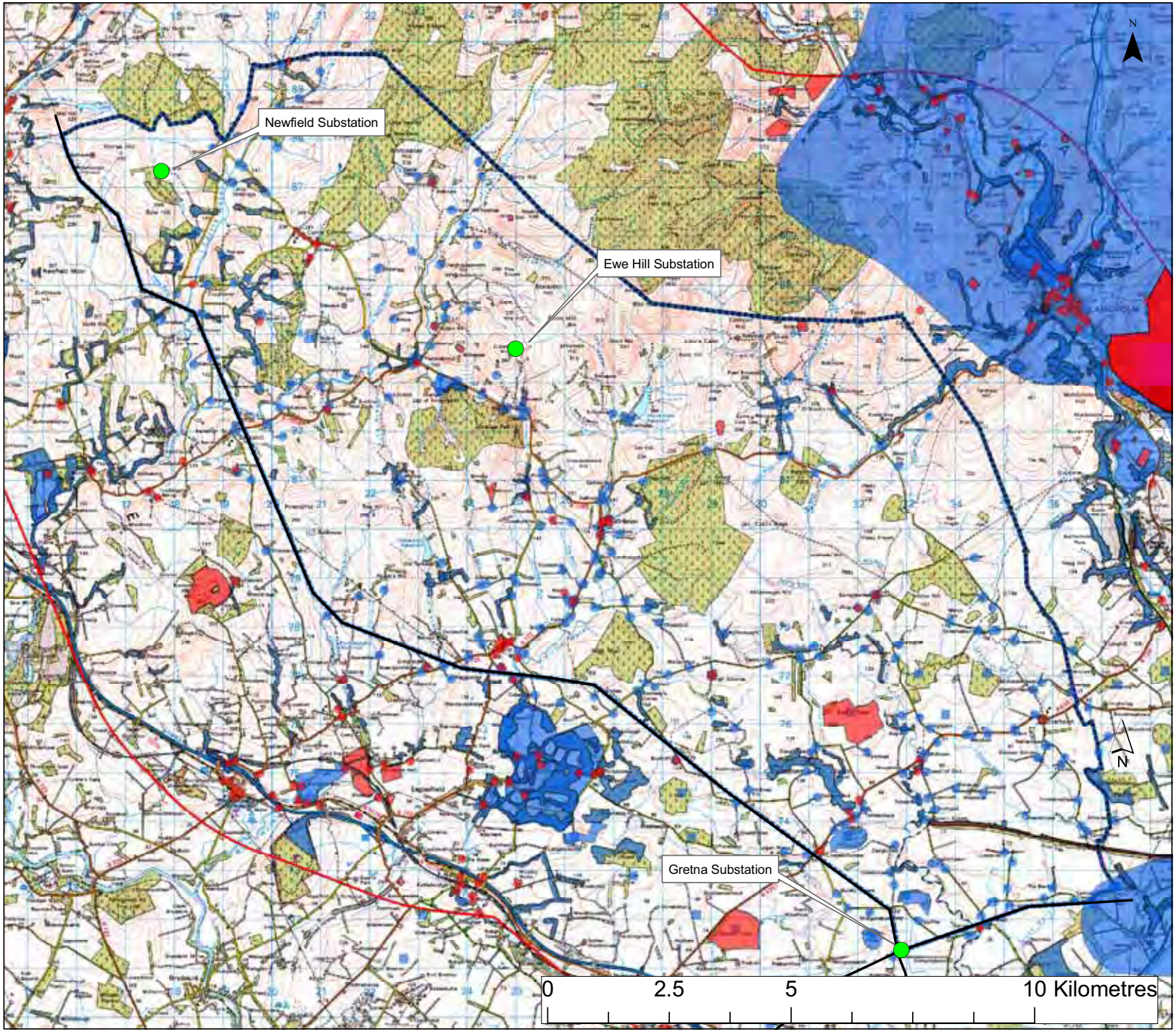

Legend

- Study Area
- Buffer Area
- Substation Locations
- Highest Amenity Constraints
- High Amenity Constraints

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Notes

Figure 5
Highest and High Amenity Constraints

Size: A3
Scale: Not to Scale
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

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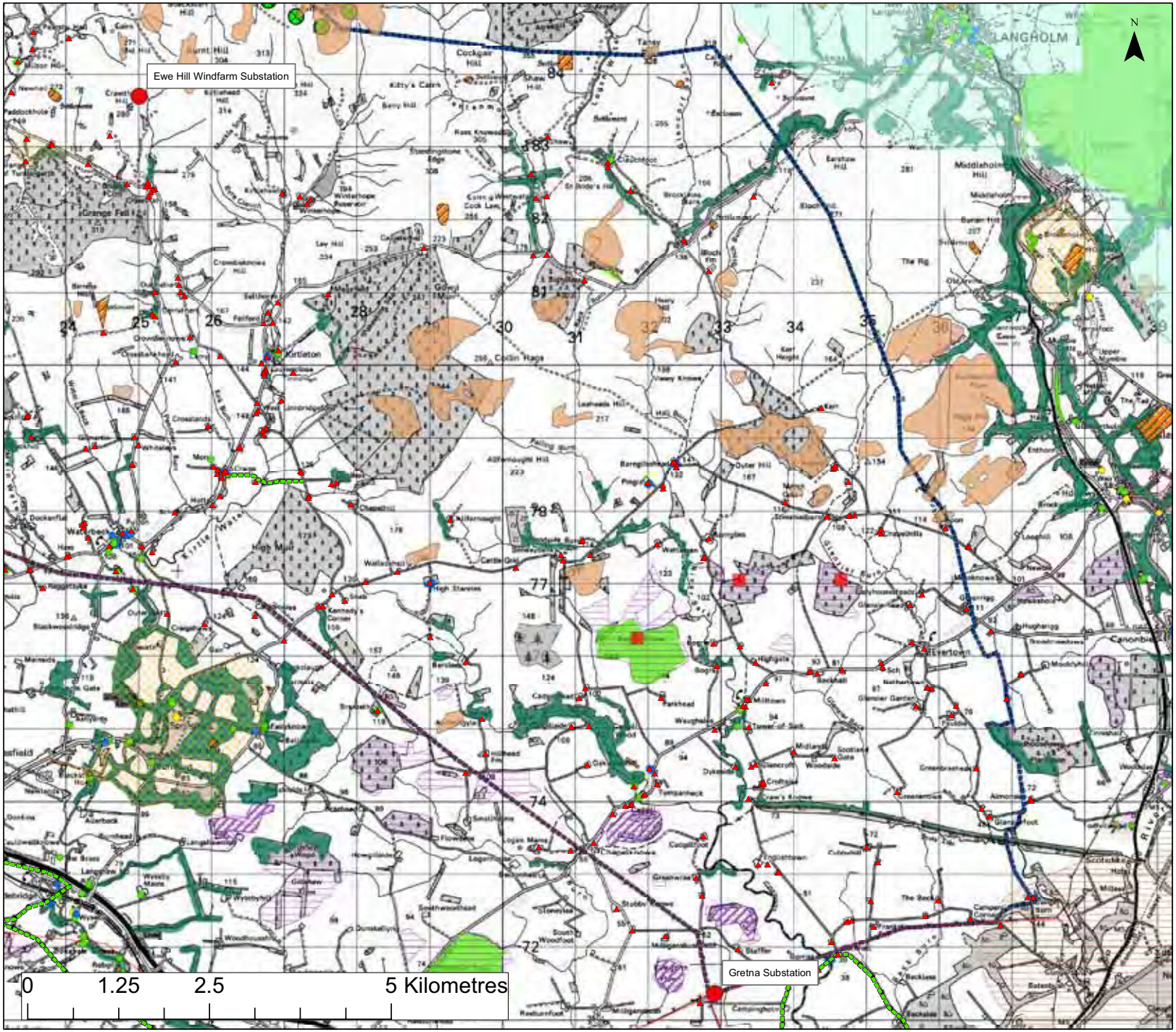

Legend

- Study Area
- Existing Transmission Lines
- Substation
- Proposed Wind Turbine
- Site of Special Scientific Interest
- Ancient Woodland Inventory Site
- Local Wildlife Site
- Intermediate Bog Inventory Site
- Blanket Bog
- Bog / Mire
- Scheduled Ancient Monument
- Category A Listed Building
- Category B Listed Building
- Category C Listed Building
- Non-Inventory Designated Landscape
- Regional Scenic Area
- Landscape of County Importance (Cumbria County Council)
- Residential Property
- Right of Way

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Notes

Figure 6a
Gretna to Ewe Hill - Constraints Map

Size: A3
Scale: Not to Scale
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

SP TRANSMISSION

Date: 12.08.09
Revision: -
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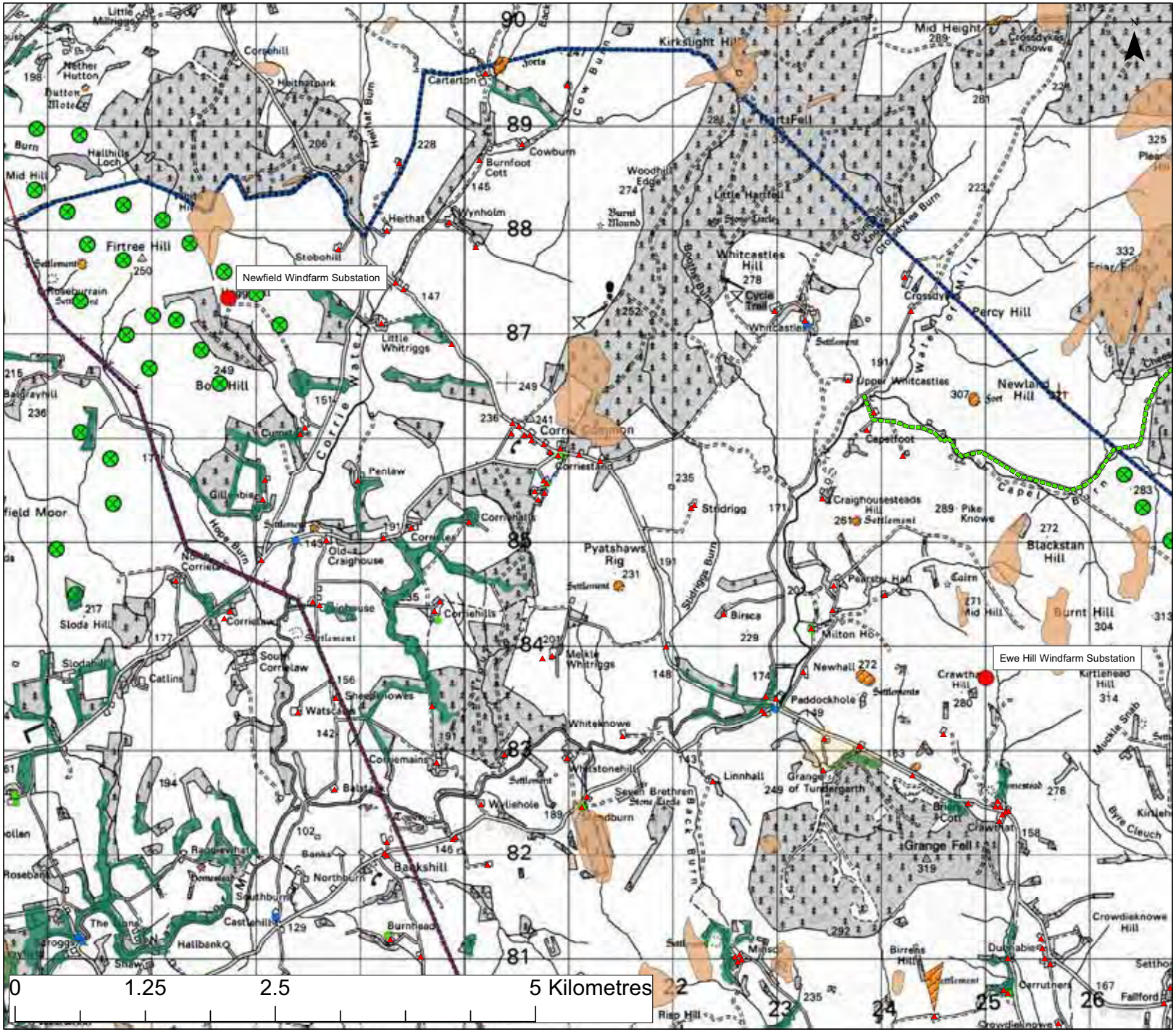

Legend

- Study Area
- Existing Transmission Lines
- Substation
- Proposed Wind Turbine
- Site of Special Scientific Interest
- Ancient Woodland Inventory Site
- Local Wildlife Site
- Intermediate Bog Inventory Site
- Blanket Bog
- Bog / Mire
- Scheduled Ancient Monument
- Category A Listed Building
- Category B Listed Building
- Category C Listed Building
- Non-Inventory Designated Landscape
- Regional Scenic Area
- Residential Property
- Right of Way

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Notes

Figure 6b
Ewe Hill to Newfield - Constraints Map

Size: A3
Scale: Not to Scale
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

SP TRANSMISSION

Date: 12.08.09
Revision: -
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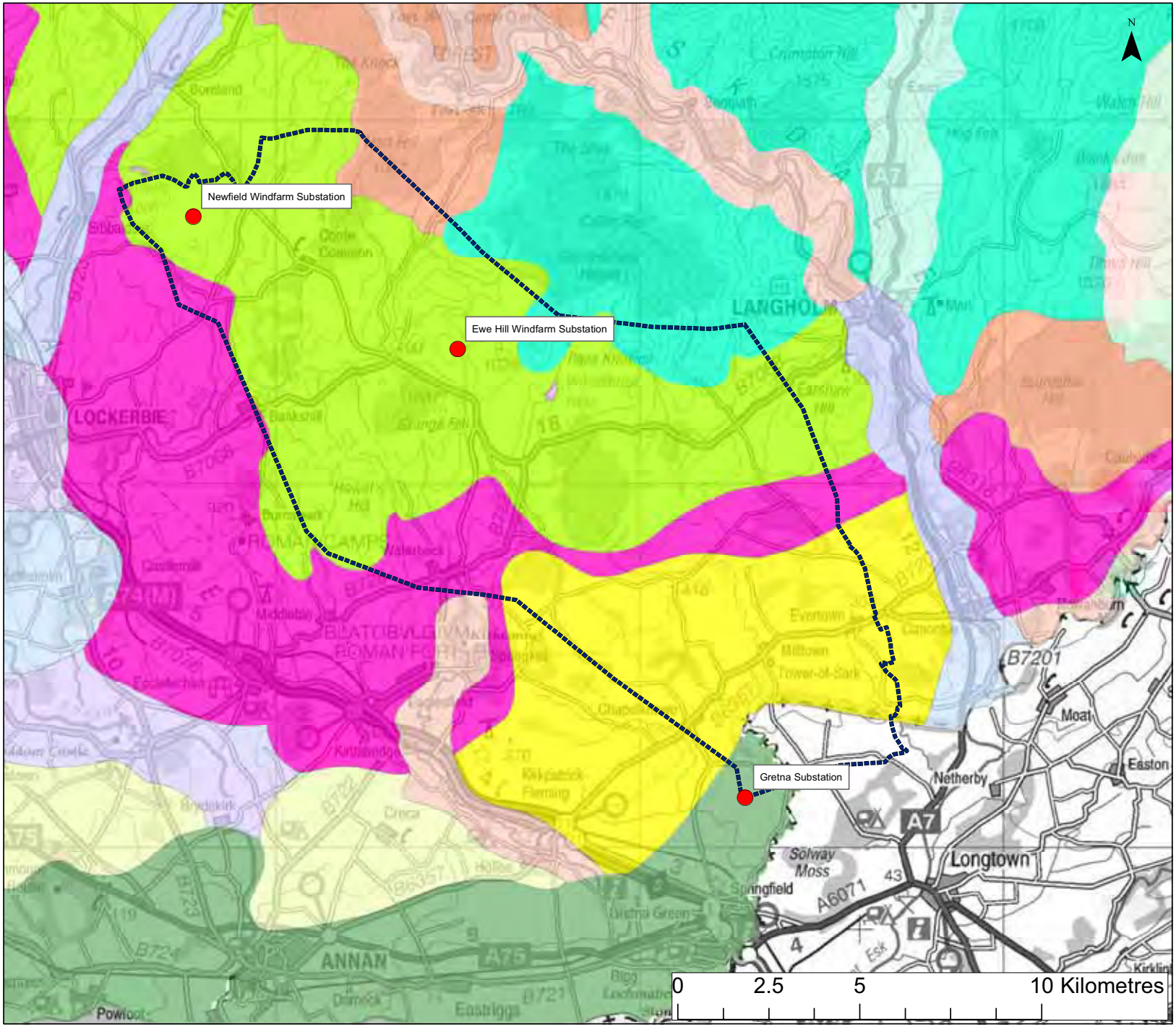

Legend

- Substations
- Flow Plateau LCA
- Upland Fringe LCA
- Southern Uplands LCA
- Foothills LCA
- Foothills with Forest LCA
- Coastal Flats LCA

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Notes

Figure 7
SNH Landscape Character Types

Size: A3
Scale: Not to Scale
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

SP TRANSMISSION

Date: 14.08.09
Revision: -
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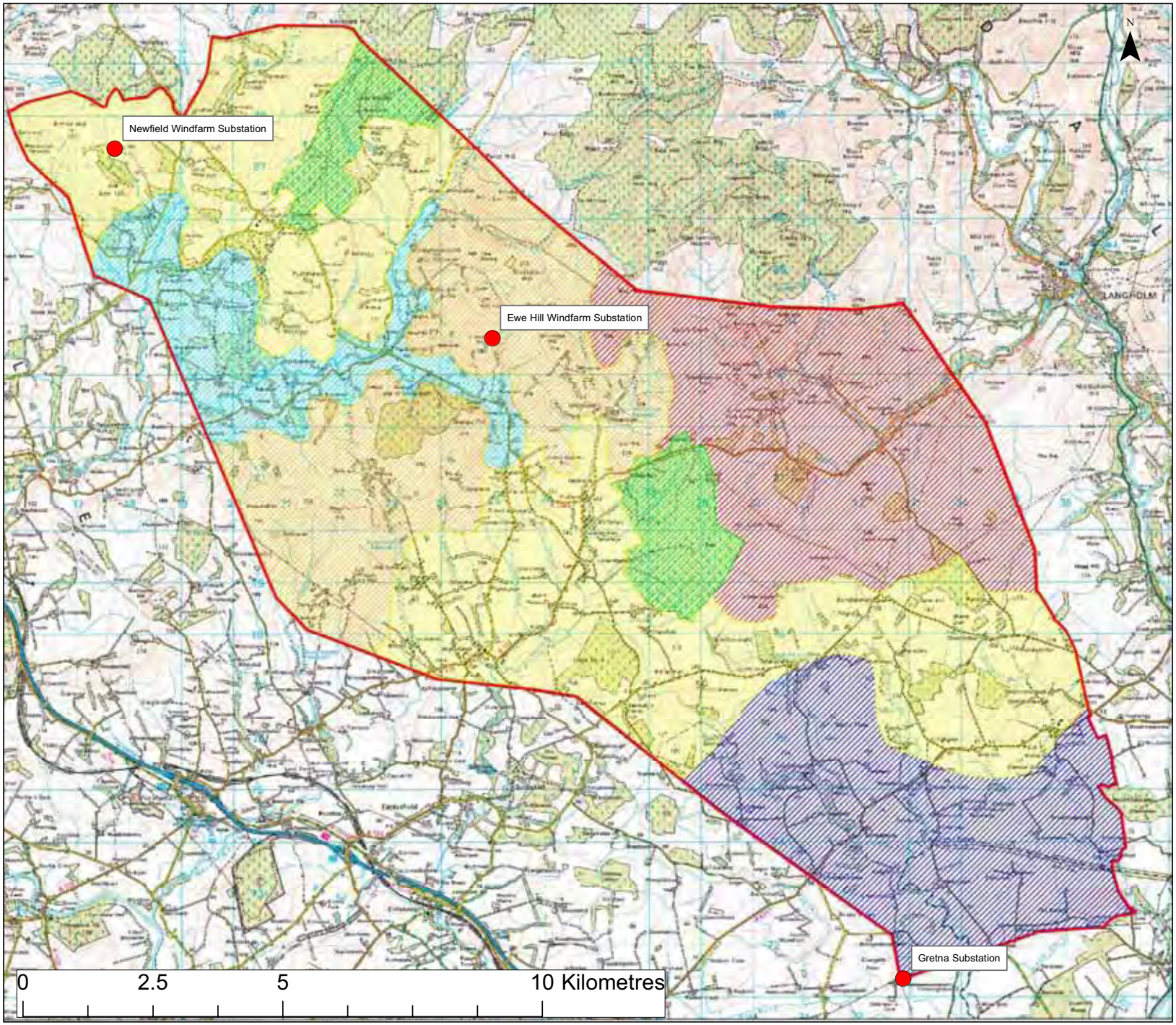

Legend

- Substations
- Lowland Farmland
- Intimate River Corridor
- Transitional Farmland
- Upland Pasture
- Upland Heath
- Plantation Woodland

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Notes

Figure 8
Gillespies Landscape Character Types

Size: A3
Scale: Not to Scale
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

SP TRANSMISSION

Date: 14.08.09
Revision: -
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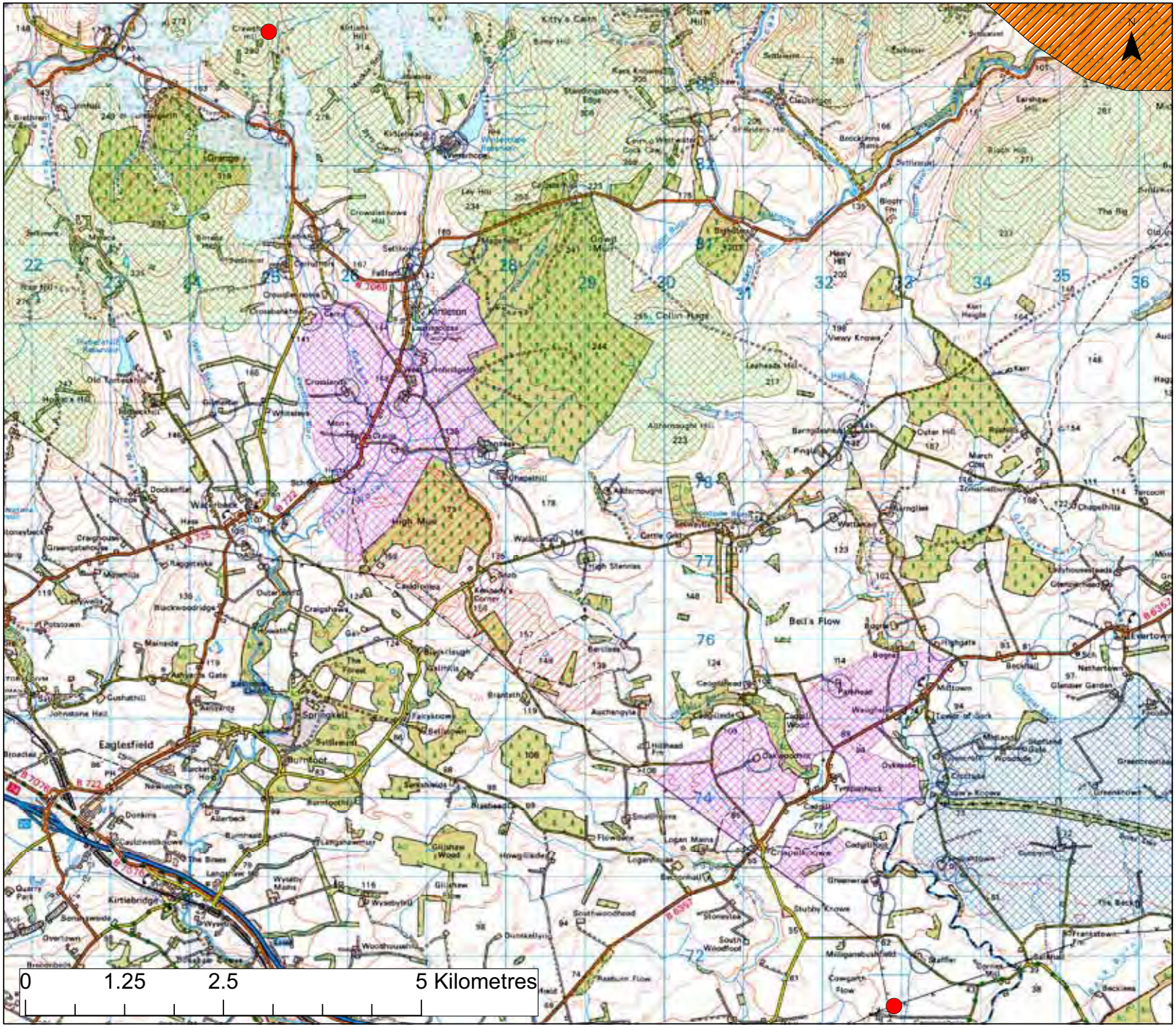

Legend

- Substations
- Residential receptor (150m buffer)
- Impact on views from settlements
- Impact on setting of historic features
- Varied topography and slopes
- Upland landscape
- Intimate landscape
- 'Double climbing'
- Regional Scenic Area

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Notes

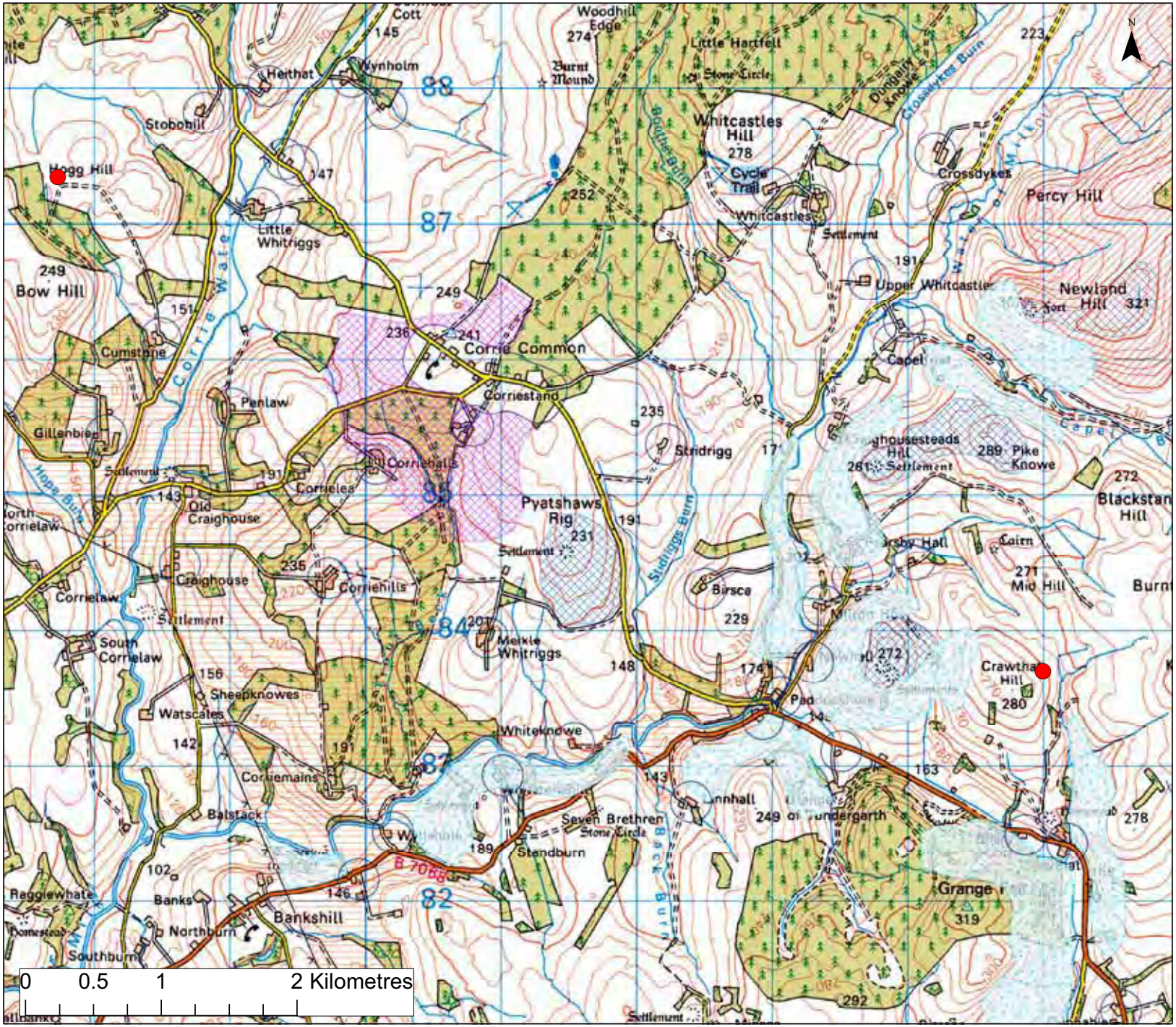
Ridge lines, summits and plateaus have not been annotated but have been considered, as read off the OS base mapping.

Figure 9a
Gretna to Ewe Hill -
Landscape Constraints

Size: A3
Scale: Not to Scale
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

SP TRANSMISSION

Date: 14.08.09
Revision: -
Drawn by: AR
Checked by: SI



Notes

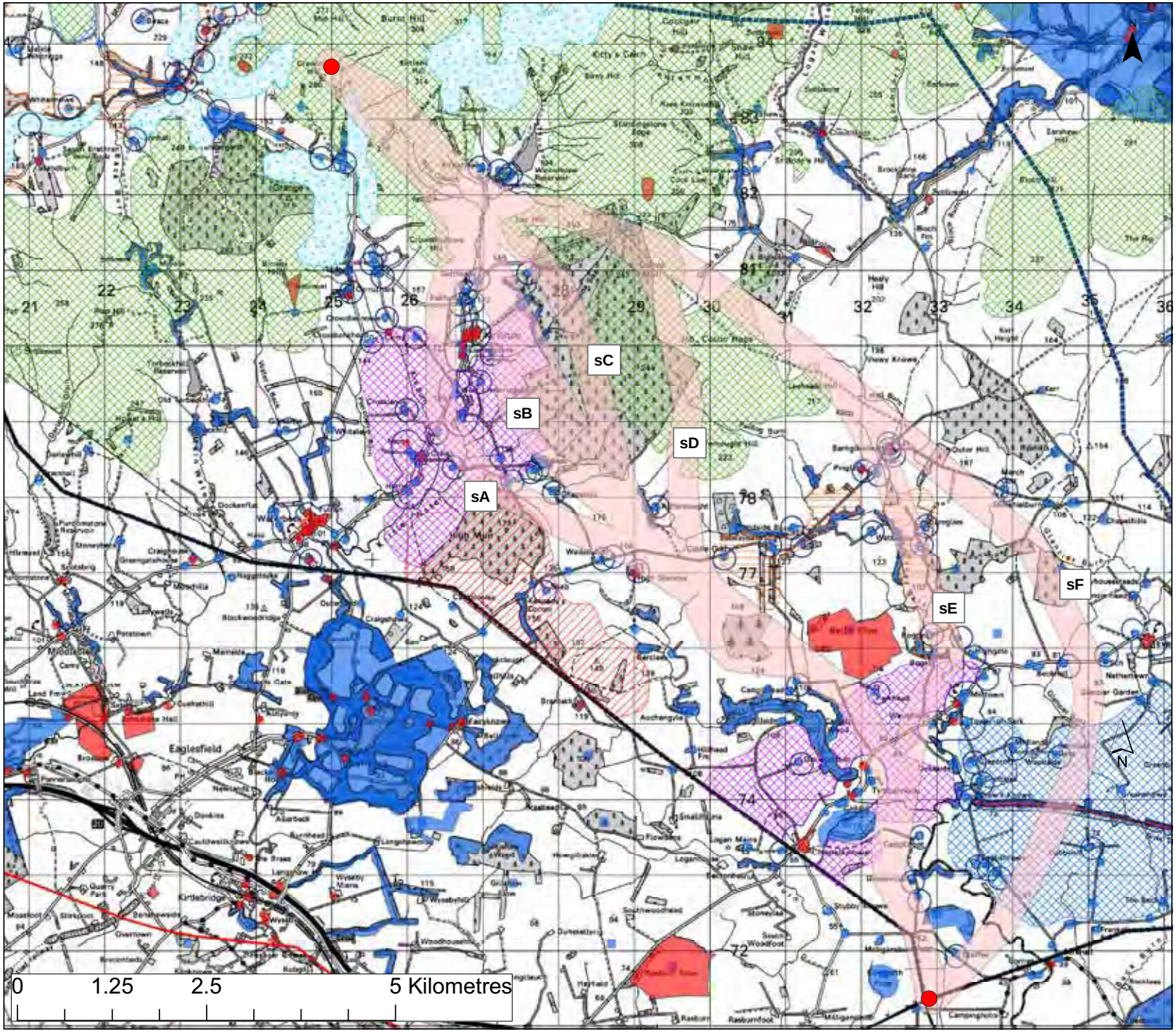
Ridge lines, summits and plateaus have not been annotated but have been considered, as read off the OS base mapping.

Figure 9b
Ewe Hill to Newfield - Landscape Constraints

Size: A3
Scale: Not to Scale
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

SP TRANSMISSION

Date: 14.08.09
Revision: -
Drawn by: AR
Checked by: SI



Legend

- Study Area
- Substation Locations
- Narrow Corridor
- Highest amenity constraints
- High amenity constraints
- Impact on views from settlements
- Impact on setting of historic features
- Varied topography and slopes
- Upland landscape
- Intimate landscape
- 'Double climbing'

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Notes

Ridge lines, summits and plateaus have not been annotated but have been considered, as read off the OS base mapping.

Figure 10
Gretna to Ewe Hill -
Narrow Corridors

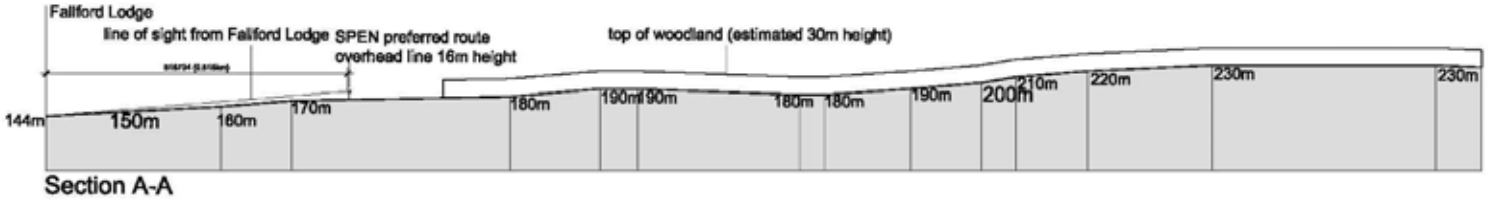
Size: A3
Scale: Not to Scale
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

SP TRANSMISSION

Date: 17.08.09
Revision: -
Drawn by: AR
Checked by: SI

Section Location (scale 1/50,000 @ A3)

Existing View



Section A-A

Legend

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Notes

Figure 11a
Section AA - Narrow Route Corridor Selection sB/sC

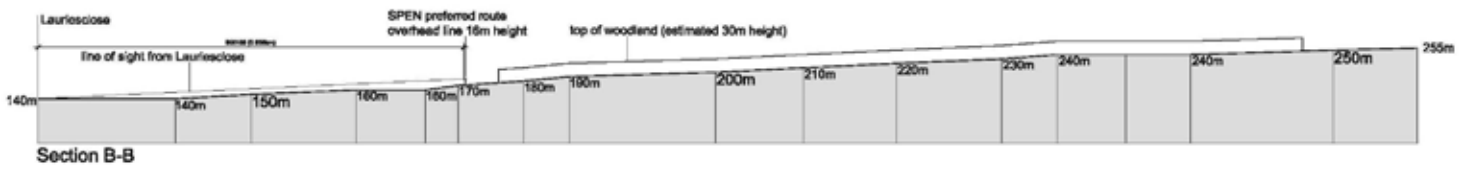
Size: A3
Scale: Not to Scale
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

SP TRANSMISSION

Date: 12.08.09
Revision: -
Drawn by: AR
Checked by: SI

Section Location (scale 1:50,000 @ A3)

Existing View



Section B-B

Legend

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WSP

Notes

Figure 11b
Section BB - Narrow Route Corridor Selection sB/sC

Size: A3
Scale: Not to Scale
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

SP TRANSMISSION

Date: 12.08.09
Revision: -
Drawn by: AR
Checked by: SI

Section Location (scale 1/50,000 @ A3)

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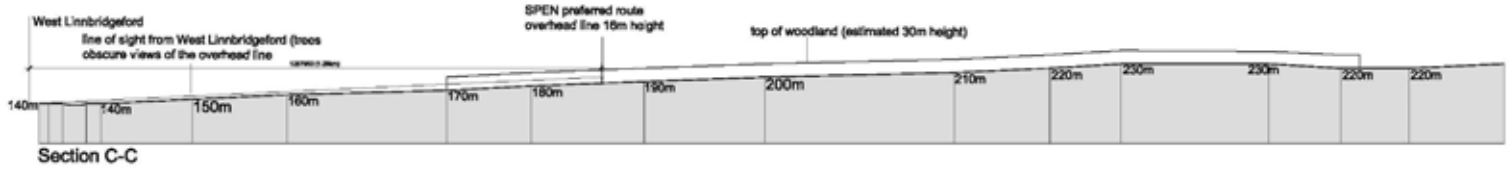

Section C-C

Legend

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Notes

Figure 11c
Section CC - Narrow Route Corridor Selection sB/sC

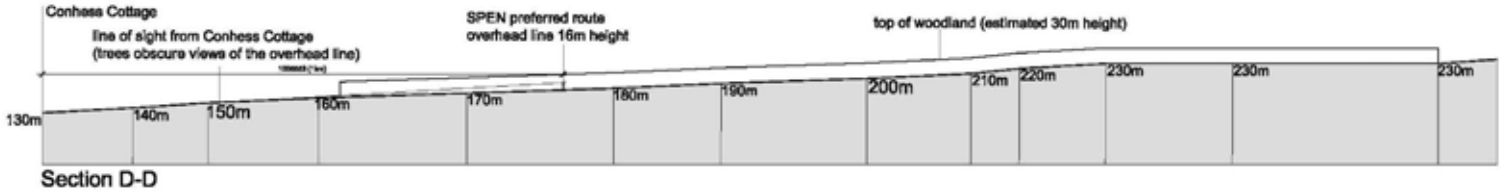
Size: A3
Scale: Not to Scale
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

SP TRANSMISSION

Date: 12.08.09
Revision: -
Drawn by: AR
Checked by: SI

Section Location (scale 1/50,000 @ A3)

Existing View



Section D-D

Legend

GILLESPIES WSP

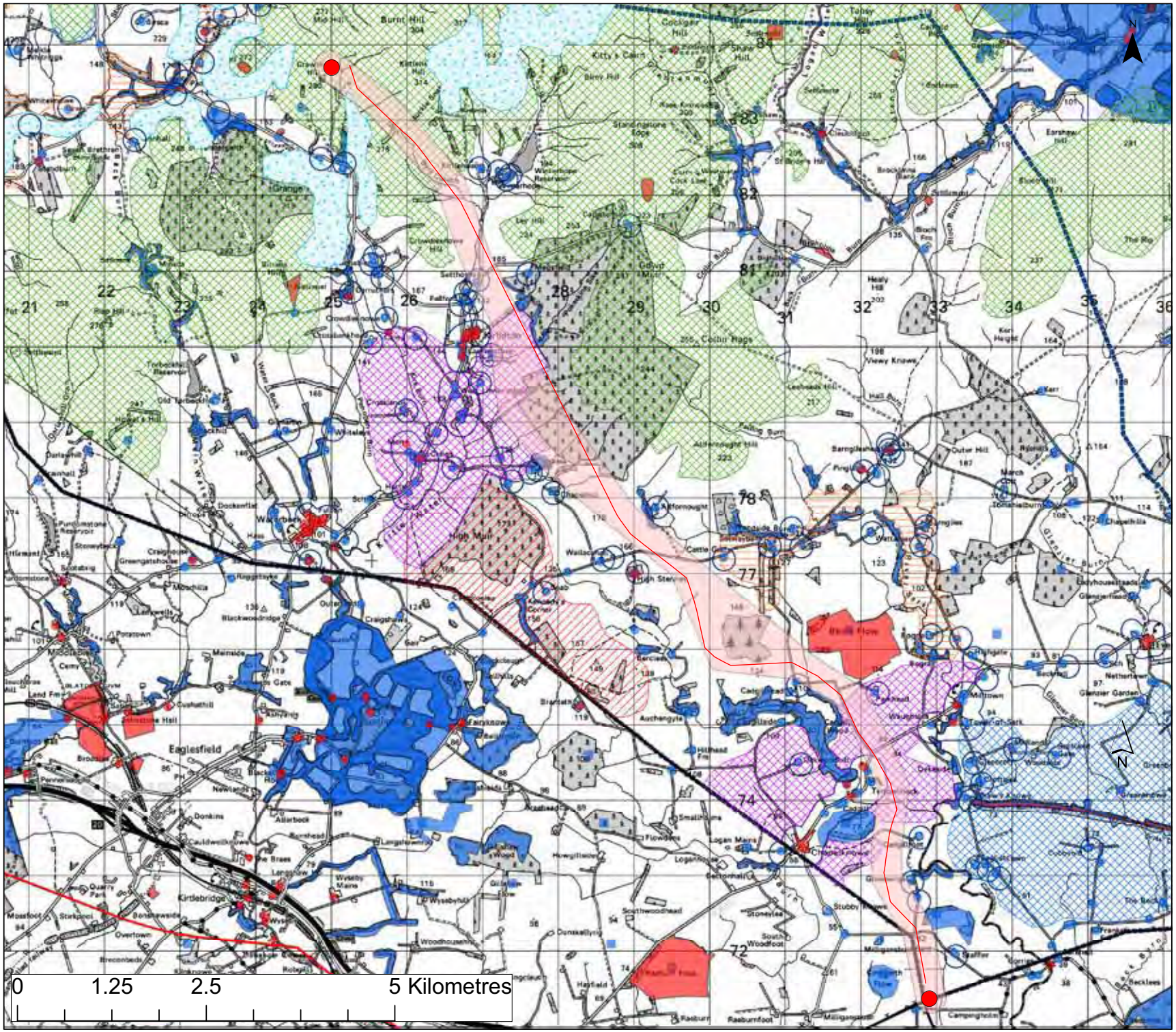
Notes

Figure 11d
Section DD - Narrow Route Corridor Selection sB/sC

Size: A3
Scale: Not to Scale
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

SP TRANSMISSION

Date: 12.08.09
Revision: -
Drawn by: AR
Checked by: SI



Legend

- Study Area
- Substation Locations
- Narrow Corridor
- Highest amenity constraints
- High amenity constraints
- Impact on views from settlements
- Impact on setting of historic features
- Varied topography and slopes
- Upland landscape
- Intimate landscape
- 'Double climbing'
- Preferred Route Alignment

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Notes

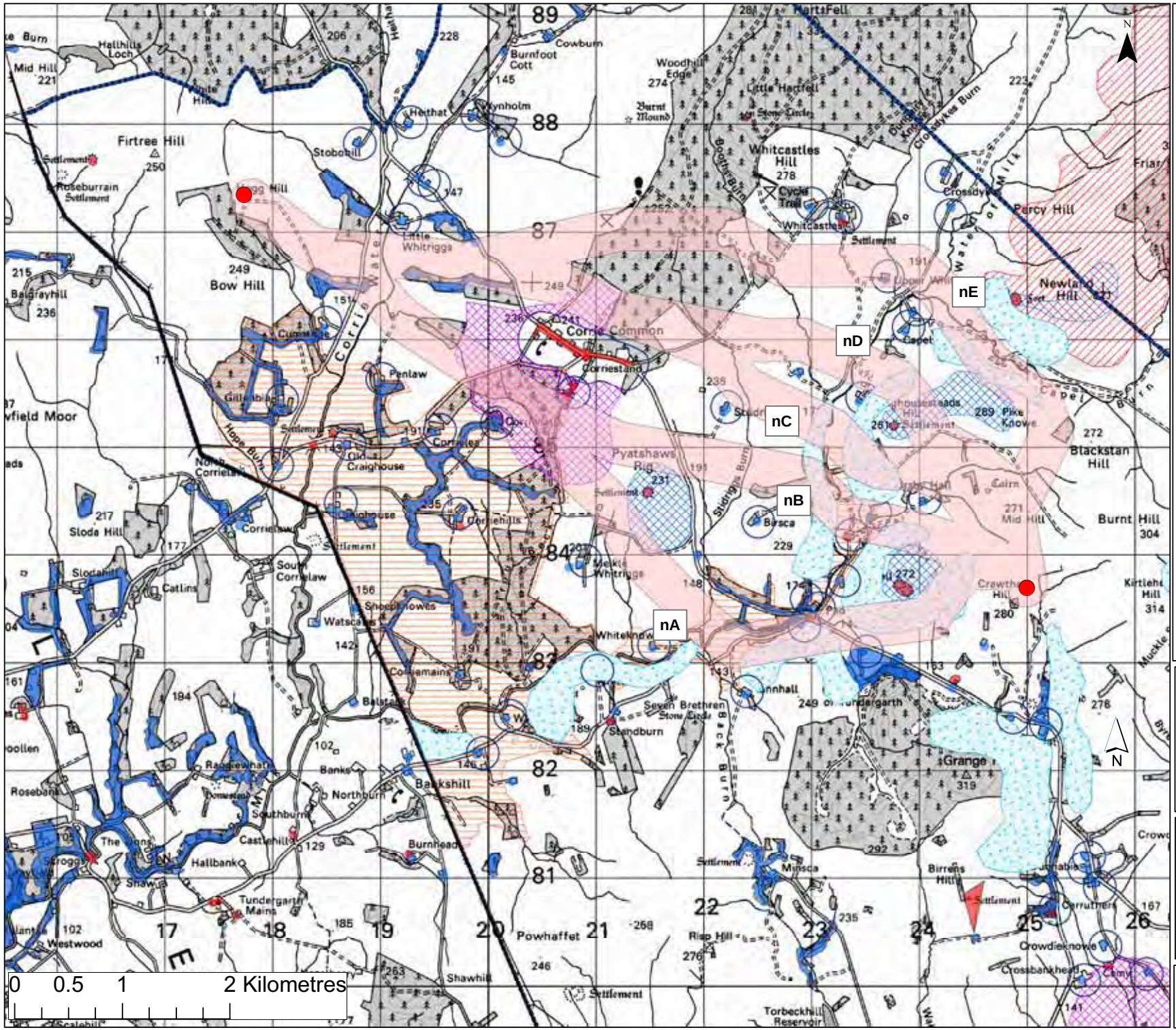
Ridge lines, summits and plateaus have not been annotated but have been considered, as read off the OS base mapping.

Figure 12
Gretna to Ewe Hill -
Preferred Alignment

Size: A3
Scale: Not to Scale
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

SP TRANSMISSION

Date: 17.08.09
Revision: -
Drawn by: AR
Checked by: SI



Legend

- Study Area
- Substation Locations
- Narrow Corridor
- Highest amenity constraints
- High amenity constraints
- Impact on views from settlements
- Impact on setting of historic features
- Varied topography and slopes
- Intimate landscape
- 'Double climbing'

GILLESPIES WSP

Notes

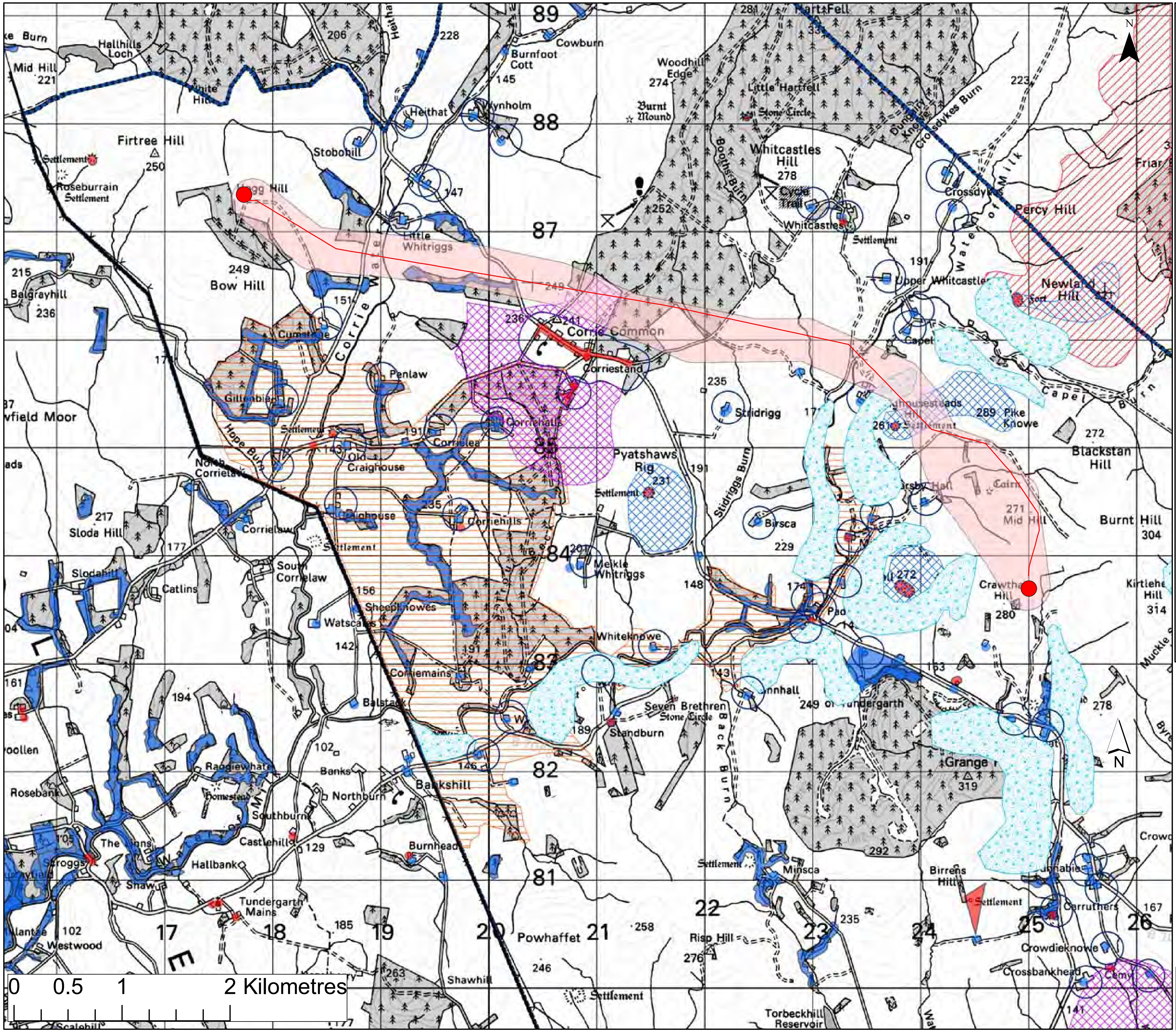
Ridge lines, summits and plateaus have not been annotated but have been considered, as read off the OS base mapping.

Figure 13
Ewe Hill to Newfield - Narrow Corridors

Size: A3
Scale: Not to Scale
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

SP TRANSMISSION

Date: 17.08.09
Revision: -
Drawn by: AR
Checked by: SI



Legend

- Study Area
- Substation Locations
- Narrow Corridor
- Highest amenity constraints
- High amenity constraints
- Impact on views from settlements
- Impact on setting of historic features
- Varied topography and slopes
- Intimate landscape
- 'Double climbing'
- Preferred Route Alignment

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Notes

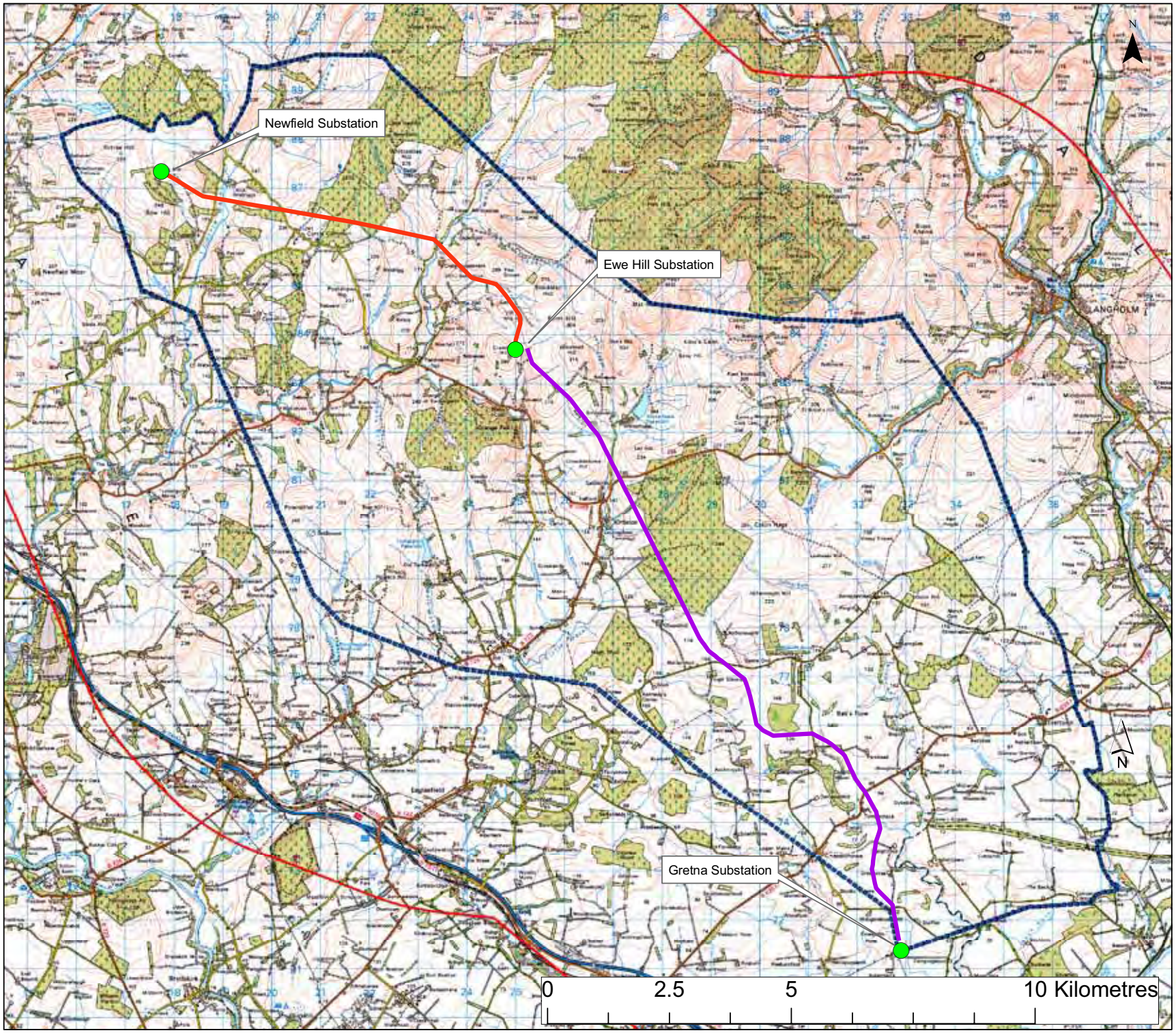
Ridge lines, summits and plateaus have not been annotated but have been considered, as read off the OS base mapping.

Figure 14
Ewe Hill to Newfield - Preferred Alignment

Size: A3
Scale: Not to Scale
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

SP TRANSMISSION

Date: 17.08.09
Revision: -
Drawn by: AR
Checked by: SI



Legend

- Study Area
- Gretna to Ewe Hill Preferred Alignment
- Ewe Hill to Newfield Preferred Alignment
- Substation Locations

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Notes

Figure 15
Preferred Alignments

Size: A3
Scale: Not to Scale
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

SP TRANSMISSION

Date: 12.08.09
Revision: -
Drawn by: AR
Checked by: SI

APPENDICES

APPENDIX 2 - Glossary

Angle Poles: Poles erected to allow for a change in direction of the line.

Conductor: The name given to the metallic wires strung from pole to pole to carry electric current. These are generally made of aluminium.

Earth Conductor: A wire under slung on a wood pole. These are used for protection against lightning strikes but can also contain fibre optic cores for communication purposes.

Insulators: Materials that are very poor conductors of electricity. Air exists as natural insulation around conductors, but at supports, an insulator string (or strings) is required to prevent live contact with the wood pole body. Glass, polymeric or porcelain insulators can be used.

Insulator Strings: Insulator units assembled in articulated strings between the pole steelwork and conductors.

Kilovolt (kV): 1,000 volts.

Megawatt (MW): 1,000,000 watts.

The National Grid: The electricity transmission network of the UK.

Overhead Transmission Line: An electric line installed above ground usually supported by heavy duty wooden poles.

Substation: Controls the flow and voltage of power by means of transformers and switchgear, with facilities for control, fault protection and communications.

Volts: The international system unit of electric potential and electromotive force.

Watt: The unit of electric power.

APPENDIX 1 - THE HOLFORD RULES

The Holford Rules were formulated by the late Lord Holford, Professor of Town Planning, University College, London in 1959 and published by the Royal Society of Arts. The Holford Rules remain the starting point for routeing electricity transmission lines in the UK. Since the Rules apply English designations, they require some interpretation to match them to circumstances in Scotland. The Holford Rules are a product of a specific time and set of circumstances. At the time the Holford Rules were written, the area of land designated for amenity value was far smaller than now and the design of routes to avoid such areas was easier as a result. In Scotland, land designated for amenity value is largely confined to areas of land with sparse population. The Holford Rules give no guidance on how to reconcile routeing to avoid areas of amenity value where this would have a greater visual intrusion due to the proximity of the line to people. This limitation of the Rules is clarified in the National Grid Company's (NGC's) Supplementary Notes to their Guidelines for the Routeing of New High Voltage Overhead Transmission Lines.

A central premise of the Holford Rules is that the extent of the visual effect of an overhead transmission line can be reduced by careful routeing. The Holford Rules provide a valuable basis for an approach to transmission line routeing, but require adaptation to meet present day circumstances. The routeing practice followed by SP Transmission plc is derived from the Holford Rules and takes account of the National Grid Company's Guidelines for the Routeing of New High Voltage Overhead Transmission Lines.

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.

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.

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

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.

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 the trees.

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'.

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

The National Grid Company (NGC) reviewed the Holford Rules in 1992 (refer Appendix 3) and confirmed them as an invaluable tool in selecting and assessing line routeing options as part of the environmental assessment process. As a result of this review, the Rules have had some supplementary notes added to them by NGC.

In 2004 a further review was carried out by Scottish Hydro-Electric Transmission Limited in conjunction with Scottish Power Transmission Limited (refer Appendix 3) and their review confirmed the relevance of "Rules" in overhead Line routeing.

GILLESPIES WSP

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Appendix 2.3 Summary of Consultation Responses

Appendix 2.3 Summary of Consultation Responses

Consultee Organisation	Type and Date of Consultation Response	Comments on Project and Effects	Information Provided	Consideration in this ES
British Trust for Ornithology (BTO)	Letter from Sue Gough, Research Ecologist – Terrestrial Ecology Unit, BTO, 27th November 2006, and email on 21st May 2007.	The information found from a data search for the study area includes, New Breeding Atlas Data, Breeding Bird Survey Data, Atlas of Wintering Birds in Britain and Ireland, Common Birds Census, and Waterways Breeding Bird Survey. Specific species data surveys include, Woodlark, Nightjar, Nightingale, Breeding Skylark, Winter Skylark, Breeding Waders of Wet Meadows, Winter Farmland Bird Surveys and Heron Census. Costing details were also provided. Bird count data was subsequently obtained for the Study Area.	N/A	This information has been incorporated into the baseline desk study for Ecology and Ornithology, as described in Chapter 7 of this ES.
BTO	Email response from Mark Collier, Wetland Bird Survey (WeBS) Research Officer, BTO, 28th November 2006.	The coverage of WeBS data for the study area is low as there are very few count sites.	The only areas where counts have been carried out in the area are at Hallhills Loch, Springkell Ponds and Purdomstone Reservoir, all of which lie outwith the Study Area.	This information has been incorporated into the baseline desk study for Ecology and Ornithology, as described in Chapter 7 of this ES.
Dumfries and Galloway Council, Archaeology Department	Consultation with Andrew Nicholson (AN), Sites and Monuments Record (SMR) Officer, 4th August 2006.	It has been advised that D&G Council has approximately 1000 sites which are not on the Historic Scotland (HS) datasets including sites which D&G have determined as nationally important. HS are currently reviewing the national designations with regard to the potential to include these on the national datasets.	AN is the SMR Officer and the Council Archaeologist is Jane Brann who should be the contact for all further consultation correspondence.	This information has been incorporated into the baseline desk study for Archaeology and Cultural Heritage, as described in Chapter 8 of this ES.
Dumfries and Galloway Environmental Resource	Letter from Mark Pollitt, DGERC Manager, 21st August 2006.	No comments made other than the information provided.	ARCGIS format shape files provided containing the following information: • Broad Habitat Data	This information has been incorporated into the baseline desk study for Ecology and Ornithology, as described in Chapter 7 of this ES.

Consultee Organisation	Type and Date of Consultation Response	Comments on Project and Effects	Information Provided	Consideration in this ES
Centre (DGERC)			• Local Wildlife Sites • Important Bird Areas Further information provided includes: • Georeferenced images of the NVC habitat data • Maps of Red Squirrel priority woodland • Maps of Lowland Raised Bog and Intermediate Bog sites The study area has also been checked for RSPB, WWT, SWT reserves and for SNH consultation for priority Annex 1 species (Natterjack Toads/Great Crested Newts etc) and none of the aforementioned has been identified in the Study Area.	
DGERC	Email response from Mark Pollitt, Manager, DGERC, 5th December 2006.	None made. The present records of Bat and Wildfowl data is currently incomplete, therefore it has been suggested to contact the SNH regional office.	Data for various species and habitats including red squirrels and LBAP species. Habitat information includes some broad habitats and some National Vegetation Classification (NVC) data.	This information has been incorporated into the baseline desk study for Ecology and Ornithology, as described in Chapter 7 of this ES.
	Email response from Mark Pollitt, Manager, DGERC, 6th December 2006.	Further information provided with regard to the type of data that is available and the costing for this.	Records of protected species, records of Local Biodiversity Action Plan (LBAP) species, including	This information has been incorporated into the baseline desk study for Ecology and Ornithology, as described in Chapter 7 of this ES.

Consultee Organisation	Type and Date of Consultation Response	Comments on Project and Effects	Information Provided	Consideration in this ES
			GIS layers for each 1km square/tetrad, habitat maps including broad habitat maps and NVC survey maps provided.	
	Follow up consultation – letter response received 25th September 2008.	All data requested again to cross-check validity.	Records of protected species, records of Local Biodiversity Action Plan (LBAP) species, including GIS layers for each 1km square/tetrad, habitat maps including broad habitat maps and NVC survey maps provided.	This information has been incorporated into the baseline desk study for Ecology and Ornithology, as described in Chapter 7 of this ES.
Dumfries and Galloway Planning and Environmental Services	Letter from Dave Suttie, Area Planning Manager (Annandale and Eskdale), 8th September 2006.	The letter details the fact that the Ewe Hill Wind Farm is a Section 36 application and is at an advanced stage. D&G Council has considered the relevant consultation and has confirmed that it does not object to the proposal. The Newfield proposal, also a Section 36 application, is at a much earlier stage. Officers from the Council has informed the applicant's agents that they would object to the proposal on visual and cumulative impact grounds. The Annandale and Eskdale (AE) Area Committee also noted when determining the Ewe Hill consultation that if the wind farm was given consent, the area of land to the south of the B723 and the B709 between Lockerbie and Langholm would be at capacity as far as wind farm developments are concerned (as wind farms at Minsca and Carlesgill within this area have also been approved).	Two gas pipe lines are located within the area. One which is operated by Transco and the other operated by Bord Gais Eireann (BGE). There are several Scheduled Ancient Monuments in the area, and a considerable number of lesser items of archaeological interest. When the possible routes have been considered it has been advised to contact the Local Authority Archaeologist, Jane Brann, for further information about specific locations etc. An annotated version of the plan has been provided showing the routes of the	This information has been taken into consideration as part of the routeing appraisal process for the overhead lines, as described in Chapter 2 of this ES. The archaeological information has also been incorporated into the baseline desk study for Archaeology and Cultural Heritage, as described in Chapter 8 of this ES.

Consultee Organisation	Type and Date of Consultation Response	Comments on Project and Effects	Information Provided	Consideration in this ES
			gas lines.	
Dumfries and Galloway Council Landscape Architect	On-going discussions from 2008 to 2010 between Gillespies and D&GC regarding viewpoints for photomontages.	Viewpoints for photomontages agreed.		Landscape and Visual Effects are considered in Chapter 6 of this ES.
Dumfries and Galloway Council Landscape Architect	Site visit to review route alteration at Cadgillhead Farm 28th October 2010.	D&GC confirmed content with alteration to route at Cadgillhead Farm.		The route alteration has been assessed by all of the technical specialists as part of the EIA process.
Environment Agency (EA)	Email from Jilly Dixon, Planning Liaison Assistant, 18th May 2007	The EA has fisheries responsibility in the Rivers Sark and Border Esk in Scotland and part of the preferred Gretna Substation to Ewe Hill Wind Farm OHL route passes through the Sark catchment. The Sark contains populations of salmon, sea trout and brown trout along with several coarse fish species. The EA requests the avoidance of crossing through any watercourses wherever possible. If this is unavoidable, any work involving the crossing of watercourses should be carried out between 1 June and 30 September to avoid the main fish spawning and incubation periods. Where such crossings occur, silt input should be minimised to prevent loss of spawning habitat. Under the terms of the Salmon and Freshwater Fisheries Act 1975, it is an offence to disturb spawning fish or their habitat.	N/A	Chapter 10 of this ES presents an assessment of the potential impacts on hydrology and details appropriate mitigation measures.
Forest Enterprise Scotland.	Letter from Moira Baptie, Environment Manager, 21st November 2006.	Environmental and red squirrel sightings data is held at local forest level. The enquiry has therefore been forwarded to Bill Meadows, the Forest District Manager for AE Forest District.	No information or data provided as the area that Forestry Enterprise Scotland manages is not within the Study Area.	This information has been incorporated into the baseline desk study for Ecology and Ornithology, as described in Chapter 7 of this ES.

Consultee Organisation	Type and Date of Consultation Response	Comments on Project and Effects	Information Provided	Consideration in this ES
Historic Scotland (HS)	Letter from William Kidd, Historic Scotland, 22nd September 2006.	The comments concentrate on Historic Scotland's specific statutory remit for scheduled monuments, listed buildings, historic gardens and designed landscapes. Historic Scotland recommends that suitably qualified archaeological/cultural heritage consultants advise on and carry out the detailed assessment of impacts on cultural heritage aspects of the EIA. A baseline desk study of existing cultural heritage records and sources of information should be carried out identifying all scheduled monuments, archaeological sites and landscapes, listed buildings, historic gardens and designed landscapes and conservation areas, both within the development area and within the Zone of Visual Influence (ZVI). The direct impact of all the elements of the proposed OHLs on cultural heritage assets and their indirect impact on the landscape setting of these assets, both individually and cumulatively, should be assessed. Historic Scotland would also be happy to provide any further information or advice on any such sites identified as potentially significant as a result of the ZVI analysis.	Two lists have been provided detailing the scheduled monuments and listed buildings. Map extracts showing the locations of these sites has been provided. An annex has also been provided with the letter which provides guidance on issues which Historic Scotland considers should be taken into account when assessing the impact on the setting of cultural heritage features. This guidance applies to both the sites identified within the study area and potentially to others in the wider vicinity. Information on the location of all scheduled monuments, listed buildings and gardens and designed landscapes can be obtained from www.PASTMAP.org.uk	The guidance provided by Historic Scotland has been used to develop the assessment methodology for Archaeology and Cultural Heritage, as presented in Chapter 8 of this ES.
HS	Letter from Rosalind Campbell, 5th July 2007	The proposed OHL alignments may have an impact on the setting of several scheduled monuments. It is advised that any ES produced for this proposed development includes an assessment of its likely impacts on the historic environment. Detailed visual representations will be required, to illustrate	Annex to letter providing general considerations for the assessment of impact on the setting of heritage assets	The findings of the assessment of potential effects on Archaeology and Cultural Heritage are presented in Chapter 8 of this ES.

Consultee Organisation	Type and Date of Consultation Response	Comments on Project and Effects	Information Provided	Consideration in this ES
		the findings on the issue of the impacts of the proposed development on the scheduled monuments in its vicinity. It is recommended that they show views to and from the monuments and the intervisibility of the towers and lines with the monuments in the landscape.		
HS	Response to EIA Scoping from Adele Shaw, EIA Team Leader, received 9th June 2010	Broadly content with approach to assessment.	3 additional sites identified for assessment: Timpanhek Cottage, Craighousesteads fort and Pearsby Hill enclosures and settlement.	The 3 additional sites have been assessed in Chapter 8 of this ES.
Red Squirrels in South Scotland	Letter from Ann-Marie MacMaster, Red Squirrel Conservation Officer, Dumfries and Galloway, 22nd November 2006.	None made.	Two Guidance Documents were provided for the two priority woodlands, Eskdalemuir and Tanlawhill, also including a red squirrel sighting map.	This information has been incorporated into the baseline desk study for Ecology and Ornithology, as described in Chapter 7 of this ES.
RSPB Scotland	Letter received 15th March	RSPB data available already received (email dated 03.01.07). Chris Rollie is able to provide limited information on breeding raptors (made available under confidential conditions).	Black grouse data (one sighting) was provided. Further details on black grouse are currently being put onto the system but not yet available.	This information has been incorporated into the baseline desk study for Ecology and Ornithology, as described in Chapter 7 of this ES.
RSPB	Response to EIA Scoping from Chris Rollie, Area Manager, received 21st June 2010	Route of the proposed overhead lines runs through an area that is not known to contain significant populations of birds of conservation concern.	ES should consider the potential for collision risk from geese and swans. Habitats should be restored.	Collision risk has been assessed in Chapter 7 of this ES.
Scottish Environment Protection Agency (SEPA)	Allan Macaskill, Senior Environment Protection Officer, 8th September 2006.	There is no other environmental information, other than what has already been sourced from SEPA that would be of practical use for the study area. The main issue for SEPA during large construction projects is control of silt run-off. This issue should be given particular attention	The Environment Agency regulates fishery throughout the River Esk catchment protection (within English Local Authority boundary areas). The main contact and details are also provided.	Best practice mitigation with regards to pollution from construction is presented in Chapter 9 (Geology and Soils) and Chapter 10 (Hydrology).

Consultee Organisation	Type and Date of Consultation Response	Comments on Project and Effects	Information Provided	Consideration in this ES
		in any EIA. SEPA recommends that river crossings should be achieved using directional drilling rather than open cut where possible.	The River Annan District Salmon Fishery Board has jurisdiction over the River Annan and Kirtle Water catchments. The main contact and details have been provided.	
SEPA	Letter from Allan Macaskill, Senior Environment Protection Officer, 20th July 2007.	SEPA has no comments on the proposed routes for the OHLs. If the works involve any water crossings, it is recommended that: • The works must comply with the Water Environment (Controlled Activities) (Scotland) Regulations 2005; and • The River Annan District Salmon Fishery Board should be consulted. Contractors should agree method statements with SEPA before construction starts.	N/A	Further discussion of the Water Environment (Controlled Activities) (Scotland) Regulations 2005 and how this has influenced design and mitigation of the proposed scheme is presented in Chapter 10 of this ES.
Scottish Natural Heritage (SNH)	Letter from Jonathan Warren, Area Officer, SNH, 31st August 2006.	No comments made other than the information provided.	The information provided includes: The land use of the area taken from the 1997 Dumfries and Galloway Environmental Audit, which is taken from aerial photography and interpreted into land use and habitat types. Extracts have also been provided from the Lowland Raised Bog and Intermediate Bog inventories. A copy of the Dumfries and	This information has been incorporated into the baseline desk study for Ecology and Ornithology, as described in Chapter 7 of this ES.

Consultee Organisation	Type and Date of Consultation Response	Comments on Project and Effects	Information Provided	Consideration in this ES
			Galloway Landscape Assessment.	
SNH	Telephone conversation with Jonathan Warren, SNH Dumfries, 1st September 2006.	Jonathan Warren stressed that he is happy to provide additional and more detailed information as the commission progresses.	There are no Regionally Important Geological Sites (RIGS) in the study area. There is only one Geology Conservation Review site, which is also a geological SSSI, within the Study Area (Bigholms Burn).	This information has been incorporated into the baseline desk study for Geology and Soils, as described in Chapter 9 of this ES.
SNH	Letter from Zoe Smolka, Area Officer, Annandale & Eskerdale, 27th November 2006.	Red squirrels and bats are present in the study area and surveys for these protected species will be necessary where trees, buildings or bridges are affected by the proposed development. Otters and badgers are also present within the survey area and SNH advise that once approximate routes for the OHLs have been established, a survey for otter and badger can be undertaken. For specific protected species records it is recommended to get in contact with the Dumfries and Galloway Environmental Resource Centre. The only migratory bird information which they hold is anecdotal.	Maps have been provided detailing the following information: SNH's records of areas of Ancient and Long Established Woodland (as listed on the inventory of Ancient and Long-Established Woodland Sites), intermediate and raised peat bogs, designated sites and rights of way.	This information has been incorporated into the baseline desk study for Ecology and Ornithology, as described in Chapter 7 of this ES.
SNH	Letter received 23rd February 2007	SNH do not hold data on black grouse leks nor site specific details of breeding raptors within this corridor.	SNH suggests contacting Chris Rollie (Dumfries and Galloway Area Manager at RSPB Scotland and Chairman of the South Scotland Raptor Study Group.	Chris Rollie has been contacted and the information provided has been incorporated into the baseline desk study for Ecology and Ornithology, as described in Chapter 7 of this ES.
SNH	Letter from Jonathan Warren, Area Officer, East Dumfriesshire, 11th June 2007	SNH is content with the approach used in the initial assessment of the options for the preferred route corridor and that the preferred corridors are the routes with the fewest ecological and landscape impacts.	N/A	Further discussion on the alternatives considered is presented in Chapter 2 of this ES. The EIA Scoping Report, which

Consultee Organisation	Type and Date of Consultation Response	Comments on Project and Effects	Information Provided	Consideration in this ES
		Concern is expressed that the options for undergrounding or connection to the existing overhead line have not been considered. It is expected that the proposed Scoping Report will identify in more detail the methodology that will be used for the landscape impact assessment of the route. Changes in the landscape and cumulative effects should be considered.		contained details of the proposed assessment methodologies for the EIA was issued to the Energy Consents Unit of the Scottish Government for circulation to statutory consultees in February 2010. Assessment of Landscape and Visual effects and Cumulative effects is presented in Chapters 6 and 16 of this RS respectively.
SNH	Consultation Document issued. Email response from Barry Dunne, Area officer on 6th October 2009.	SNH content with route options appraisal and landscape appraisal. No significant issues raised.	N/A	N/A
SNH	Response to EIA Scoping from John Gibson, Area Officer, received 19th August 2010.	Survey work has previously been agreed. Landscape comments have been taken on board. Ancient woodland should be avoided.	N/A	Ancient woodland has been avoided where practicable as part of the routeing options appraisal for the overhead lines. Further details on this process are presented in Chapter 2 of this ES.
SNH	Site visit to review route alteration at Cadgillhead Farm 28th October 2010.	SNH confirmed content with alteration to route at Cadgillhead Farm.	N/A	N/A
Local commercial woodland managers	The managers of the large areas of commercial woodland to the east of Kirtleton and to the north of Corrie Common were contacted by RTS Ltd regarding future felling plans.	It was reported that felling will be ongoing in both woodlands.	N/A	This information has been incorporated into the baseline desk study for Forestry, as described in Chapter 12 of this ES.
Dumfries & Galloway Council Public Health Services	Emailed request for information on Private Water Supplies – August 2008.		List of properties that are recorded on the Private Water Supplies Register.	This information has been incorporated into the baseline desk study for Hydrology, as described in Chapter 10 of this ES.
Scotways	Follow up consultation. Letter received 19th August 2008	In addition to RoW DA33 and DA117, Scotwats have identified another in the area, DA63.	N/A	Rights of Way have been avoided where practicable as part of the routeing options appraisal for the overhead lines. Further details on this process are presented in Chapter 2 of this ES.
Defence	Formal consultation letter received	It was reported that the MoD has no	N/A	N/A

Consultee Organisation	Type and Date of Consultation Response	Comments on Project and Effects	Information Provided	Consideration in this ES
Estates Safeguarding	August 2009.	safeguarding objections associated with the proposed OHLs.		
Crown Estate	Response to EIA Scoping from Alison Cooper, Assistant Scottish Estate Performance Manager, received 14th June 2010.	The project does not directly affect Crown Estate fishing interests.	N/A	Hydrological assessment is provided in Chapter 10 of this ES.
Scottish Government Directorate for the Built Environment	Response to EIA Scoping from Simon Pallant, Senior Planner, received 27th May 2010.	Environmental Statement should refer to Scottish Planning Policy. Addressed in Chapter 5 of ES.	N/A	Planning policy is considered in details in Chapter 5 of this ES.

Appendix 7.1 Phase I Habitat Survey: Plant Species lists for Study Areas 1 & 2

Study Area 1. Gretna – Ewe Hill

Scientific Name	Common Name
Acer pseudoplatanus	Sycamore
Achillea millefolium	Yarrow
Achillea ptarmica	Sneezewort
Aegopodium podagraria	Ground-elder
Agrostis capillaris	Common Bent
Alchemilla vulgaris	Lady's Mantle
Alliaria petiolata	Garlic Mustard
Alnus glutinosa	Alder
Alopecurus pratensis	Meadow Foxtail
Andromeda polifolia	Bog-rosemary
Anemone nemorosa	Wood Anemone
Angelica sylvestris	Wild Angelica
Anthoxanthum odoratum	Sweet Vernal Grass
Anthriscus sylvestris	Cow Parsley
Arrhenatherum elatius	False Oat-grass
Artemisia vulgaris	Mugwort
Aulacomnium palustre	Bog Groove-moss
Bellis perennis	Daisy
Betula pendula	Silver Birch
Betula pubescens	Downy Birch
Botrychium lunaria	Moonwort
Briza media	Quaking-grass
Calluna vulgaris	Heather
Caltha palustris	Marsh Marigold
Calystegia sepium	Hedge Bindweed
Campanula rotundifolia	Harebell
Capsella bursa-pastoris	Shepherd's-purse
Cardamine pratensis	Cuckooflower
Carex binervis	Green-ribbed Sedge
Carex curta	White Sedge
Carex echinata	Star Sedge
Carex hirta	Hairy Sedge
Carex nigra	Common Sedge
Carex ovalis	Oval Sedge
Carex panicea	Carnation Sedge
Carex rostrata	Bottle Sedge
Carex viridula	Yellow Sedge

Scientific Name	Common Name
Centaurea nigra	Common Knapweed
Cerastium fontanum	Common Mouse-ear
Chamerion angustifolium	Rosebay Willowherb
Chrysosplenium oppositifolium	Opposite-leaved Golden-saxifrage
Cirsium palustre	Marsh Thistle
Cirsium vulgare	Spear Thistle
Cladonia impexa	Reindeer Moss
Conopodium majus	Pignut
Corylus avellana	Hazel
Crataegus monogyna	Hawthorn
Cynosurus cristatus	Crested Dog's-tail
Dactylis glomerata	Cock's-foot
Dactylorhiza fuchsii	Common Spotted Orchid
Dactylorhiza maculata	Heath Spotted Orchid
Deschampsia cespitosa	Tufted Hair-grass
Deschampsia flexuosa	Wavy Hair-grass
Dicranum majus	Greater Fork-moss
Dicranum scoparium	Broom Fork-moss
Digitalis purpurea	Foxglove
Drosera rotundifolia	Round-leaved Sundew
Dryopteris dilatata	Broad Buckler-fern
Dryopteris filix-mas	Common Male Fern
Eleocharis palustris	Common Spike-rush
Elytrigia repens	Common Couch
Empetrum nigrum	Crowberry
Epilobium hirsutum	Great Willowherb
Epilobium montanum	Broad-leaved Willowherb
Epilobium parviflorum	Hoary Willowherb
Equisetum arvense	Field Horsetail
Equisetum fluviatile	Water Horsetail
Equisetum sylvaticum	Wood Horsetail
Erica tetralix	Cross-leaved Heath
Eriophorum angustifolium	Common Cottongrass
Eriophorum vaginatum	Hare's-tail Cottongrass
Euphrasia tetraquetra	dicotyledon
Fallopia japonica	Japanese Knotweed
Festuca ovina	Sheep's Fescue
Festuca pratensis	Meadow Fescue
Festuca rubra	Red Fescue
Filago vulgaris	Common Cudweed
Filipendula ulmaria	Meadowsweet
Fragaria vesca	Wild Strawberry
Fraxinus excelsior	Ash

Scientific Name	Common Name
Galium aparine	Cleavers
Galium palustre	Common Marsh-bedstraw
Galium saxatile	Heath Bedstraw
Galium uliginosum	Fen Bedstraw
Galium verum	Lady's Bedstraw
Geranium pratense	Meadow Crane's-bill
Geranium robertianum	Herb-robert
Geum rivale	Water Avens
Glechoma hederacea	Ground-ivy
Glyceria fluitans	Floating Sweet-grass
Hedera helix ssp. helix	Common Ivy
Heracleum sphondylium	Hogweed
Hieracium sabaudum	composite
Hippuris vulgaris	Mare's-tail
Holcus lanatus	Yorkshire-fog
Hyacinthoides non-scripta	Bluebell
Hydrocharis morsus-ranae	Frogbit
Hypericum maculatum ssp. maculatum	St john's wort
Hypnum cupressiforme	Cypress-leaved Plait-moss
Hypnum jutlandicum	Heath Plait-moss
Hypochaeris radicata	Cat's-ear
Ilex aquifolium	Holly
Impatiens glandulifera	Himalayan Balsam
Juncus acutiflorus	Sharp-flowered Rush
Juncus articulatus	Jointed Rush
Juncus bufonius	Toad Rush
Juncus conglomeratus	Compact Rush
Juncus effusus	Soft Rush
Juncus inflexus	Hard Rush
Juncus squarrosus	Heath Rush
Knautia arvensis	Field Scabious
Lapsana communis	Nipplewort
Larix decidua	Larch
Lathyrus pratensis	Meadow Vetchling
Lemna minor	Common Duckweed
Leucanthemum vulgare	Oxeye Daisy
Linaria vulgaris	Common Toadflax
Lolium perenne	Perennial Rye-grass
Lonicera periclymenum	Honeysuckle
Lotus corniculatus	Common Bird's-foot Trefoil
Lotus pedunculatus	Greater Bird's-foot Trefoil
Luzula campestris	Field Wood-rush
Luzula multiflora	Heath Wood-rush

Scientific Name	Common Name
Luzula pilosa	Hairy Wood-rush
Lychnis flos-cuculi	Ragged Robin
Matricaria discoidea	Pineappleweed
Mentha aquatica	Water Mint
Mercurialis perennis	Dog's Mercury
Molinia caerulea	Purple Moor-grass
Myosotis arvensis	Field Forget-me-not
Myosotis scorpioides	Water Forget-me-not
Nardus stricta	Mat-grass
Narthecium ossifragum	Bog Asphodel
Odontites verna	Red Bartsia
Ononis repens	Common Restharrow
Oxalis acetosella	Wood-sorrel
Pedicularis sylvatica	Lousewort
Persicaria maculosa	Redshank
Phleum pratense	Timothy
Picea sitchensis	Sitka Spruce
Pinus contorta	Lodgepole Pine
Pinus sylvestris	Scots Pine
Plagiothecium undulatum	Waved Silk-moss
Plantago lanceolata	Ribwort Plantain
Plantago major	Greater Plantain
Pleurozium schreberi	Red-stemmed Feather-moss
Poa annua	Annual Meadow-grass
Poa pratensis	Smooth Meadow-grass
Poa trivialis	Rough Meadow-grass
Polytrichum commune	Common Haircap
Polytrichum formosum	Bank Haircap
Potamogeton polygonifolius	Bog Pondweed
Potentilla anserina	Silverweed
Potentilla erecta	Tormentil
Potentilla palustris	Marsh Cinquefoil
Primula vulgaris	Primrose
Prunella vulgaris	Selfheal
Prunus avium	Wild Cherry
Pteridium aquilinum	Bracken
Quercus robur	Pedunculate Oak
Ranunculus acris	Meadow Buttercup
Ranunculus ficaria	Lesser Celandine
Ranunculus flammula	Lesser Spearwort
Ranunculus repens	Creeping Buttercup
Rhinanthus minor	Yellow-rattle
Rhynchospora alba	White Beak-sedge

Scientific Name	Common Name
Rhytidiadelphus loreus	Little Shaggy-moss
Rosa canina agg.	Dog Roses
Rubus fruticosus agg.	Bramble
Rubus idaeus	Raspberry
Rumex acetosa	Common Sorrel
Rumex acetosella	Sheep's Sorrel [agg.]
Rumex crispus	Curled Dock
Rumex obtusifolius	Broad-leaved Dock
Salix caprea	Goat Willow
Sambucus nigra	Elder
Scirpus cespitosum	Deergrass
Scrophularia nodosa	Common Figwort
Senecio jacobaea	Common Ragwort
Senecio vulgaris	Groundsel
Sonchus asper	Prickly Sow-thistle
Sonchus oleraceus	Smooth Sow-thistle
Sorbus aucuparia	Rowan
Sphagnum capillifolium	Red Bog-moss
Sphagnum compactum	Compact Bog-moss
Sphagnum cuspidatum	Feathery Bog-moss
Sphagnum fallax	Flat-topped Bog-moss
Sphagnum fimbriatum	Fringed Bog-moss
Sphagnum magellanicum	Magellanic Bog-moss
Sphagnum palustre	Blunt-leaved Bog-moss
Sphagnum papillosum	Papillose Bog-moss
Sphagnum quinquefarium	Five-ranked Bog-moss
Sphagnum squarrosum	Spiky Bog-moss
Sphagnum tenellum	Soft Bog-moss
Stachys palustris	Marsh Woundwort
Stachys sylvatica	Hedge Woundwort
Stellaria graminea	Lesser Stitchwort
Stellaria holostea	Greater Stitchwort
Stellaria media	Common Chickweed
Succisa pratensis	Devil's-bit Scabious
Taraxacum officinale agg.	Dandelion
Trifolium pratense	Red Clover
Trifolium repens	White Clover
Tussilago farfara	Colt's-foot
Typha latifolia	Common Reedmace
Ulex europaeus	Gorse
Urtica dioica	Common Nettle
Vaccinium myrtillus	Blaeberry
Vaccinium oxycoccos	Cranberry

Scientific Name	Common Name
Vaccinium uliginosum	Bog Bilberry
Vaccinium vitis-idaea	Cowberry
Valeriana officinalis	Common Valerian
Veronica beccabunga	Brooklime
Veronica chamaedrys	Germander Speedwell
Veronica officinalis	Heath Speedwell
Vicia hirsuta	Hairy Tare
Vicia sativa	Common Vetch
Viola canina	Heath Dog-violet
Viola palustris	Marsh Violet
Viola riviniana	Common Dog-violet
Viola tricolor	Wild Pansy

Study Area 2. Ewe Hill – Newfield

Scientific Name	Common Name
Acer pseudoplatanus	Sycamore
Achillea millefolium	Yarrow
Achillea ptarmica	Sneezewort
Aegopodium podagraria	Ground-elder
Agrostis capillaris	Common Bent
Alchemilla vulgaris	Lady's Mantle
Alliaria petiolata	Garlic Mustard
Alnus glutinosa	Alder
Alopecurus pratensis	Meadow Foxtail
Andromeda polifolia	Bog-rosemary
Anemone nemorosa	Wood Anemone
Angelica sylvestris	Wild Angelica
Anthoxanthum odoratum	Sweet Vernal Grass
Anthriscus sylvestris	Cow Parsley
Arrhenatherum elatius	False Oat-grass
Artemisia vulgaris	Mugwort
Aulacomnium palustre	Bog Groove-moss
Bellis perennis	Daisy
Betula pendula	Silver Birch
Betula pubescens	Downy Birch
Botrychium lunaria	Moonwort
Briza media	Quaking-grass
Calluna vulgaris	Heather
Caltha palustris	Marsh Marigold
Calystegia sepium	Hedge Bindweed
Campanula rotundifolia	Harebell
Capsella bursa-pastoris	Shepherd's-purse
Cardamine pratensis	Cuckooflower

Scientific Name	Common Name
Carex binervis	Green-ribbed Sedge
Carex echinata	Star Sedge
Carex hirta	Hairy Sedge
Carex nigra	Common Sedge
Carex ovalis	Oval Sedge
Carex panicea	Carnation Sedge
Carex rostrata	Bottle Sedge
Carex viridula	Yellow Sedge
Centaurea nigra	Common Knapweed
Cerastium fontanum	Common Mouse-ear
Chamerion angustifolium	Rosebay Willowherb
Chrysosplenium oppositifolium	Opposite-leaved Golden-saxifrage
Cirsium palustre	Marsh Thistle
Cirsium vulgare	Spear Thistle
Cladonia impexa	Reindeer Moss
Conopodium majus	Pignut
Corylus avellana	Hazel
Crataegus monogyna	Hawthorn
Cynosurus cristatus	Crested Dog's-tail
Dactylis glomerata	Cock's-foot
Dactylorhiza fuchsii	Common Spotted Orchid
Dactylorhiza maculata	Heath Spotted Orchid
Deschampsia cespitosa	Tufted Hair-grass
Deschampsia flexuosa	Wavy Hair-grass
Dicranum scoparium	Broom Fork-moss
Digitalis purpurea	Foxglove
Drosera rotundifolia	Round-leaved Sundew
Dryopteris dilatata	Broad Buckler-fern
Dryopteris filix-mas	Common Male Fern
Eleocharis palustris	Common Spike-rush
Elytrigia repens	Common Couch
Empetrum nigrum	Crowberry
Epilobium hirsutum	Great Willowherb
Epilobium montanum	Broad-leaved Willowherb
Epilobium parviflorum	Hoary Willowherb
Equisetum arvense	Field Horsetail
Equisetum fluviatile	Water Horsetail
Equisetum sylvaticum	Wood Horsetail
Erica tetralix	Cross-leaved Heath
Eriophorum angustifolium	Common Cottongrass
Eriophorum vaginatum	Hare's-tail Cottongrass
Euphrasia tetraquetra	dicotyledon
Fallopia japonica	Japanese Knotweed

Scientific Name	Common Name
Festuca ovina	Sheep's Fescue
Festuca pratensis	Meadow Fescue
Festuca rubra	Red Fescue
Filago vulgaris	Common Cudweed
Filipendula ulmaria	Meadowsweet
Fragaria vesca	Wild Strawberry
Fraxinus excelsior	Ash
Galium aparine	Cleavers
Galium palustre	Common Marsh-bedstraw
Galium saxatile	Heath Bedstraw
Galium uliginosum	Fen Bedstraw
Galium verum	Lady's Bedstraw
Geranium pratense	Meadow Crane's-bill
Geranium robertianum	Herb-robert
Geum rivale	Water Avens
Glechoma hederacea	Ground-ivy
Glyceria fluitans	Floating Sweet-grass
Hedera helix ssp. helix	Common Ivy
Heracleum sphondylium	Hogweed
Hieracium sabaudum	composite
Hippuris vulgaris	Mare's-tail
Holcus lanatus	Yorkshire-fog
Hyacinthoides non-scripta	Bluebell
Hydrocharis morsus-ranae	Frogbit
Hypericum maculatum ssp. maculatum	St john's wort
Hypnum jutlandicum	Heath Plait-moss
Hypochaeris radicata	Cat's-ear
Ilex aquifolium	Holly
Juncus acutiflorus	Sharp-flowered Rush
Juncus articulatus	Jointed Rush
Juncus bufonius	Toad Rush
Juncus conglomeratus	Compact Rush
Juncus effusus	Soft Rush
Juncus inflexus	Hard Rush
Juncus squarrosus	Heath Rush
Lapsana communis	Nipplewort
Larix decidua	Larch
Lathyrus pratensis	Meadow Vetchling
Lemna minor	Common Duckweed
Leucanthemum vulgare	Oxeye Daisy
Linaria vulgaris	Common Toadflax
Lolium perenne	Perennial Rye-grass
Lonicera periclymenum	Honeysuckle

Scientific Name	Common Name
Lotus corniculatus	Common Bird's-foot Trefoil
Lotus pedunculatus	Greater Bird's-foot Trefoil
Luzula campestris	Field Wood-rush
Luzula multiflora	Heath Wood-rush
Luzula pilosa	Hairy Wood-rush
Lychnis flos-cuculi	Ragged Robin
Matricaria discoidea	Pineappleweed
Mentha aquatica	Water Mint
Molinia caerulea	Purple Moor-grass
Myosotis arvensis	Field Forget-me-not
Myosotis scorpioides	Water Forget-me-not
Nardus stricta	Mat-grass
Narthecium ossifragum	Bog Asphodel
Oxalis acetosella	Wood-sorrel
Pedicularis sylvatica	Lousewort
Persicaria maculosa	Redshank
Phleum pratense	Timothy
Picea sitchensis	Sitka Spruce
Pinus sylvestris	Scots Pine
Plantago lanceolata	Ribwort Plantain
Plantago major	Greater Plantain
Pleurozium schreberi	Red-stemmed Feather-moss
Poa annua	Annual Meadow-grass
Poa pratensis	Smooth Meadow-grass
Poa trivialis	Rough Meadow-grass
Polytrichum commune	Common Haircap
Polytrichum formosum	Bank Haircap
Potamogeton polygonifolius	Bog Pondweed
Potentilla anserina	Silverweed
Potentilla erecta	Tormentil
Potentilla palustris	Marsh Cinquefoil
Primula vulgaris	Primrose
Prunella vulgaris	Selfheal
Pteridium aquilinum	Bracken
Quercus robur	Pedunculate Oak
Ranunculus acris	Meadow Buttercup
Ranunculus ficaria	Lesser Celandine
Ranunculus flammula	Lesser Spearwort
Ranunculus repens	Creeping Buttercup
Rhinanthus minor	Yellow-rattle
Rhynchospora alba	White Beak-sedge
Rosa canina agg.	Dog Roses
Rubus fruticosus agg.	Bramble

Scientific Name	Common Name
Rubus idaeus	Raspberry
Rumex acetosa	Common Sorrel
Rumex acetosella	Sheep's Sorrel [agg.]
Rumex crispus	Curled Dock
Rumex obtusifolius	Broad-leaved Dock
Salix caprea	Goat Willow
Sambucus nigra	Elder
Scirpus cespitosum	Deergrass
Scrophularia nodosa	Common Figwort
Senecio jacobaea	Common Ragwort
Senecio vulgaris	Groundsel
Sonchus asper	Prickly Sow-thistle
Sonchus oleraceus	Smooth Sow-thistle
Sorbus aucuparia	Rowan
Sphagnum capillifolium	Red Bog-moss
Sphagnum cuspidatum	Feathery Bog-moss
Sphagnum fallax	Flat-topped Bog-moss
Sphagnum palustre	Blunt-leaved Bog-moss
Sphagnum papillosum	Papillose Bog-moss
Stachys palustris	Marsh Woundwort
Stachys sylvatica	Hedge Woundwort
Stellaria graminea	Lesser Stitchwort
Stellaria holostea	Greater Stitchwort
Stellaria media	Common Chickweed
Succisa pratensis	Devil's-bit Scabious
Taraxacum officinale agg.	Dandelion
Trifolium pratense	Red Clover
Trifolium repens	White Clover
Tussilago farfara	Colt's-foot
Typha latifolia	Common Reedmace
Ulex europaeus	Gorse
Urtica dioica	Common Nettle
Vaccinium myrtillus	Blaeberry
Vaccinium oxycoccos	Cranberry
Vaccinium uliginosum	Bog Bilberry
Vaccinium vitis-idaea	Cowberry
Valeriana officinalis	Common Valerian
Veronica beccabunga	Brooklime
Veronica chamaedrys	Germander Speedwell
Veronica officinalis	Heath Speedwell
Vicia hirsuta	Hairy Tare
Vicia sativa	Common Vetch
Viola canina	Heath Dog-violet

Scientific Name	Common Name
Viola palustris	Marsh Violet
Viola riviniana	Common Dog-violet
Viola tricolor	Wild Pansy

Appendix 7.2 NVC Peatland Report 2007

National Vegetation Classification Survey of Peatlands On the Proposed Route Of the Gretna – Ewe Hill & Ewe Hill – Newfield 132kV OHLs June - July 2007

Updated August 2009

Prepared for WSP Environmental

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1 Executive Summary

A peatland habitat survey to National Vegetation Classification level was commissioned by WSP Environmental during the summer of 2007 to characterise and evaluate the peatland habitats that lay either on or close to the proposed route of the Gretna – Ewehill and Ewehill – Newfield 132kV OHLs, Dumfries & Galloway. Survey work was conducted during June and July 2007 following standard methodologies, and was updated in August 2009. The surveys confirmed the relatively good condition of most of the lowland raised mires in the study area with M18 and M19 mire present, and in particular the high quality of the M19 raised/intermediate mire of Bell's Flow. Several of the mires with intermediate mire characteristics showed signs of further degradation due to stock grazing and choking of mire vegetation by purple moor-grass. Tree and scrub invasion is also a long-term management implication on several of the mires.

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1. Introduction

A peatland habitat survey to National Vegetation Classification level was commissioned by WSP Environmental during the summer of 2007 to characterise and evaluate the peatland habitats that lay either on or close to the proposed routes of the Gretna – Ewehill and Ewehill – Newfield 132kV OHLs, Dumfries & Galloway.

Gretna – Ewe Hill

The proposed Gretna – Ewe Hill route commences in grid square NY 3271 and terminates in grid square NY 2433 and traverses a mosaic of habitats between 46 - 220m elevation above sea level (asl). Most of the habitats are associated with farming practices, typically mixed farming with arable and pasture near Gretna interspersed with isolated pockets of lowland raised and intermediate mire, watercourses and native deciduous woodland. As the route progresses northwards into upland areas rough grazing has modified intermediate/blanket mire peatland into acid grassland, with occasional pockets of intermediate/blanket mire remaining, with conifer forests a common feature.

Ewe Hill – Newfield

The proposed Ewe Hill – Newfield route commences in grid square NY 2433 and terminates in NY 1886 and traverses a mosaic of habitats between 130 and 220m elevation asl. Most of the habitats are associated with upland grazing practices but at the southern end of the route several farms have intensively improved their grazing land. Upland areas are dominated by soft rush pastures and some pockets of wet acid heath/acid grassland and marshy grassland.

2. Methods

'Since its development in the 1980s, the National Vegetation Classification (NVC) has become the standard classification used for describing vegetation in Britain. Whereas many other classifications are restricted to particular types of vegetation, the NVC aims to describe all the vegetation of Great Britain. This means that it is possible to analyse and map, a complex site, composed of several habitat types (e.g. woodland, scrub, heathland and bog) using the same classification system. The NVC is a 'phytosociological' classification, classifying vegetation solely on the basis of the plant species of which it is composed. The resulting communities can usually be correlated to other factors, such as geology and soils, climate, water chemistry and management; but the plant species alone are used to assign the vegetation to a community. The NVC breaks down each broad vegetation type (e.g. heath, mire, woodland) into communities, designated by a number and name' (Elkington et al. 2001).

The objectives of the peatland NVC were to:

i. Identify key areas of mire;
ii. Assess the NVC communities found on each area of mire;
iii. Assess peatland condition; and
iv. Determine if any significant changes in NVC community and peatland condition had occurred between 2007 and 2009.

All fieldwork took place between mid-June and mid-July 2007 and August 2009 following standard methodologies and definitions used to map and describe NVC communities and habitats (Rodwell 1991). The peatlands were walked over and an assessment made of community type and sub-communities present. All species in each vegetation community and sub-community were recorded. Cover abundance for species (vascular plants, lichens and bryophytes) in each community were recorded using Frequency and Domin Scales.

Tables 2.1. and 2.2. below show the percentages indicated by the Frequency and Domin scales that were used to classify the vegetation types.

Table 2.1. NVC frequency table

Frequency	How often species is found
V	81-100%
IV	61-80%
III	41-60%
II	21-40%
I	1-20%

Table 2.2. NVC Domin table

Domin	% Species cover
10	91-100%
9	76-90%
8	51-75%
7	34-50%
6	26-33%
5	11-25%
4	4-10%
3	<4% With many individuals
2	<4% With several individuals
1	<4% With few individuals

3. Results

Gretna – Ewe Hill
Seven peatland areas either on or in close proximity to the proposed Gretna – Ewe Hill route were assessed in 2007, (see Table 3.1.) and due to changes in the proposed route by 2009 an additional peatland was surveyed during 2009. The main NVC habitats are identified in bold, with associated habitats noted in parentheses.
Ewe Hill – Newfield
One peatland area in proximity to the Ewe Hill – Newfield proposed route was surveyed in 2007 and re-assessed in 2009.

Table 3.2. summarises the NVC communities and sub-communities found on each peatland, habitat condition, and recommended management.
Appendix 1. illustrates the NVC communities and sub-communities found on each peatland with full species listing. A total of 20 species of bryophyte and 39 species of vascular plant were recorded (Appendix 2). A number of these species were associated with peripheral grassland/woodland habitats around the peatlands and do not necessarily imply that the peatlands were seriously degraded or contained these species.

Table 3.1. Peatland areas surveyed

Proposed OHL Route	Peatland	Grid Reference
Gretna - Ewe Hill	*Cowgarth Flow*	NY 322 716
Gretna – Ewe Hill	*Greenwrae Flow*	NY 331 724
Gretna – Ewe Hill	*Cadgill Flow*	NY 318 736
Gretna – Ewe Hill	*Bells Flow*	NY 319 758
Gretna – Ewe Hill (added 2009)	*Berclees – Cadgillhead un-named mire*	NY 303 757
Gretna – Ewe Hill	*Solwaybank un-named intermediate/blanket Mire*	NY 300 766
Gretna – Ewe Hill	*Allfornaught South un-named Blanket Mire*	NY 290 773
Gretna – Ewe Hill	*Allfornaught North un-named Blanket Mire*	NY 286 777
Ewe Hill - Newfield	*Blackstan Moss*	NY 252 849

Table 3.2. Summary of NVC Habitat types found on the peatlands

Site	Grid Reference	NVC Code - Dominant code and (<5%)	Management	Habitat condition	Peat Depth
Cowgarth Flow	NY33175 72387	**M18a - *Erica tetralix - Sphagnum papillosum* (Sub C:*Sphagnum magellanicum - Andromeda polifolia*) Raised Mire**	No Conservation Management	Pine and birch scrub encroachment	>1m
Cowgarth Flow		(W18 - *Pinus sylvestris - Hylocmium splendens)*	Plantation	Heavily modified with remnant understorey	
Cowgarth Flow	NY33128 72522	(M15d - *Scirpus cespitosus - Erica tetralix* (Sub C:Typical) Wet Heath		Degrading at margins due to historical cutting away of lagg fen and bog margin: drying out	
Greenwrae Flow	NY32355 71708	**M19a - *Calluna vulgaris - Eriophorum vaginatum* (Sub C:*Erica tetralix*) Blanket Mire**	No Conservation Management	Good but threatened by scrub encroachment	>1.5m
Greenwrae Flow		(W18b/c/d - *Pinus sylvestris - Hylocmium splendens* (Sub C's:*Vaccinium myrtillus - Vaccininum vitis-idaea:Luzula pilosa:Sphagnum capillifolium*)	Plantation		
Greenwrae Flow		(M17c *Scirpus cespitosus - Eriophorum vaginatum* blanket bog (Sub C: *Juncus squarrosus - Rhytidiadelphus loreus*)			<0.5m
Greenwrae Flow		(W4a - *Betula pubescens - Molinia caerulea* (Sub C:*Dryopteris dilatata - Rubus fructicosus*)		Drier areas	
Greenwrae Flow		(W4c - *Betula pubescens - Molinia caerulea* (Sub C:*Sphagnum*)		Wetter deeper peat areas	
Cadgill Flow	NY31856 73721	**M18 - *Erica tetralix - Sphagnum papillosum* (Sub C:*Empetrum nigrum - Cladonia*) Raised Mire**	No Conservation Management	Birch scrub encroachment - degrading due to drying out	>2m
		(W4a - *Betula pubescens - Molinia caerulea* (Sub C:*Dryopteris dilatata - Rubus fructicosus*)			
Bell's Flow	NY32003 75650	**M18a - *Erica tetralix - Sphagnum papillosum* (Sub C:*Sphagnum magellanicum - Andromeda polifolia*) Raised Mire**	Conservation Management	SSSI - good condition high water table	>2m
		(M20 - Eriophorum vaginatum blanket and raised mire)			

Site	Grid Reference	NVC Code - Dominant code and (<5%)	Management	Habitat condition	Peat Depth
Berclees – Cadgillhead un-named mire	NY 303 757	**M19a - *Calluna vulgaris - Eriophorum vaginatum* (Sub C:*Erica tetralix*) Blanket Mire**	No Conservation Management. Some drainage and grazing to west.	Degraded due to over-dominance by *Molinia caerulea* and limited drainage impacts but still of value	>2m
		[M18 - *Erica tetralix - Sphagnum papillosum* (Sub C:*Empetrum nigrum - Cladonia*) Raised Mire]			
Solwaybank Blanket Mire	NY30007 76734	**M17a -*Scirpus cespitosus - Eriophorum vaginatum* (Sub C:*Drosera rotundifolia - Sphagnum* spp.) Blanket Mire**	No Conservation Management. Historical grazing	Overgrazed and degraded but recovering, still very dry.	<2m
Solwaybank Blanket Mire		(M3 - *Eriophorum angustifolium* Bog Pool)			
		(M21 *Narthecium ossifragum* Valley Mire)			
Allfornaught Blanket Mire South	NY28895 77346	**M17a -*Scirpus cespitosus - Eriophorum vaginatum* (Sub C:*Drosera rotundifolia - Sphagnum* spp.) Blanket Mire**	No Conservation Management. Historical peat cutting	Grazed by horses. Variable condition due to drainage, grazing and historical cutting. Much currently being over-dominated by *Molinia*.	>2m
Allfornaught Blanket Mire South		(U6 - *Juncus squarrosus - Festuca ovina* Grassland)	Grazed margins		
Allfornaught Blanket Mire North	NY28598 77876	**M19a - *Calluna vulgaris - Eriophorum vaginatum* (Sub C:*Erica tetralix*) Blanket Mire**	Some drainage	Impacted by drainage and grazing.	>1m
Allfornaught Blanket Mire North		(U6 - *Juncus squarrosus - Festuca ovina* Grassland)	Grazed margins		
Blackstan Moss	NY2522854	**M20 - Eriophorum vaginatum blanket and raised mire**	No Conservation Management. Deep drainage	Recovering	>3m

Site	Grid Reference	NVC Code - Dominant code and (<5%)	Management	Habitat condition	Peat Depth
			and historical grazing		
		(M3 - *Eriophorum angustifolium* Bog Pool)	Historical grazing	Recovering	

4. Conclusions

Gretna – Ewe Hill

In the local context, the most important site is Bell's Flow. This site is in particularly good condition with a water table at or close to the surface across much of the mire. It also was the only site where Magellanic Bog-moss (*Sphagnum magellanicum*) was found. This species is indicative of relatively undisturbed conditions. Bell's Flow is also the most extensive mire which increases its conservation value and that has been recognised by its designation in 1986 as a Special Site of Scientific Interest (SSSI). This site will not be impacted by the proposed route from Gretna – Ewe Hill.

Greenwrae and Cadgill Flows are also in good condition with relatively high water tables but are threatened by scrub invasion and degradation due to peripheral drainage, particularly for Greenwrae Flow, where a >2m deep ditch has been recently been re-excavated around the edge of the mire. The conservation value of both sites has been recognised by the non-statutory designation of them by the Scottish Wildlife Trust/Local Authority as Wildlife Sites/Site of Importance for Nature Conservation.

Cowgarth Flow and Greenwrae Flows have both been cut into around the margins, and Cowgarth flow shows some signs of historical grazing damage. Pine invasion was just starting in 2007 and will eventually threaten the plant communities on this site. Note: Tree invasion was much more noticeable in 2009 as seedlings observed in 2007 are getting taller. Even so Cowgarth Flow is worthy of preservation, and with appropriate management could be maintained long-term and improve in condition. Cowgarth Flow has also been designated as a Wildlife Sites/Site of Importance for Nature Conservation.

Solwaybank intermediate/blanket mire has been badly degraded and has deep drainage at the northern (downslope) margin. It is very dry and has been heavily grazed. Although it is now showing some signs of recovery, it is unlikely to fully recover due to the drainage and loss of species that may have difficulty recolonising from any distance.

Allfornaught (south) intermediate/blanket mire was grazed by a few horses in 2007, which may have temporarily reduced the dominant cover of purple moor-grass on much of the site. The mire has been cutover and drained and is showing the early signs of modification towards acid grassland over much of its area. In 2009 the purple moor-grass had encroached significantly on the peatland vegetation over much of the site other than one low lying wet area where bog mosses persist. Management of this species would be a key issue for the long-term integrity of the peatland on this site.

Allfornaught intermediate/blanket mire (north) has some peripheral grazing, has been drained and is again showing signs of modification towards acid grassland over much of its area. As with Allfornaught (south) intermediate/blanket mire there has been an increase in purple moor-grass although not to the same extent. Again, purple moor-grass is seen as a key management issue for the habitat, which also now appears to be drier than in 2007.

The proposed route for the Gretna – Ewe Hill OHL crosses the Berclees-Cadgillhead un-named mire, which is the only mire that will be directly impacted by the proposed route. The mire is choked by purple moor-grass although the underlying peatland vegetation still survives in 2009. Despite no formal habitat surveying in 2007, the peatland was surveyed for the presence of breeding birds in 2007 and the same ecologist carried out the 2009 assessment, so is confident that there has been no appreciable degradation of the habitat between 2007-2009. For works on this peatland it is advised that as far as possible access should be either with extremely low ground pressure vehicles for any work on the peatland, with access preferably taken from Berclees to the west across farmland, or via adjacent forestry rides and tracks to minimise tracking across the peatland. Potentially, some components could be air-dropped at the required locations too to ensure that heavy loads are not taken across fragile peatland habitat. Again, purple moor-grass is seen as a key management issue for the habitat.

The peatlands at Solwaybank and Allfornaught have areas within them that are less sensitive but ideally tracking on any of the identified peatlands should be minimised or done with the highest due regard for the habitat.

Ewe Hill - Newfield
Blackstan Moss appears to have been degraded by historical grazing but is now recovering, although full recovery would be significantly impeded by the 3m deep ditch dug at the southern end of the peatland. The bog margins contain some acid grassland species. If drainage were reduced the Moss would have high potential for recovery. It does not appear to be heavily impacted by the forestry plantation at the northern end, which probably lies outside or on the edge of the basin that the Moss lies in. This peatland is within the survey corridor for the proposed route but will not be impacted by the route or any associated works.

5. References

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Appendix 1. Details of NVC habitats and species found on each peatland

Site	NVC Habitat Type	NVC Frequency & Domin	NVC Habitat Type	NVC Frequency & Domin	NVC Habitat Type	NVC Frequency & Domin
Cowgarth Flow	**M18a Raised Bog - Drained peat >1m depth**		**M15d Wet Heath**		**Plantation W18 Woodland**	
	Erica tetralix	V 4-6	*Calluna vulgaris* (>0.3m)	V 6-8 (8-10)	*Pinus sylvestris*	
	Eriophorum vaginatum	IV 4-6	*Vaccinium myrtillus*	V 4-6	*Betula pendula*	
	Vaccinium oxycoccus	V 4	*Vaccinium oxycoccus*	V 3		
	Empetrum nigrum	IV 4-6 (3)	*Erica tetralix*	IV 4	**Understory**	
	Sphagnum papillosum	III 4	*Sphagnum capillifolium*	III 4(-5)	*Galium* sp	
	Sphagnum palustre	III 4	*Eriophorum vaginatum*	III 3	Various ferns - including Dryopteris spp.	
	Deschampsia flexuosa	III 1-3	*Eriophorum angustifolium*	III 3 (II 2)	*Festuca ovina*	
	Scirpus cespitosum	III	*Deschampsia flexuosa*	III 1-3	*Anthoxanthum odoratum*	
	Andromeda polifolia	II 2	*Festuca ovina*	I	*Molinia caerulea*	
	Sphagnum fallax (in drainage ditches)	I 4-6	*Sphagnum fallax* (in drainage ditches)	I	*Digitalis purpurea*	
	Narthecium ossifragum	I	*Andromeda polifolia*	I 2	*Vaccinium myrtillus*	
	Vaccinium uliginosum	I	*Anthoxanthum odoratum*		*Sphagnum palustre*	
Cowgarth Flow (cont.)	*Cladonia impexa*		*Festuca ovina*		*Rubus fruticosus*	
			Juncus squarrosus		*Luzula campestris*	
			Hypnum jutlandicum		*Sphagnum squarrosum*	
			Dicranium scoparium		*Sphagnum fallax*	
					Sphagnum palustre	
					Molinia caerulea	
					Calluna vulgaris	

Site	NVC Habitat Type	NVC Frequency & Domin	NVC Habitat Type	NVC Frequency & Domin	NVC Habitat Type	NVC Frequency & Domin
Greenwrae Flow	**M19a - Raised Bog - Drained/cut peat >1.5m depth**		**Plantation - W18 Woodland**		**M17c - peat <0.5m depth**	
	Calluna vulgaris (>0.35m)	V 6-8	*Pinus sylvestris* - plantation	V	*Calluna vulgaris* (>0.5m)	V 6-8
	Eriophorum vaginatum	V 4-6	*Betula pendula/pubescens* (scrub)	V	*Scirpus cespitosum*	V 4
	Vaccinium oxycoccus	V 3	**Understorey**		*Sphagnum capillifolium*	III 4
	Erica tetralix	IV 4	*Festuca ovina*	IV	*Sphagnum papillosum*	III 4
	Vaccinium myrtillus	III 3-4	*Anthoxanthum odoratum*	IV	*Eriophorum vaginatum*	III
Greenwrae Flow (cont.)	**M19a - Raised Bog - Drained/cut peat >1.5m depth**		**Plantation - W18 Woodland: Understorey**		**M17c - peat <0.5m depth**	
	Empetrum nigrum	III 1-3	*Vaccinium myrtillus* (W18b)	IV	*Eriophorum angustifolium*	III
	Vaccinium ugilinosum	III	*Galium sp*	III	*Molinia caerulea*	II
	Sphagnum capillifolium (noticable loss of sphagna spp)	III	*Digitalis purpurea*	I	*Erica tetralix*	I
	Narthecium ossifragum	III	*Eriophorum angustifolium*		*Andromeda polifolia*	I
	Eriophorum angustifolium	I	*Luzula pilosa* (W18c)		*Nardus stricta*	
	Andromeda polifolia	I 2	*Dicranium scoparium*		*Deschampsia flexuosa*	
	Sphagnum fallax		*Erica tetralix* (W18d)		*Anthoxanthum odoratum*	
	Occasional *Pleurocarpous* mosses		*Sphagnum capillifolium*		*Carex nigra*	
	Hypnum jutlandicum		*Sphagnum quinquefarium*		***Pleurocarpous* mosses**	
	Pleurozium schreberi		*Vaccinium oxycoccus*		*Hypnum jutlandicum*	IV
	Dicranium scoparium		*Andromeda polifolia*		*Pleurozium schreberi*	IV
	Polytrichum commune				*Dicranium scoparium*	III

Site	NVC Habitat Type	NVC Frequency & Domin	NVC Habitat Type	NVC Frequency & Domin	NVC Habitat Type	NVC Frequency & Domin
Greenwrae Flow (cont.)			**W4a (dryer)-W4c (wet) Scrub Woodland**	V	***Pleurocarpous* mosses**	
			Betula pendula/pubescens	III	*Rhytidiadelphus loreus*	
			Sphagnum squarrosum		*Plagiothecium undulatum*	III
			Sphagnum cuspidatum	II	*Polytrichum commune*	
			Sphagnum palustre & fallax (W4c)	III	*Cladonia impexa*	
			Dryopteris dilatata (W4a)		*Luzula multiflora*	
			Rubus fructicosus (W4a)		*Juncus squarrosus*	
			Aulacomnium palustre		*Deschampsia flexuosa*	
			Polytrichum formosum			
			Juncus effusus			
			Molinia caerulea			

Site	NVC Habitat Type	NVC Frequency & Domin	NVC Habitat Type	NVC Frequency & Domin	NVC Habitat Type	NVC Frequency & Domin
Cadgill Flow	**M18 Raised Mire but degraded by drainage. Peat >2m depth, surrounded by birch scrub woodland (W4)**		**W4a (dryer)-W4c (wet) Scrub Woodland**			
	Calluna vulgaris (>0.3m)	V	*Betula pendula/pubescens*	V		
	Erica tetralix	V	*Eriophorum vaginatum*	IV		

	Eriophorum angustifolium	IV	*Dryopteris dilatata* (W4a)	III		
			Molinia caerulea	III		
			Sphagnum palustre & fallax			
	Occasional		**W4c (wet) Scrub Woodland**			
	Vaccinium myrtillus	III	*Vaccinium myrtillus*			
	Molinia caerulea	III	*Polytrichum formosum*			
	Eriophorum vaginatum	II				
	Nardus stricta	II	**Occasional**			
	Andromeda polifolia	I 1-2	*Carex nigra*			
	Narthecium ossifragum	I	*Aulacomnium palustre*			
	Empetrum nigrum	I	*Calluna vulgaris*			
Site	**NVC Habitat Type**	**NVC Frequency & Domin**	**NVC Habitat Type**	**NVC Frequency & Domin**	**NVC Habitat Type**	**NVC Frequency & Domin**
Cadgill Flow (cont.)	**Occasional**		**Occasional**			
	Vaccinium ugilinosum	I	*Pleurozium schreberi*			
	Cladonia impexa	I	*Rubus fruticosus*			
	Vaccinium oxycoccus	I	*Dicranium majus*			
	Sphagnum capillifolium		*Festuca ovina*			
	Sphagnum palustre					
	Cladonia impexa					
	Vaccinium uliginosum					
	Neutral Grassland/Marshy Grassland					
	Juncus effusus					
	Carex hirta					
	Carex binervis					
	Juncus inflexus					
	Dactylorhiza fuchsii					

Site	NVC Habitat Type	NVC Frequency & Domin	NVC Habitat Type	NVC Frequency & Domin	NVC Habitat Type	NVC Frequency & Domin
Bell's Flow	**M18a SSSI - (Peat >2m depth)**		**M20**			
	Calluna vulgaris (>0.3m)	IV 6-8	*Eriophorum vaginatum*	IV 6-8		
	Erica tetralix	IV 6-8	*Erica tetralix*	IV 6-8		
	Eriophorum vaginatum	IV 6-8	*Sphagnum palustre*	III		
	Sphagnum capillifolium	III	*Sphagnum papillosum*	III		
	Sphagnum cuspidatum	III	*Sphagnum cuspidatum*	III		
	Sphagnum papillosum	III	*Vaccinium oxycoccus*	II		
	Sphagnum palustre	III	*Drosera rotundifolia*	II		
	Sphagnum fallax	II	*Sphagnum tenellum*	I		
	Andromeda polifolia	III 2-3	*Sphagnum magellanicum*	I		
	Vaccinium oxycoccus	II 2-3				
	Narthecium ossifragum	II				
	Eriophorum angustifolium	I				
	Vaccinium myrtillus	I				
	Vaccinium ugilinosum	I				
	Sphagnum tenellum	I				
Site	**NVC Habitat Type**	**NVC Frequency & Domin**	**NVC Habitat Type**	**NVC Frequency & Domin**	**NVC Habitat Type**	**NVC Frequency & Domin**
Bell's Flow (cont.)	**M18a SSSI - (Peat >2m depth)**					
	Sphagnum magellanicum	I				
	Scirpus cespitosum					
	Occasional					
	Carex nigra					
	Ranunculus flammula					
	Drosera rotundifolia					

Berclees – Cadgillhead Farms: un-named moss	**M19a intermediate mire**		**M18 intermediate mire**		**W4a (dryer)-W4c (wet) Scrub Woodland**	
	Eriophorum vaginatum	V 6-8	*Molinia caerulea*	V 4-8	*Betula pendula/pubescens*	IV
	Molinia caerulea	V 6-8	*Eriophorum vaginatum*	V 4-5	*Molinia caerulea*	IV
	Erica tetralix	V 1	*Erica tetralix*	V 1-2	*Sphagnum palustre & fallax*	
	Calluna vulgaris (>0.3m)	IV 3	*Calluna vulgaris* (>0.3m)	IV 3	*Eriophorum vaginatum*	I
	Sphagnum cuspidatum	II 2	*Sphagnum cuspidatum*	II 2	*Polytrichum commune*	

Site	**NVC Habitat Type**	**NVC Frequency & Domin**	**NVC Habitat Type**	**NVC Frequency & Domin**	**NVC Habitat Type**	**NVC Frequency & Domin**
Berclees – Cadgillhead Farms: un-named moss (cont.)	**M19a intermediate mire**		**M18 intermediate mire**		**W4a (dryer)-W4c (wet) Scrub Woodland**	
	Narthecium ossifragum	II 1-2	*Sphagnum fallax*	I 3	*Vaccinium myrtillus*	
	Sphagnum fallax	I 3	*Sphagnum papillosum*	I 2	*Potentilla erecta*	
	Molinia caerulea	I 3	*Sphagnum palustre*	I 2		
	Sphagnum papillosum	I 2	*Andromeda polifolia*	I 1-2		
	Sphagnum palustre	I 2	*Narthecium ossifragum*	I 1-2		
	Andromeda polifolia	I 1-2	*Juncus effusus*	I 1		
	Cladonia impexa	I 1-2	*Betula pendula*	Present		
	Vaccinium oxycoccus	I 1				
	Eriophorum angustifolium	I 1				
	Vaccinium myrtillus	I 1				
	Scirpus cespitosum	I 1				
	Empetrum nigrum	I 1				
	Polytrichum commune					
	Dicranium scoparium					

Site	NVC Habitat Type	NVC Frequency & Domin	NVC Habitat Type	NVC Frequency & Domin	NVC Habitat Type	NVC Frequency & Domin
Solwaybank Mire	**M17a (peat <2m depth)**		**M3 - Bog pools**		**Range of habitats present**	
	Eriophorum vaginatum (tussocks)	IV 8	*Eriophorum angustifolium dominated*		*Eriophorum vaginatum/Scirpus cespitosum*	
	Erica tetralix	III	*Drosera rotundifolia*			
	Scirpus cespitosum	III	*Narthecium ossifragum*		*Eriophorum vaginatum/Erica tetralix*	
	Vaccinium myrtillus	I			*Eriophorum vaginatum/Sphagnum compactum*	
	Vaccinium oxycoccus	I				
	Vaccinium ugilinosum	I			*Eriophorum angustifolium* bog pools M2	
	Andromeda polifolia	I 1-2				
	Sphagnum capillifolium				*Narthecium ossifragum* valley mire M21	
	Sphagnum palustre					
	Sphagnum cuspidatum					
	Sphagnum compactum					
	Sphagnum fallax					
	Molinia caerulea					

Site	NVC Habitat Type	NVC Frequency & Domin	NVC Habitat Type	NVC Frequency & Domin	NVC Habitat Type	NVC Frequency & Domin
Solwaybank Mire (cont.)	**M17a (peat <2m depth)**					
	Potentilla erecta					
	Calluna vulgaris (0.2m)					
	Empetrum nigrum					
	Cladonia impexa					
	Narthecium ossifragum					
Allfornaught Intermediate Mire South	**Low level (cutover)**		**M17 Middle level**		**M17 drained to acid grassland U4/5/6 Upper level**	
	M17 various due to old peat cuts (>2m peat depth)					
	Erica tetralix	V 6-8	*Molinia caerulea*		*Molinia caerulea*	
	Eriophorum vaginatum (tussocks)	V 6-8	*Eriophorum vaginatum* (tussocks)		*Erica tetralix*	
	Scirpus cespitosum	V 4-6	*Sphagnum cuspidatum*		*Calluna vulgaris*	
	Narthecium ossifragum	I	*Sphagnum palustre*		*Scirpus cespitosum*	
	Sphagnum cuspidatum	I	*Sphagnum papillosum*		*Potentilla erecta*	
	Sphagnum palustre	I			*Vaccinium myrtillus*	
	Vaccinium oxycoccus	I			*Vaccinium ugilinosum*	

Site	NVC Habitat Type	NVC Frequency & Domin	NVC Habitat Type	NVC Frequency & Domin	NVC Habitat Type	NVC Frequency & Domin
Allfornaught Intermediate Mire South (cont.)	**M19a Peat >1m depth)**		**Acid grassland U6**		**M17 drained to acid grassland U4/5/6 Upper level**	
	Calluna vulgaris	IV			*Luzula campestris*	
	Vaccinium myrtillus	V 6-8	*Deschampsia flexuosa*		*Luzula multiflora*	
	Eriophorum vaginatum	V 6-8	*Festuca ovina/rubra*		*Dactylorhiza maculata*	
	Scirpus cespitosum	IV 4	*Juncus squarrosus*		*Drosera rotundifolia*	
	Erica tetralix	IV 4	*Polytrichum commune*		*Narthecium ossifragum*	
	Molinia caerulea	IV 4	*Luzula campestris*		*Andromeda polifolia*	
	Sphagnum capillifolium	III	*Luzula multiflora*			
	Sphagnum cuspidatum	III	*Pedicularis sylvatica*			
	Sphagnum papillosum	III	*Dactylorhiza maculata*			
	Sphagnum palustre	III				
	Sphagnum fallax (ditches)					
	Occasional					
	Vaccinium oxycoccus	I				
	Narthecium ossifragum	I				
	Eriophorum angustifolium	I				

Site	NVC Habitat Type	NVC Frequency & Domin	NVC Habitat Type	NVC Frequency & Domin	NVC Habitat Type	NVC Frequency & Domin
Blackstan Moss	**M20 (peat >3m depth)**		**M3 - Bog Pools**		**M20**	
	Calluna vulgaris	V 6-8	*Sphagnum cuspidatum*	IV 6	*Eriophorum vaginatum*	V 7-9
	Vaccinium myrtillus	IV 4	*Sphagnum palustre*	III	*Erica tetralix*	IV 5-7
	Eriophorum vaginatum	IV 4	*Sphagnum fallax*	III	*Sphagnum capillifolium*	III
	Sphagnum capillifolium	III	*Eriophorum angustifolium*	III	*Molinia caerulea*	III
	Sphagnum papillosum	III	*Vaccinium oxycoccus*	III	*Vaccinium oxycoccus*	I
	Sphagnum palustre	II	*Narthecium ossifragum*	III		
	Dicranium scoparium	II	*Drosera rotundifolia*	I	**M20 - with overdominance of *Molinia***	
	Erica tetralix	II			*Molinia caerulea*	
	Eriophorum angustifolium	I			*Eriophorum vaginatum*	
	Molinia caerulea	I			*Polytrichum commune*	
	Polytrichum commune	I			*Aulacomnium palustre*	
	Cladonia impexa	I			*Dicranium scoparium*	
	Empetrum nigrum	I			*Sphagnum papillosum*	
	Aulacomnium palustre	I			*Sphagnum palustre*	
	Hypnum jutlandicum	I			*Galium saxatile*	
	Pleurozium schreberi	I			*Potentilla erecta*	

Appendix 2. Species found on the peatlands and associated peripheral habitats

20 species of bryophyte and 39 species of vascular plant were recorded:

Scientific Name	**Common Name**
Aulacomnium palustre	Bog Groove-moss
Cladonia impexa	Reindeer Moss
Dicranium majus	Greater Fork-moss
Dicranium scoparium	Broom Fork-moss
Hypnum jutlandicum	Heath Feather-moss
Plagiothecium undulatum	Waved Silk-moss
Pleurozium schreberi	Red-stemmed Feather-moss
Polytrichum commune	Marsh Hair-moss
Polytrichum formosum	Wood Hair-moss
Rhytidiadelphus loreus	Little Shaggy-moss
Sphagnum capillifolium	Red Bog-moss
Sphagnum compactum	Compact Bog-moss
Sphagnum cuspidatum	Feathery Bog-moss
Sphagnum fallax	Flat-topped Bog-moss
Sphagnum magellanicum	Magellanic Bog-moss
Sphagnum palustre	Blunt-leaved Bog-moss
Sphagnum papillosum	Papillose Bog-moss
Sphagnum quinquefarium	Five-ranked Bog-moss
Sphagnum squarrosum	Spiky Bog-moss
Sphagnum tenellum	Soft Bog-moss
Andromeda polifolia	Bog Rosemary
Anthoxanthum odoratum	Sweet Vernal Grass
Betula pendula	Downy Birch
Betula pubescens	Silver Birch
Calluna vulgaris	Heather
Carex binervis	Green-ribbed Sedge
Carex hirta	Hairy Sedge
Carex nigra	Common Sedge
Dactylorhiza fuchsia	Common Spotted Orchid
Dactylorhiza maculata	Heath Spotted Orchid
Deschampsia flexuosa	Wavy Hair-grass
Digitalis purpurea	Foxglove
Drosera rotundifolia	Round-leaved Sundew
Dryopteris dilatata	Broad Buckler Fern
Empetrum nigrum	Crowberry
Erica tetralix	Cross-leaved Heath

Scientific Name	Common Name
Eriophorum angustifolium	Common Cotton-grass
Eriophorum vaginatum	Hare's-tail Cotton-grass
Festuca ovina	Sheep's Fescue
Galium saxatile	Heath Bedstraw
Galium sp	Marsh/Fen Bedstraw
Juncus effuses	Soft Rush
Juncus inflexus	Hard Rush
Juncus squarrosus	Heath Rush
Luzula campestris	Field Wood-rush
Luzula multiflora	Heath Wood-rush
Luzula pilosa	Hairy Wood-rush
Molinia caerulea	Purple Moor-grass
Nardus stricta	Mat Grass
Narthecium ossifragum	Bog Asphodel
Pedicularis sylvatica	Lousewort
Pinus sylvestris	Scots Pine
Potentilla erecta	Tormentil
Ranunculus flammula	Lesser Spearwort
Rubus fructicosus	Bramble
Scirpus cespitosum	Deergrass
Vaccinium oxycoccus	Cranberry
Vaccinium ugilinosum	Bog Bilberry
Vaccinium myrtillus	Blaeberry

Appendix 7.3 Protected Species Survey Results

THIS APPENDIX IS CONFIDENTIAL AND HAS BEEN FORWARDED UNDER SEPARATE COVER DIRECTLY TO SCOTTISH NATURAL HERITAGE AND THE SCOTTISH GOVERNMENT.

Appendix 7.4 Breeding Bird Survey Results

Woodland Breeding Bird Survey Results

	Study Area 1: Gretna - Ewe Hill Proposed OHL Route											
	Greenwrae Flow Mire Woodland	**Cadgill Flow Mire Woodland**	**Neds Beck Semi-natural/Ancient Woodland**	**Anniegill Plantation**	**Plantation Nr Berclees**	**Allfornaught semi-natural Woodland**	**Conhess Plantation**	**Kirtleton Wood**	**Fallford Plantation**	**Byre Cleuch South Plantation**	**Gate Head Plantation**	**Dunnabie Hill Plantation**
Grid Ref	**NY 32937 72425**	**NY 32167 73815**	**NY 31622 75280**	**NY 30467 76655**	**NY 29177 76518**	**NY 29187 77800**	**NY 27972 79475**	**NY 26887 80325**	**NY 26722 80830**	**NY 26828 81935**	**NY 26342 82950**	**NY 25792 82795**
Woodland Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
List of Bird Species Codes												
B.		B.	B.	B.	B.		B.	B.	B.		B.	B.
BC	BC		BC			BC						
BF							**BF**					
BT	BT	BT	BT	BT		BT	BT	BT	BT			
BZ				BZ			BZ			BZ		
C.		C.		C.		C.	C.			C.		C.
CC				CC			CC	CC				
CG				CG								
CH		CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
CK		**CK**		**CK**								
CT		CT	CT	CT	CT		CT	CT	CT	CT	CT	
D.				**D.**			**D.**	**D.**			**D.**	
GC				**GC**			**GC**		**GC**	**GC**	**GC**	
GO					GO			GO				
GR											GR	
GS	GS		GS									
GT			GT		GT	GT						
J.				J.			J.					
K.							**K.**					
LI				**LI**			**LI**					

Study Area 1: Gretna - Ewe Hill Proposed OHL Route - continued												
	Greenwrae Flow Mire Woodland	**Cadgill Flow Mire Woodland**	**Neds Beck Semi-natural/Ancient Woodland**	**Anniegill Plantation**	**Plantation Nr Berclees**	**Allfornaught semi-natural Woodland**	**Conhess Plantation**	**Kirtleton Wood**	**Fallford Plantation**	**Byre Cleuch South Plantation**	**Gate Head Plantation**	**Dunnabie Hill Plantation**
Grid Ref	**NY 32937 72425**	**NY 32167 73815**	**NY 31622 75280**	**NY 30467 76655**	**NY 29177 76518**	**NY 29187 77800**	**NY 27972 79475**	**NY 26887 80325**	**NY 26722 80830**	**NY 26828 81935**	**NY 26342 82950**	**NY 25792 82795**
Woodland Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
List of Bird Species Codes												
LR				**LR**			**LR**				**LR**	
M.	M.						M.				M.	
MG										MG		
MP	**MP**											
PH	PH		PH								PH	
R.	R.	R.	R.	R.		R.	R.	R.	R.	R.	R.	R.
RN												RN
RO								RO				
RT			**RT**			**RT**	**RT**					
SH	SH			SH			SH				SH	
SK				SK			SK					
ST						**ST**	**ST**			**ST**		
TC							TC		TC			
TO							TO					
TP												
WP	WP			WP	WP	WP	WP		WP	WP	WP	WP
WR	WR	WR	WR	WR	WR	WR	WR	WR	WR	WR	WR	WR
WW	**WW**	**WW**	**WW**	**WW**	**WW**	**WW**	**WW**		**WW**	**WW**	**WW**	**WW**
Total # Species	**11**	**9**	**12**	20	**8**	**11**	**25**	**10**	**10**	**11**	**14**	**8**

Key
Red = UK Red-listed species
Orange = UK Amber-listed species
Black text = UK Green-listed species

	Study Area 2: Ewe Hill - Newfield Proposed Route															
	Craw-that Hill Plant-ation	**Alton Hill Plant-ation**	**Haggie's Brae Plantation**	**Blackstan Plantatio n**	**Craig-house-steads Plant-ation**	**Carhead Plant-ation**	**Corrie Plant-ation north little block**	**Corrie Plant-ation south little block**	**Corrie Plant-ation**	**Park-cleuch Plantatio n**	**Lady-cleuch Plantatio n**	**Little Whitriggs Plantatio n**	**Cumstone North Plantation**	**Cumstone South Plantation**	**Stobohill Linn Plantatio n**	**Hogg Hill Plantation**
Grid Ref	**NY 24862 83535**	**NY 24487 84715**	**NY 24192 84530**	**NY 25327 85150**	**NY 23485 85440**	**NY 23732 85908**	**NY 22642 86855**	**NY 22482 86620**	**NY 21362 86555**	**NY 19608 86140**	**NY 19912 86490**	**NY 19707 87000**	**NY 18562 86520**	**NY 18300 86198**	**NY 18757 87115**	**NY 18002 86760**
Wood Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
List of Bird Species Codes																
B.		B.	B.			B.			B.	B.			B.	B.	B.	B.
BF													**BF**		**BF**	
BT					BT	BT							BT	BT		
BZ				BZ		BZ			BZ			BZ				
C.	C.			C.					C.	C.	C.	C.	C.	C.	C.	C.
CC															CC	
CD													CD			
CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH		CH	CH
CK	**CK**								**CK**							
CR									CR						**CK**	
CT		CT					CT		CT	CT		CT	CT	CT	CT	CT
D.														**D.**		
GC	**GC**			**GC**		**GC**	**GC**	**GC**	**GC**				**GC**	**GC**	**GC**	**GC**
GL									GL							
GO												GO	GO			
GR													GR			
GT												GT	GT			
H.													H.			

Study Area 2: Ewe Hill - Newfield Proposed Route - continued																
	Craw-that Hill Plant-ation	Alton Hill Plant-ation	Haggie's Brae Plantation	Blackstan Plantatio n	Craig-house-steads Plant-ation	Carhead Plant-ation	Corrie Plant-ation north little block	Corrie Plant-ation south little block	Corrie Plant-ation	Park-cleuch Plantatio n	Lady-cleuch Plantatio n	Little Whitriggs Plantatio n	Cumstone North Plantation	Cumstone South Plantation	Stobohill Linn Plantatio n	Hogg Hill Plantation
Grid Ref	**NY 24862 83535**	**NY 24487 84715**	**NY 24192 84530**	**NY 25327 85150**	**NY 23485 85440**	**NY 23732 85908**	**NY 22642 86855**	**NY 22482 86620**	**NY 21362 86555**	**NY 19608 86140**	**NY 19912 86490**	**NY 19707 87000**	**NY 18562 86520**	**NY 18300 86198**	**NY 18757 87115**	**NY 18002 86760**
Wood Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Bird Species Codes																
J.									J.							
LR									LR							
M.				M.				M.		M.		M.		M.		M.
MG								MG	MG							
MP									MP		MP					
PH						PH										
R.		R.	R.	R.		R.	R.	R.	R.	R.	R.	R.	R.	R.	R.	R.
RN		RN														
S.									S.							
SC											SC					
SF															SF	
SK		SK				SK		SK	SK	SK		SK	SK			
ST									ST				ST	ST	ST	ST
TC												TC			TC	
WC									WC							
WP		WP		WP	WP				WP	WP		WP	WP		WP	WP
WR			WR	WR			WR	WR	WR	WR	WR	WR	WR	WR	WR	WR
WW		WW		WW	WW	WW		WW	WW		WW	WW	WW	WW	WW	WW
Total # Species	**4**	**8**	**4**	**9**	**4**	**9**	**5**	**8**	**21**	**9**	**7**	**13**	**18**	**11**	**15**	**11**

Key
Red = UK Red-listed species
Orange = UK Amber-listed species
Black text = UK Green-listed species

Bird Species Codes follow British Trust for Ornithology Species Codes:

B.	Blackbird	**CD**	Collared Dove	**H.**	Grey Heron	**RT**	Redstart	**TO**	Tawny Owl
BC	Blackcap	**CR**	Crossbill	**J.**	Jay	**R.**	Robin	**TP**	Tree Pipit
BT	Blue Tit	**CK**	Cuckoo	**K.**	Kestrel	**RO**	Rook	**WC**	Whinchat
BF	Bullfinch	**D.**	Dunnock	**LR**	Lesser Redpoll	**SK**	Siskin	**WP**	Wood Pigeon
BZ	Buzzard	**GC**	Goldcrest	**LI**	Linnet	**S.**	Skylark	**WR**	Wren
CG	Canada Goose	**GL**	Grey Wagtail	**MG**	Magpie	**ST**	Song Thrush	**WW**	Willow Warbler
C.	Carrion Crow	**GO**	Goldfinch	**MP**	Meadow Pipit	**SH**	Sparrowhawk		
CH	Chaffinch	**GS**	Great Spotted Woodpecker	**M.**	Mistle Thrush	**SF**	Spotted Flycatcher		
CC	Chiffchaff	**GT**	Great Tit	**PH**	Pheasant	**SC**	Stonechat		
CT	Coal Tit	**GR**	Greenfinch	**RN**	Raven	**TC**	Treecreeper		

Common Bird Census Results: Maximum counts and monthly totals for singing males/estimated numbers of pairs 2010

	Gretna - Ewe Hill						**Ewe Hill - Newfield**				
	Maximum Counts	**April**	**May**	**June**	**July**		**Maximum Counts**	**April**	**May**	**June**	**July**
B.	55	55	17	2	2		12	12	6	0	2
BC	4	1	4	0	3		0	0	0	0	0
BF	2	2	1	0	0		0	0	0	0	0
BH	0	0	0	0	0		10	10	10	10	10

	Gretna - Ewe Hill						Ewe Hill - Newfield				
	Maximum Counts	April	May	June	July		Maximum Counts	April	May	June	July
BO	0	0	0	0	0		1	1	0	0	0
BT	9	9	8	1	0		1	1	0	0	0
BZ	4	4	4	4	0		4	4	0	1	3
C.	20	20	11	4	1		14	14	4	1	0
CC	1	0	0	0	1		4	0	1	2	4
CD	0	0	0	0	0		1	0	1	0	0
CH	135	135	64	48	34		61	43	35	34	61
CK	5	4	5	1	0		3	3	2	0	0
CR	3	0	2	3	0		3	2	1	0	3
CS	1	0	0	1	0		0	0	0	0	0
CT	29	29	3	5	5		16	16	5	1	5
CU	18	10	18	4	1		5	5	1	0	3
D.	12	12	2	2	0		8	8	4	0	1
GC	26	26	4	0	1		14	14	6	0	1
GH	5	4	5	0	5		2	2	0	0	1
GL	1	0	1	0	0		2	0	0	0	2
GO	10	10	4	3	3		2	2	0	0	2
GR	2	1	2	0	0		1	0	1	0	1
GS	2	1	2	0	0		1	1	0	0	0
GT	11	11	2	0	1		3	3	0	0	0
GW	0	0	0	0	0		1	0	0	0	1
H.	0	0	0	0	0		2	2	2	2	0
HM	2	0	2	0	0		3	3	1	1	2
HS	9	5	8	5	9		0	0	0	0	0
J.	1	1	1	0	0		2	0	2	0	1
JD	1	1	0	1	1		3	3	2	1	2

	Gretna - Ewe Hill						Ewe Hill - Newfield				
	Maximum Counts	April	May	June	July		Maximum Counts	April	May	June	July
K.	0	0	0	0	0		1	0	0	0	1
L.	4	4	3	3	1		4	1	1	1	4
LI	3	3	2	0	0		0	0	0	0	0
LR	5	5	2	4	2		0	0	0	0	0
LT	3	3	0	0	0		0	0	0	0	0
M.	1	1	0	0	0		1	1	1	0	1
MA	2	0	2	0	0		0	0	0	0	0
MG	2	2	0	0	0		0	0	0	0	0
MP	83	60	83	56	44		73	52	73	45	71
MS	0	0	0	0	0		1	1	0	0	0
OC	3	1	3	0	1		3	1	1	1	3
P.	2	2	0	0	0		0	0	0	0	0
PH	1	1	0	0	0		0	0	0	0	0
PW	1	1	1	0	0		0	0	0	0	0
R.	55	55	14	32	6		26	26	16	4	15
RB	20	10	20	13	10		7	2	1	1	7
RN	1	1	0	1	0		0	0	0	0	0
RO	2	2	0	0	0		1	1	0	0	0
RT	3	3	0	2	0		0	0	0	0	0
S.	83	83	65	47	33		55	50	41	34	55
SC	5	3	5	2	2		3	2	3	0	1
SD	1	0	0	0	1		0	0	0	0	0
SG	3	3	2	0	0		1	1	1	0	0
SH	1	1	0	0	0		0	0	0	0	0
SK	1	1	1	0	0		2	2	0	0	0
SL	5	5	1	1	2		1	0	1	1	1

	Gretna - Ewe Hill						Ewe Hill - Newfield				
	Maximum Counts	April	May	June	July		Maximum Counts	April	May	June	July
SM	40	40	40	40	40		0	0	0	0	0
SN	1	1	0	1	0		2	2	1	1	1
ST	16	16	3	3	0		10	10	5	0	1
SW	6	6	4	3	5		11	11	3	2	3
TC	0	0	0	0	0		2	0	0	1	2
TS	1	0	0	0	1		0	0	0	0	0
W.	1	0	1	0	0		1	1	1	0	0
WH	2	2	0	0	0		1	1	0	0	0
WP	9	9	3	2	0		12	12	7	0	4
WR	73	73	32	24	33		63	59	31	32	63
WW	122	122	35	38	23		73	73	24	19	30
Y.	5	5	3	3	0		0	0	0	0	0

Bird Species Codes follow British Trust for Ornithology Species Codes:

B.	Blackbird	**GT**	Great Tit	**RN**	Raven
BC	Blackcap	**GW**	Garden Warbler	**RO**	Rook
BF	Bullfinch	**H.**	Grey Heron	**RT**	Redstart
BH	Black-headed Gull	**HM**	House Martin	**S.**	Skylark
BO	Barn Owl	**HS**	House Sparrow	**SC**	Stonechat
BT	Blue Tit	**J.**	Jay	**SD**	Stock Dove
BZ	Buzzard	**JD**	Jackdaw	**SG**	Starling
C.	Carrion Crow	**K.**	Kestrel	**SH**	Sparrowhawk
CC	Chiffchaff	**L.**	Lapwing	**SK**	Siskin
CD	Collared Dove	**LI**	Linnet	**SL**	Swallow

CH	Chaffinch	**LR**	Lesser Redpoll	**SM**	Sand Martin
CK	Cuckoo	**LT**	Long-tailed Tit	**SN**	Snipe
CR	Crossbill	**M.**	Mistle Thrush	**ST**	Song Thrush
CS	Common Sandpiper	**MA**	Mallard	**SW**	Sedge Warbler
CT	Coal Tit	**MG**	Magpie	**TC**	Treecreeper
CU	Curlew	**MP**	Meadow Pipit	**TS**	Tree Sparrow
D.	Dunnock	**MS**	Mute Swan	**W.**	Wheatear
GC	Goldcrest	**OC**	Oystercatcher	**WH**	Whitethroat
GH	Grasshopper Warbler	**P.**	Grey Partridge	**WW**	Willow Warbler
GL	Grey Wagtail	**PH**	Pheasant	**WP**	Wood Pigeon
GO	Goldfinch	**PW**	Pied Wagtail	**WR**	Wren
GR	Greenfinch	**R.**	Robin	**Y.**	Yellowhammer
GS	Great Spotted Woodpecker	**RB**	Reed Bunting		

Appendix 11.1 Migration & Winter Period Vantage Point Survey Results

Date	VP	Start Time	End Time	Species	Time	Av. Ht (m)	# Birds	Cloud	Temp	Wind	Wind	Visibility (km)	Comments
26/09/2008	Sol	1005	1205	None				1	10	ESE	1	>2	
26/09/2008	Corrie	1220	1420	None				7	14	SSW	3	>2	
26/09/2008	Stubby	1440	1640	None				8	14	SSW	2	>2	
27/09/2008	Stubby	0705	0905	None				2	8	SW	1	>2	
27/09/2008	Corrie	0930	1130	None				8	13	SW	3	>2	
27/09/2008	Sol	1145	1345	None				8	13	SW	3	>2	
29/09/2008	Corrie	0725	0925	None				8	8	W	3	>2	
29/09/2008	Stubby	1010	1210	None				7	10	W	3	>2	
29/09/2008	Sol	1245	1445	None				8	12	W	3	>2	
04/10/2008	Corrie	0720	0920	None				8	9	SW	6	>2	
04/10/2008	Sol	0940	1140	None				8	8	SW	4-6	>2	
04/10/2008	Stubby	1210	1410	None				8	9	SW	6	>2	
06/10/2008	Stubby	0655	0855	GP	0703	10	9	2	6	E	1	>2	Cross PR
06/10/2008	Stubby	0655	0855	H.	0728	20	1	2	6	E	1	>2	Cross PR
06/10/2008	Stubby	0655	0855	PG	0740	300	27	2	6	E	1	>2	Cross PR
06/10/2008	Stubby	0655	0855	PG	0742	300	14	2	6	E	1	>2	Cross PR
06/10/2008	Stubby	0655	0855	PG	0746	400	50	2	6	E	1	>2	East of PR
06/10/2008	Stubby	0655	0855	PG	0747	400	12	2	6	E	1	>2	East of PR
06/10/2008	Stubby	0655	0855	PG	0747	400	30	2	6	E	1	>2	East of PR
06/10/2008	Stubby	0655	0855	PG	0748	400	25	2	6	E	1	>2	East of PR
06/10/2008	Stubby	0655	0855	PG	0748	400	68	2	6	E	1	>2	East of PR
06/10/2008	Stubby	0655	0855	PG	0748	400	47	2	6	E	1	>2	East of PR
06/10/2008	Stubby	0655	0855	PG	0752	400	61	2	6	E	1	>2	East of PR
06/10/2008	Stubby	0655	0855	PG	0755	70	4	2	6	E	1	>2	East of PR
06/10/2008	Stubby	0655	0855	PG	0758	400	400	2	6	E	1	>2	East of PR
06/10/2008	Stubby	0655	0855	PG	0802	400	150	2	6	E	1	>2	East of PR
06/10/2008	Stubby	0655	0855	PG	0807	400	30	2	6	E	1	>2	East of PR
06/10/2008	Stubby	0655	0855	PG	0810	400	18	2	6	E	1	>2	East of PR
06/10/2008	Stubby	0655	0855	PG	0812	400	12	2	6	E	1	>2	East of PR
06/10/2008	Stubby	0655	0855	PG	0815	400	150	2	6	E	1	>2	East of PR

Date	VP	Start Time	End Time	Species	Time	Av. Ht (m)	# Birds	Cloud	Temp	Wind	Wind	Visibility (km)	Comments
06/10/2008	Corrie	0930	1130	None				2	6	E	2	>2	
06/10/2008	Sol	1155	1355	None				6	8	SE	2-3	>2	
11/10/2008	Stubby	0650	0850	PG	0803	300	8	8	13	SW	2	>2	East of route
11/10/2008	Stubby	0650	0850	PG	0808	300	150	8	13	SW	2	>2	East of route
11/10/2008	Stubby	0650	0850	PG	0810	300	35	8	13	SW	2	>2	East of route
11/10/2008	Sol	0920	1120	None				2	11	WSW	3	>2	
11/10/2008	Corrie	1145	1345	None				2	13	WSW	3	>2	
16/10/2008	Sol	0710	0910	None				2	4	NW	1	>2	
16/10/2008	Corrie	0935	1135	None				1	5	NW	2	>2	
16/10/2008	Stubby	1215	1415	None				2	13	NW	3	>2	
20/10/2008	Corrie	0745	0945	None				8	9	SW	4	>2	
20/10/2008	Sol	1010	1210	HH	1123	2	1	8	12	SW	4	>2	Cross PR
20/10/2008	Stubby	1230	1430	PG	1258	150	500	8	12	W	6-7	>2	Cross PR
24/10/2008	Stubby	1005	1205	PG	1020	200	2000	1	11	W	5	>2	Lifted out of field just east of proposed route
24/10/2008	Stubby	1005	1205	PG	1035	120	500	1	11	W	5	>2	Birds returned to same field
24/10/2008	Corrie	1235	1435	None				4	10	W	5	>2	
24/10/2008	Sol	1450	1650	None				1	12	NW	5	>2	
27/10/2008	Stubby	0630	0830	PG	0650	120	2	0	3	SW	2	>2	Cross PR
27/10/2008	Sol	0845	1045	None				1	4	SSW	2	>2	
02/11/2008	Corrie	0650	0850	None				0	-1	E	1	>2	
02/11/2008	Sol	0910	1110	None				0	6	E	1	>2	
02/11/2008	Stubby	1130	1330	H.	1225	2	2	0	12	E	1	>2	Cross PR
02/11/2008	Stubby	1130	1330	PG	1143	130	35	0	12	E	1	>2	

Date	VP	Start Time	End Time	Species	Time	Av. Ht (m)	# Birds	Cloud	Temp	Wind	Wind	Visibility (km)	Comments
05/11/2008	Stubby	0700	0900	PG	0817	180	36	8	6	E	2	>2	Cross PR
05/11/2008	Sol	0915	1115	None				8	6	E	1	>2	
05/11/2008	Corrie	1150	1350	None				8	7	E	2	>2	
11/11/2008	Stubby	0930	1130	PG	1010	50	21	8	10	W	5-6	>2	cross PR
11/11/2008	Stubby	0930	1130	PG	1050	100	1	8	10	W	5-6	>2	cross PR & Landed in stubble to west
11/11/2008	Corrie	1205	1405	None				8	10	W	5-6	>2	
11/11/2008	Sol	1435	1635	None				8	9	W	4	>2	
15/11/2008	Corrie	0905	1105	None				4	9	W	5-6	>2	
15/11/2008	Sol	1125	1325	None				2	11	W	4	>2	
15/11/2008	Stubby	1345	1545	PG	1535	80	68	2	8	NW	4	>2	cross PR & Landed beside 400
19/11/2008	Stubby	0850	1050	None				6	10	W	5	>2	
19/11/2008	Sol	1105	1305	None				6	12	NW	3	>2	
19/11/2008	Corrie	1345	1545	None				6	6	NW	3	>2	
26/11/2008	Stubby	0735	0935	PG	0758	180	115	8	9	W	3	>2	cross PR
26/11/2008	Stubby	0735	0935	PG	0807	180	200	8	9	W	3	>2	cross PR
26/11/2008	Stubby	0735	0935	PG	0814	180	14	8	9	W	3	>2	
26/11/2008	Stubby	0735	0935	PG	0818	180	75	8	9	W	3	>2	
26/11/2008	Stubby	0735	0935	PG	0821	180	16	8	9	W	3	>2	
26/11/2008	Stubby	0735	0935	PG	0835	200	180	8	9	W	3	>2	cross PR
26/11/2008	Stubby	0735	0935	PG	0940	180	150	8	9	W	3	>2	cross PR
26/11/2008	Stubby	0735	0935	PG	0940	180	50	8	9	W	3	>2	cross PR
26/11/2008	Sol	0950	1150	None				8	10	W	3	>2	
26/11/2008	Corrie	1225	1425	None				7	10	W	4	>2	
24/01/2009	Sol	1105	1305	None				6	4	W	1-2	>2	
24/01/2009	Corrie	1315	1515	None				5	2	SW	1-2	>2	
25/01/2009	Stubby	0750	0950	None				8	2	W	2	>2	
25/01/2009	Sol	1010	1210	None				0	10	W	4	>2	

Date	VP	Start Time	End Time	Species	Time	Av. Ht (m)	# Birds	Cloud	Temp	Wind	Wind	Visibility (km)	Comments
25/01/2009	Corrie	1230	1430	None				8	6	W	5	>2	
25/01/2009	Stubby	1445	1645	None				2	2	SW	2	>2	
27/01/2009	Corrie	0745	0945	None				8	6	SW	2	>2	
27/01/2009	Sol	1010	1210	None				8	6	0	0	>2	Drizzle
27/01/2009	Stubby	1250	1450	None				8	6	S	1	>2	
27/01/2009	Sol	1500	1700	None				8	6	SE	1	>2	Drizzle
29/01/2009	Stubby	0715	0915	None				8	0	SSE	1	>2	
29/01/2009	Sol	0930	1130	None				8	4	SSE	2	>2	
29/01/2009	Corrie	1210	1410	None				8	5	SSE	2	>2	
30/01/2009	Corrie	0720	0920	None				7	0	SE	3	>2	
30/01/2009	Sol	0950	1150	None				8	2	SE	3	>2	
30/01/2009	Stubby	1230	1430	None				8	4	SE	2	>2	
31/01/2009	Stubby	0745	0945	None				8	3	SE	1-2	>2	
31/01/2009	Corrie	1015	1215	None				8	4	SE	2	>2	
04/02/2009	Stubby	0730	0930	None				0	-2	0	0	>2	
04/02/2009	Sol	0945	1145	None				7	0	E	2	>2	
04/02/2009	Corrie	1215	1415	None				7	2	NNW	2	>2	
07/02/2009	Corrie	0715	0915	None				2	-2	N	1	>2	
07/02/2009	Sol	0940	1140	None				4	1	N	3	>2	
07/02/2009	Stubby	1215	1415	None				7	3	N	3-4	>2	
11/02/2009	Sol	0715	0915	PG	0840	250	300	8	0	NNE	1	>2	cross PR then headed north rising to 400m near wind farm
11/02/2009	Corrie	0955	1155	None				7	-1	NNE	2	>2	1" snow cover
11/02/2009	Stubby	1230	1430	None				0	3	NNE	2	>2	
14/02/2009	Sol	1215	1415	None				8	4	W	1	>2	
14/02/2009	Corrie	0720	0920	None				8	1	SW	1	>2	Hazy
14/02/2009	Stubby	1000	1200	PG	1112	100	7	8	3	NNE	1	>2	cross PR
16/02/2009	Corrie	1200	1400	None				8	8	W	4	>2	
16/02/2009	Stubby	0715	0915	PG	0755	100	23	8	6	SW	2	>2	E of PR
16/02/2009	Sol	0930	1130	None				8	6	SW	2-3	>2	

Date	VP	Start Time	End Time	Species	Time	Av. Ht (m)	# Birds	Cloud	Temp	Wind	Wind	Visibility (km)	Comments
25/02/2009	Corrie	0710	0910	None				8	5	SW	4	>2	Hazy at start
25/02/2009	Sol	0935	1135	PG	0947	600	60	7	6	W	4	>2	West of PR
25/02/2009	Stubby	1150	1350	None				4	9	W	4	>2	

Appendix 8.1 Designated & Historic Sites

Gretna Substation to Ewe Hill Substation

Designated Sites

WSP Ref[1]	Ref	Name	Period	Description	Potential impact summary[2]
SAM2	11964	Timpanheck Cottage	Prehistoric – Neo?	The cursus survives as an arrangement of two parallel ditches aligned NW/SE with a terminal ditch at the monument's S end. The ditches run for almost 200m and at their widest are 20m apart. The area to be scheduled is rectangular, to include the remains described and an area around them within which related material may be expected to be found.	Direct impacts: No Indirect impacts: No Scale: Indirect impacts upon the monument are not precluded by topography, but current monument condition limits the value of long distance views.
LB2	10081	Cadgill House	Early Modern	c.1839. 2-storey, House with outbuildings. Category B	Direct impacts: No Indirect impacts: No Scale: Mitigation by route design reduces impacts to negligible level.
LB3	10083	Half Morton Parish Church And Churchyard	Post Medieval	c 1744; 4-bay church, repaired and enlarged c1795 ('addition of N jamb); churchyard is: quadrangular enclosure. Category C (S)	Direct impacts: No Indirect impacts: No Scale: Mitigation by route design reduces impacts to negligible level.
LB4	10080	Cadgill Bridge (B6357 Over Cadgill Burn)	Early Modern	Early 19th century. Roadbridge; Category B	Direct impacts: No Indirect impacts: No Scale: Mitigation by route design reduces impacts to negligible level.
LB5	10084	High Stenries, Including Barn	Post Medieval	Mid 18th century farmhouse with courtyard steading. Listed for high quality of barn. Category: C(S)	Direct impacts: No Indirect impacts: No Scale: Mitigation by route design reduces impacts to negligible level.

[1] WSP reference relates to the archaeological figure labels
[2] This simplified analysis of impacts upon specific resource is not intended to preclude impacts upon hitherto unidentified archaeological resources. The formal presentation of impact is contained within the main chapter.

Prehistoric

WSP Ref	Ref	Name	Description	Potential impact summary
AHM1	NY28SE 41	Gate Head	BURNT MOUND, On a gentle slope in an area of unimproved ground, there is a crescentic burnt mound measuring 9.8m from N to S by 7m transversely and up to 0.7m in height. The mound opens to a dry stream-bed on the NE and the SE side is noticeably higher. Removal of a turf revealed a core of reddened angular stones and fragments of charcoal within a matrix of dark brown earth.	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM2	NY28SE 42	Gate Head	BURNT MOUND, This burnt mound lies on gently sloping ground at the intersection of a dry stream-bed and a modern drainage ditch. It measures 3.5m in diameter and is 0.1m high. Removal of a turf from the mound revealed a core of reddened angular stones and fragments of charcoal within a matrix of dark brown earth.	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM3	NY28SE 43	Kirtle Slack	RING ENCLOSURE, On the W edge of a burn gully, there is a ring-enclosure which measures 5.5m in diameter within a low turf bank up to 2m thick and 0.3m high.	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM4	NY28SE 70	Megsfield	RING ENCLOSURE, Vertical aerial photography (OS 69/411/065) has revealed a small ring-enclosure within what is now an area of dense forestry 250m E of Megsfield cottage (NY28SE 71).	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM5	NY28SE 28.01	Ley Hill	RING ENCLOSURE, Vertical air photography (OS 69/411/069) has recorded two small ring-enclosures at the W end of Ley Hill.	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.

Medieval/Post Medieval

WSP Ref	Ref	Name	Description	Potential impact summary
AHM6	NY28SE 20	Muckle Snab	RING ENCLOSURE, Three circular earthen banks: (i) NY 2664 8283. 0.4m high, 1.1m wide, 8.7m over all diameter. Slight depression in SE quadrant. (ii) NY 2675 8292. 0.5m high, 2.7m wide, 10.7m over all diameter. No visible entrance. (iii) NY 2677 8297. 0.6m high, 2.0m wide, 10.7m over all diameter. No visible entrance. All are on natural ground surface, with no sign of levelling. Probably sheepfolds.	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM7	NY37SW 11	Alderman's Seat	Farmhouse, farmstead, horse engine house	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM8	NY37SW 70	Staffler	Farmhouse, farmstead	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM9	NY37SW 6	Grenewich / Greenwrae	Tower house, A map of 1590 places the tower of 'Grenewich' on the E side of the River Sark, but it more probably stood W of the river, on the modern farm of Greenwrae	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM10	NY37SW 52.00	Stubbyknowe	Farmhouse, farmstead	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM11	NY37SW 52.01	Stubbyknowe Bar	Cottage	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.

WSP Ref	Ref	Name	Description	Potential impact summary
AHM12	NY37SW 60	Greenwrae	Farmhouse, farmstead	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM13	NY37SW 62	Milligansbushfield	Farmhouse, farmstead	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM14	NY37SW 24.00	Half Morton Parish Church	Church, Half Morton Parish Church. T-plan kirk, its rubble walling mostly rendered and lined as ashlar. The body was built in 1744 and enlarged c. 1795; the N 'aisle' was added in 1833. J Gifford 1996.	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM15	NY37SW 7	Timpanheck	Farmhouse, farmstead	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM16	NY37SW 9	Chapelknowe, Chapel-Of-Logan	Farmhouse, farmstead	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM17	NY37SW 22	Cadgill House	Manse, For Half Morton parish church (NY 3201 7444), see NY37SW 24.	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM18	NY37SW 54	Chapelknowe	Village, Hamlet containing the old United Prebyterian Church. J Gifford 1996.	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.

WSP Ref	Ref	Name	Description	Potential impact summary
AHM19	NY37SW 58	Cadgillfoot	Farmhouse, farmstead	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM20	NY37SW 24.01	Half Morton Parish Church, Churchyard	BURIAL GROUND	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM21	NY37NW 12	Cadgillhead	Farmhouse, farmstead	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM22	NY37NW 50	Parkhead	Farmhouse, farmstead	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM23	NY37NW 33	Cadgillhead	RIG AND FURROW, A large area of rig-and-furrow cultivation has been recorded by vertical aerial photography (106G/Scot/UK 145 frames 3192-3 and 4374-5, dated 12 July 1946) on a NE-facing slope about 300m NW of Cadgillhead steading (NY37NW 12).	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM24	NY27NE 9.00	Highstenries	FARMHOUSE	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM25	NY37NW 34	Solwaybank	RIG AND FURROW, Substantial tracts of rig-and-furrow cultivation have been recorded by vertical aerial photography (106G/Scot/UK 145 frame 3374, dated 12 July 1946) to the S of Solwaybank steading (NY37NW 11.00) The main concentrations are centred at NY 305 766, 307 766, 306 762 and 308 762.	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.

WSP Ref	Ref	Name	Description	Potential impact summary
AHM26	NY27NE 38	Berclees	FARMHOUSE, FARMSTEAD	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM27	NY27NE 57	Bercleeshead	FIELD SYSTEM	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM28	NY27NE 9.01	Highstenries, Farmsteading, West Range	FARMSTEAD	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM29	NY27NE 9.02	Highstenries, Farmsteading, East Range	FARMSTEAD	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM30	NY27NE 73	Berklees Head	No data	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM31	NY27NE 32.0	Conhess	FARMHOUSE, FARMSTEAD	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.

WSP Ref	Ref	Name	Description	Potential impact summary
AHM32	NY27NE 33	Chapelhill	FARMSTEAD, A farmstead comprising one unroofed building, four roofed buildings, three of which are arranged around a courtyard and one of these has an attached roofed horse-gang, and four enclosures is depicted on the 1st edition of the OS 6-inch map (Dumfriesshire 1862, sheet lii). Four roofed buildings and three enclosures are shown on the current edition of the OS 1:10000 map (1983).	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM33	NY28SE 17.00	Setthorns	FARMHOUSE, FARMSTEAD	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM34	NY28SE 28.00	Ley Hill	ENCLOSURE, RIG AND FURROW, RING ENCLOSURE, Extensive cultivation remains in the form of plots of rig-and-furrow between turf banks, are visible over much of the summit and western flank of Ley Hill, which is an E to W-orientated ridge to the S of Kirtlehead Moss. There are also several ring- and subrectangular enclosures on the W flank (NY c. 2714 8130), and towards the E end (NY c. 2824 8166), there are the remains of a possible farmstead (NY28SE 50).	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM35	NY28SE 71	Megsfield	FARMSTEAD,	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM36	NY28SE 17.01	Setthorns Cottage	COTTAGE	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.

WSP Ref	Ref	Name	Description	Potential impact summary
AHM37	NY28SE 73	Fallford Bridge	ROAD BRIDGE, This bridge carries the B 7068 public road over the Kirtle Water.	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM38	NY28SE 78	Fallford Lodge	KENNELS, LODGE	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM39	NY28SE 79	Dunraggit	HOUSE	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.

Other

WSP Ref	Ref	Name	Description	Potential impact summary
AHM40	NY28SE 19	Winterhopehead	STANDING STONE, A standing stone, some 5ft 9ins (1.75m) high has recently been erected on a knoll some 300 yds SW of Winterhopehead farm. It was brought from the spot where it originally stood, in a moss about 1 1/4 miles to the NE of its present position. Another two large stones, which may be seen on the moor a short distance to the NE, have also been recently set up on end. There is no evidence to warrant the supposition that they have formed part of a stone circle.	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.

Ewe Hill Substation to Newfield Substation

Designated Sites

WSP Ref	Ref	Site Name	Date	Description	Potential impact summary
SAM1	2330	Craighousesteads	Prehistoric	Fort	Direct impacts: No Indirect impacts: No Scale: Mitigation by route design reduces impacts to negligible level.
LB1	9914	Corriestand Farmhouse And Steading	Early modern	Mid 19th century3-bay farmhouse with parallel steading range to W. Category: B	Direct impacts: No Indirect impacts: No Scale: Mitigation by route design reduces impacts to negligible level.

Prehistoric

WSP Ref	Ref	Site Name	Description	Potential impact summary
AHM41	NY28SW 65	Alton Hill	A small area of poorly-defined cord rig is visible at the SE end of Alton Hill.	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM42	NY28SE 64	Mid Hill	An extensive area of well-preserved cord rig has been recorded on the S flank of Mid Hill.	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM43	NY28SW 41	Alton Hill	A cairn is situated on the highest part of Alton Hill, a low ridge aligned from NW to SE. It measures about 14m in diameter by up to 1.2m in height, but the top has been disturbed.	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.

WSP Ref	Ref	Site Name	Description	Potential impact summary
AHM44	NY28NW 49	Goat Rig	Vertical air photography reveals extensive traces of cord rig on Goat Rig, a low ridge on the E flank of Pearsby Hill. The rig forms a series of plots blocking together at right-angles. Unfortunately, most of Goat Rig has been heavily improved, but fragments may survive to the N of the stone dyke that crosses the N end of the ridge.	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM45	NY28NW 58	Pearsby Hill	Vertical air photography has revealed cord rig on the W flank of Pearsby Hill some 200m W of the palisaded enclosure and unenclosed settlement.	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM46	NY28NW 36	Pearsby Hill	The remains of a palisaded enclosure and two overlying later enclosures are situated at a height of about 289m OD on the summit of Pearsby Hill. The line of the palisade trench is preserved only on the S and W, where it is marked by a hollow measuring about 1m in width and 0.1m in depth but it appears to describe about half of the circuit of a circular enclosure measuring about 45m in diameter. The projected line of the palisade trench on the E is interrupted by the remains of a circular round-house, the interior of which has been levelled into the slight natural slope. A second, smaller circular structure is situated immediately to the SW, and several more tenuous scarps and hollows close-by may indicate the presence of further houses. A subrectangular enclosure, measuring 10.7m by 5.6m within low grass-grown banks, lies within the S half of the palisaded enclosure; a suboval enclosure is attached to its N end.	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM49	NY28NW 8	Craighousesteads	Situated on top of Craighousesteads Hill is an oval fort measuring internally 52m NNW-SSE by 43m transversely between a single earth-and-stone rampart and ditch, best preserved in the E. The N and W sides have been considerably reduced, and two breaks are visible in the NW and SW, the former probably being an original entrance. The interior is featureless.	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.

WSP Ref	Ref	Site Name	Description	Potential impact summary
AHM50	NY28NW 9	Craighousesteads	QUARRY, NY 238 875. Two adjacent unenclosed scooped settlements each measuring 9m N-S by 8m transversely are situated on the NW-facing slope of Craighousesteads Hill, 0.5km N of the fort NY28NW 8. The more northerly shows signs of an internal ditch around the central platform.	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM47	NY28NW 48	Craighousesteads Hill	CORD RIG, ROUNDHOUSE, An unenclosed timber round-house is situated on the fringes of an extensive system of cord rig cultivation on the N flank of Craighousesteads Hill. Rather than occupying a terrace, the house has been set into a gentle slope. It comprises a shallow scoop some 10m in overall diameter, within which a central platform (about 6m in diameter) has been levelled into the slope. The most prominent feature is the front of the central platform which is about 0.6m high, but the combination of this central feature and the overall scoop has created a ledge at the top of the monor backscarp on the SSW. A second house has been revealed by vertical air photography on the terrace immediately to the NE, but this has been obliterated by improvement of the pasture. Extending across the slope to the W of the round-house there are the extensive remains of cord rig forming a series of rectangular blocks set at right-angles to each other. Some of the plots are apparently bounded by low scarps and the system is almost certainly overlain by one of the linear earthworks (NY28NW 50) that drop down the hill. Visited by RCAHMS (SPH, ARG), 28 September 1995.	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM51	NY28NW 59	Capelfoot	RING ENCLOSURE, Vertical air photography (54/RAF/1540 F22 0120) has revealed two small ring-enclosures on the left bank of an un-named stream 290m S of Capelfoot steading.	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.

AHM54	NY18NE 30	Cumstone, Hogg Hill	RING ENCLOSURE, This ring-enclosure is crossed by the forestry fence on the E flank of Hogg Hill; it measures 9m in diameter within a bank 2m thick.	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM55	NY18NE 37	Stobohill	SCOOPED SETTLEMENT, This scooped settlement is situated at the leading edge of a SE-facing terrace some 480m SE of Stobohill steading (NY18NE 57). Roughly oval on plan, but with a markedly angular corner on the W, it measures 18.5m from NE to SW by 16m transversely within a grass-grown stony bank up to 3m thick and 0.3m high. There is an entrance (2m wide) on the N, and a narrow break in the bank on the S may indicate the position of a drain. The interior has been scooped into the slope to a depth of 0.8m and is on two levels, the NE part being occupied by a roughly-oval platform which measures about 13.5m from NW to SE by 7.5m transversely.	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.

Medieval/Post Medieval

WSP Ref	Ref	Site Name	Description	**Potential impact summary**
AHM56	NY28NW 7	Capelfoot	CULTIVATION REMAINS, FIELD SYSTEM, RIG AND FURROW, Mention is made in 1959 of hitherto unrecorded field systems on the S flank of the Upper Milk near Capelfoot (NY 238 860), which are visible from the Water of Milk Road.	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM57	NY28NW 65	Craighousesteads	FARMHOUSE, FARMSTEAD	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM58	NY28NW 66	Capelfoot	FARMHOUSE, FARMSTEAD	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.

WSP Ref	Ref	Site Name	Description	Potential impact summary
AHM56	NY28NW 7	Capelfoot	CULTIVATION REMAINS, FIELD SYSTEM, RIG AND FURROW, Mention is made in 1959 of hitherto unrecorded field systems on the S flank of the Upper Milk near Capelfoot (NY 238 860), which are visible from the Water of Milk Road.	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM59	NY28NW 11	Corriestand	FARMHOUSE, FARMSTEAD	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM60	NY18NE 58	Mirrenhill Cottages	COTTAGE	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM61	NY18NE 60	Little Whitriggs	FARMHOUSE, FARMSTEAD	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM62	NY28NW 13	Whitcastles	RING ENCLOSURE, Four old turf sheepfolds.	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.
AHM63	NY28NW 14	Whitcastles	RING ENCLOSURE, Three probable turf sheepfolds, 5.0m to 7.0m in diameter.	Direct impacts: No Indirect impacts: No Scale: No risk of impact to resource fabric or setting.

Appendix 11.1 Farm Information Sheet

CONFIDENTIAL

FARM INFORMATION
Gretna/Ewe Hill/Newfield
132kV OHTL

Name:

Address:

Tel No:

Land Ref No:

Property Name:

Interviewee(s): _____

Date of Interview: _____

Interviewer: _____

Notes for Completion

1. Please complete with land-interest and return to SAC Consulting.
2. If further explanation is thought necessary - please attach notes.

SAC Consulting
Pentland Building
Bush Estate
PENICUIK
Midlothian
EH26 0PH

Tel: 0131 535 3441
Fax: 0131 535 3031

Date Sent: _____

Date Received: _____

I LAND Acres/Hectares* (please delete as appropriate)

Farm Name	Arable	Permanent Pasture	Rough	Hill	Buildings Woods etc	Total
Owned:						
Rented:						

II CROPPING Acres/Hectares

Please include details of historic and future cropping areas in a normal year on the farm. Approximate areas are all that is required but they should reconcile with the total farm area. Please note that if individual crops cannot be obtained, area of combinable crops, potatoes, other arable crops, hay/silage, grazing, other forage will suffice.

CROP	Average Areas	Comments/Further info
Cereals		
Oilseeds		
Potatoes		
Other (please specify):		
Hay (fodder or for sale)		
Silage		
Grazing		
Other Forage (please specify):		
1.1.1 TOTAL		

1.2 III STOCKING

Please list enterprise with approximate numbers/annual throughput (e.g. winter finishing cattle - 120; autumn calving suckler cows - 60).

ENTERPRISE	Numbers	Comments/Further info

2 LIVESTOCK INFORMATION

Please include any other relevant information (e.g. pedigree herds/flocks, cattle housed/out wintered, location of housing, lambs finished/store etc).

IV SUBSIDY CLAIMS AND ENVIRONMENTAL AGREEMENTS

2.1.1 Single Farm Payments

Please include details of number and type of entitlements and whether LFASS is claimed.

Is there an environmental agreement under:

	Yes	No	Description of Agreement Conditions
LMC			
Rural Development Contract			
ESA			
CPS			
RSS			
SSSI, AONB, SAC, SPA, etc			
Organic Aid			
NVZ			

V FORESTRY AND FARM WOODLANDS

Please provide details of any forestry or farm woodlands including tree species and age of plantation. Please give the name and location of the plantation. Please also include details of any Forest Management or Felling Plans.

Table 1 VI SPORTING INTERESTS

Please include details of any sporting interests on the farm e.g. fishing, deer stalking, driven shooting, rough shooting etc, their location on the land holding and the scope and scale of the sporting interests.

Figure 1

Grouse Shooting
Driven Shooting
Rough Shooting
Deer Stalking
Fishing

Figure 2 *VII LABOUR*

Please list number of employeesall labour (family and employed) including Casual Labour and Contractors.

	Number	Roles and responsibilities
Full time		
Part-time/casual		
Contractors		

VIII MACHINERY

Are there any items of machinery that you use that may be particularly constrained by the OHTL, eg. Combine, Sprayer, Silage Harvester etc:

IX OTHER BUSINESS ENTERPRISES

Please include details of any other business enterprises that operates on or from the farm (e.g. B & B, livery, farm shop, contracting etc).

Table 2 X DRAINAGE

Please indicate the type and location of field and other drains. Please also mark up the accompanying map.

Type of Drainage **Location/Depth**

Table 3

Table 4 XI WATER SUPPLY

Please indicate type of supply to domestic houses, farm buildings and fields. Please also indicate if there are any boreholes or springs, their location, where they are feeding to and what they are used for. Please mark up locations of pipes on map and indicate type of pipe and depth.

Type of Supply (Mains or Private) **Location of water pipes, boreholes, springs and wells**

XII MAPPING

Please mark up the following features on the accompanying map :

- Farm boundary
- Type of boundary features (fence, hedge, ditch etc) in fields affected by the proposed route
- Farm tracks
- Water pipes, boreholes, springs, etc
- Drains and ditches (including field drains)

Comments on Mapping

XIII GENERAL COMMENTS

Please include any other relevant information pertinent to the scheme or comments made during the interview.

2.1.2 XIV ACTIONS

Please list any actions to be followed up by Scottish Power, WSP, SAC etc.

Appendix 11.2 Land Capability Descriptions

Land suited to arable cropping

Class 1, Land capable of producing a very wide range of crops
Cropping is highly flexible and includes the more exacting crops such as winter harvested vegetables (cauliflower, brussels sprouts, leeks). The level of yield is consistently high. Soils are usually well-drained deep loams, sandy loams, silty loams or their related humic variants with good reserves of moisture. Sites are level or gently sloping and the climate is favourable. There are no or only very minor physical limitations affecting agricultural use.

Class 2, Land capable of producing a wide range of crops
Cropping is very flexible and a wide range of crops can be grown but the land may be unsuited to winter harvested crops. The level of yield is high but less consistently obtained than on Class 1 land due to the effects of minor limitations affecting cultivation, crop growth or harvesting. The limitations include, either singly or in combination, slight workability or wetness problems, slightly unfavourable soil structure or texture, moderate slopes or slightly unfavourable climate. The limitations are always minor in their effects and land in the class is highly productive.

Class 3, Land capable of producing a moderate range of crops
Land in this class is capable of producing good yields of a narrow range of crops, principally cereals and grass, and/or moderate yields of a wider range including potatoes, some vegetable crops (e.g. field beans and summer harvested brassicae) and oilseed rape. The degree of variability between years will be greater than is the case for Classes 1 and 2, mainly due to interactions between climate, soil and management factors affecting the timing and type of cultivations, sowing and harvesting. The moderate limitations require careful management and include wetness, restrictions to rooting depth, unfavourable structure or texture, strongly sloping ground, slight erosion or a variable climate. The range of soil types within the class is greater than for previous classes.

Class 3, division 3_1
Land in this division is capable of producing consistently high yields of a narrow range of crops (principally cereals and grass) and/or moderate yields of a wider range (including potatoes, field beans and other vegetables and root crops). Short grass leys are common.

Class 3, division 3_2
This land is capable of average production but high yields of barley, oats and grass are often obtained. Other crops are limited to potatoes and forage crops. Grass leys are common and reflect the increasing growth limitations for arable crops and degree of risk involved in their production.

Class 4, Land capable of producing a narrow range of crops
The land is suitable for enterprises based primarily on grassland with short arable breaks (e.g. barley, oats, forage crops). Yields of arable crops are variable due to soil, wetness or climatic factors. Yields of grass are often high but difficulties of production or utilisation may be encountered. The moderately severe levels of limitation restrict the choice of crops and demand careful management. The limitations may include moderately severe wetness, occasional damaging floods, shallow or very stony soils, moderately steep gradients, moderate erosion risk, moderately severe climate or interactions of these which increase the level of farming risk.

Class 4, division 4_1
Land in this division is suited to rotations, which, although primarily based on ley grassland, include forage crops and cereals for stock feed. Yields of grass are high but difficulties of utilisation and conservation may be encountered. Other crop yields are very variable and usually below the national average.

Class 4, division 4_2
The land is primarily grassland with some limited potential for other crops. Grass yields can be high but difficulties of conservation or utilisation may be severe, especially in areas of poor climate or on very wet soils. Some forage cropping is possible and, when the extra risks involved can be accepted, an occasional cereal crop.

Land suited only to improved grassland and rough grazing

Class 5, Land capable of use as improved grassland
The agricultural use of land in Class 5 is restricted to grass production but such land frequently plays an important role in the economy of British hill lands. Mechanised surface treatments to improve the grassland, ranging from ploughing through rotavation to surface seeding and improvement by non-disruptive techniques are all possible. Although an occasional pioneer forage crop may be grown, one or more severe limitations render the land unsuited for arable cropping. These include adverse climate, wetness, frequent damaging floods, steep slopes, soil defects or erosion risks. Grass yields within the class can be variable and difficulties in production, and particularly utilisation, are common.

Class 5, division 5_1
Establishment of a grass sward and its maintenance present few problems and potential yields are high with ample growth throughout the season. Patterns of soil, slope or wetness may be slightly restricting but the land has few poaching problems. High stocking rates are possible.

Class 5, division 5_2
Sward establishment presents no difficulties but moderate or low trafficability, patterned land and/or strong slopes cause maintenance problems. Growth rates are high and despite some problems of poaching satisfactory stocking rates are achievable.

Class 5, division 5_3
Land in this division has properties which lead to serious trafficability and poaching difficulties and although sward establishment may be easy, deterioration in quality is often rapid. Patterns of soil, slope or wetness may seriously interfere with establishment and/or maintenance. The land cannot support high stock densities without damage and this may be serious after heavy rain even in summer.

Class 6, Land capable of use only as rough grazings
The land has very severe site, soil or wetness limitations, which generally prevent the use of tractor-operated machinery for improvement. Reclamation of small areas to encourage stock to range is often possible. Climate is often a very significant limiting factor. A range of widely different qualities of grazing is included from very steep land with significant grazing value in the lowland situation to moorland with a low but sustained production in the uplands. Grazing is usually insignificant in the full arctic zones of the mountain lands, but below this level grazings which can be utilised for five months or longer in any year are included in the class. Land affected by severe industrial pollution or dereliction may be included if the effects of the pollution are non-toxic.

Class 6, division 61
Land in the division has high proportions of palatable herbage in the sward, principally the better grasses, e.g. meadow grass-bent grassland, bent-fescue grasslands.

Class 6, division 62
Moderate quality herbage such as white and flying bent grasslands, rush pastures and herb-rich moorlands or mosaics of high and low grazing values characterise land in the division.

Class 6, division 63
The vegetation is dominated by plant communities with low grazing values, particularly heather moor, bog heather moor and blanket bog.

Class 7, Land of very limited agricultural value
This land has extremely severe limitations that cannot be rectified. The limitations may result from one or more of the following: extremely severe wetness, extremely stony, rocky land, unvegetated soils, scree or beach gravels, toxic waste tips and dereliction, very steep gradients, severe erosion including intensively hagged peat lands and extremely severe climates (exposed situations, protracted snow-cover and short growing season). Agricultural use is restricted to very poor rough grazing.

Appendix 11.3 Farm Information

Farm/Estate Type, Sporting Activity and Sensitivity for Land Interests Affected by the Ewe Hill Windfarm Connection

Land Interest	Farm & Estate Type	Section	Agricultural or Sporting Activity	Sensitivity (with respect to agricultural activities)	Sensitivity (with respect to sporting activities)
Aldermanseat Farm	Agricultural use	Gretna Substation to Ewe Hill Substation	Owned farm consisting of arable and permanent pasture land. Land used for sheep grazing and silage production. No environmental agreements. Field drains present. Mains water supply.	Medium	n/a
Staffler Farm	Agricultural and sporting use	Gretna Substation to Ewe Hill Substation	Owned farm consisting of arable and permanent pasture land. Land used for oil seed/cereals and silage production and for grazing of sheep and winter finishing cattle. No environmental agreements. Field drains present. Rough shooting undertaken. Mains water supply. Other business interests include contracting.	Medium	Low
Greenwrae Farm	Agricultural use	Gretna Substation to Ewe Hill Substation	Owned farm consisting of arable land, permanent pasture land and woodland. Land used grazing and silage production. Stock includes winter sheep, dairy cows, and cattle (including 10 Limousine cattle). No environmental agreements. Field drains present. Mains and private water supply.	High	n/a
Cadgillfoot Farm	Agricultural use	Gretna Substation to Ewe Hill Substation	Owned farm consisting of arable and permanent pasture land. Land used for grazing of winter sheep/dairy cows and silage and cereals production. No environmental agreements. Field drains present. Mains water supply.	High	n/a
Tympanheck Farm	Agricultural use	Gretna Substation to Ewe Hill Substation	Owned farm consisting of arable and permanent pasture land. Land used for ewe hogs/yearlings cow grazing and silage production. No environmental agreements. Field drains present. Mains water supply.	Medium	n/a
Cadgillhead Farm (Solwaybank Estates)	Agricultural use	Gretna Substation to Ewe Hill Substation	Rented farm consisting of arable and permanent pasture land. Land used for grazing of winter sheep/summer sheep/suckler cows and silage and hay production. No environmental agreements. Drainage unknown. Mains water supply.	Medium	n/a
Berclees Farm	Agricultural use	Gretna Substation to Ewe Hill Substation	Owned farm consisting of arable and permanent pasture land. Land used for sheep/suckler cows grazing and silage production. No environmental agreements. No drainage recorded. Mains water supply.	Medium	n/a
Highstenries Farm	Agricultural use	Gretna Substation to Ewe Hill Substation	Owned farm consisting of arable and permanent pasture land. Land used for grazing of suckler cows/ewes/ewe hogs/bulls/winter finishing cattle and silage and cereals production. No environmental agreements. Field drains present. Mains water supply.	Medium	n/a
Allfornought Farm (Solwaybank Estates)	Agricultural use	Gretna Substation to Ewe Hill Substation	Rented farm consisting of arable and rough land. Land used for ewes/suckler cows grazing and silage production. No environmental agreements. Drainage unknown. Mains water supply.	Medium	n/a

Land Interest	Farm & Estate Type	Section	Agricultural or Sporting Activity	Sensitivity (with respect to agricultural activities)	Sensitivity (with respect to sporting activities)
Chapelhill Farm	Agricultural and sporting use	Gretna Substation to Ewe Hill Substation	Owned farm consisting of arable and permanent pasture land. Land used for grazing of suckler cows/winter sheep and silage and cereals production. No environmental agreements. Field drains present. Rough shooting undertaken. Mains water supply (private for animals).	Medium	Low
Conhess Farm	Agricultural and sporting use	Gretna Substation to Ewe Hill Substation	Owned farm consisting of arable and permanent pasture land. Land used for grazing of suckler cows and silage and cereals production. In the Countryside Premium Scheme (CPS). Rough shooting undertaken. Field drains present. Mains water supply (private out of use).	Medium	Low
Alderwell Forest and Conhess Forest	Forestry/non-agricultural	Gretna Substation to Ewe Hill Substation	None	n/a	n/a
Kirtleton House	Non-agricultural	Gretna Substation to Ewe Hill Substation	None	n/a	n/a
Setthoms Farm	Agricultural and sporting use	Gretna Substation to Ewe Hill Substation	Owned farm consisting of arable and permanent pasture land. Land used for grazing of sheep/suckler cows and silage and hay production. No environmental agreements. Rough shooting undertaken. Field drains present. Mains water supply.	Medium	Low
Crowdieknowe Farm	Agricultural use	Gretna Substation to Ewe Hill Substation	Owned farm consisting of arable and permanent pasture land. Land used for finishing sheep/suckler cows grazing and silage production. In an Environmentally Sensitive Area (ESA). Field drains present. Mains water supply.	Medium	n/a
Winterhope Farm	Agricultural and sporting use	Gretna Substation to Ewe Hill Substation	Owned farm consisting of arable and permanent pasture land. Land used for grazing of suckler cows and silage and cereals production. Winterhope Reservoir lies within the farm boundary. Driven shooting undertaken. Field drains present. Mains water supply.	Medium	High
Crawthat Farm	Agricultural and sporting use	Gretna Substation to Ewe Hill Substation & Ewe Hill Substation to Newfield Substation	Owned farm consisting of arable and permanent pasture land. Land used for grazing of sheep/suckler cows and silage production. Ancient monuments within the farm boundary. Rough shooting undertaken. Mains water supply. Drainage ditches present.	Medium	Low
Pearsby Hall Farm	Agricultural and sporting use	Ewe Hill Substation to Newfield Substation	Owned farm consisting of arable and permanent pasture land. Land used for grazing of sheep/cattle and silage production. Two roman forts within farm boundary. Rough shooting undertaken. Mains water supply. Field drains present.	Medium	Low
Craighousesteads Farm	Agricultural use	Ewe Hill Substation to Newfield Substation	Owned farm consisting of arable and permanent pasture land. Land used for grazing of suckler cows/ewes/ewe hogs/bulls and silage production. Roman forts within farm boundary. Private water supply. Field drains present.	Medium	n/a

Land Interest	Farm & Estate Type	Section	Agricultural or Sporting Activity	Sensitivity (with respect to agricultural activities)	Sensitivity (with respect to sporting activities)
Whitcastles Farm (Castle Milk & Corrie Estates)	Agricultural and sporting use	Ewe Hill Substation to Newfield Substation	Owned and rented farm consisting of arable, rough, woodland, hills and permanent pasture land. Land used for cereals, hay, silage and turnip production. Land also used for grazing of ewes, lambs and cattle. Farm in Rural Stewardship Scheme. Rough shooing and deer stalking undertaken. Mains water supply. Field drains present.	Medium	Moderate
Castlemilk and Corrie Estates	Non-agricultural use	Ewe Hill Substation to Newfield Substation	None	n/a	n/a
Whitehill Farm	Agricultural use	Ewe Hill Substation to Newfield Substation	Rented farm consisting of arable and permanent pasture land. Land used for grazing of heifers/ewes/cattle and hay production. Farm in Land Management Contract. Mains water supply. Field drains and open ditches present.	Medium	n/a
Moss Plantation	Non-agricultural use	Ewe Hill Substation to Newfield Substation	None	n/a	n/a
Little Whitriggs Farm (Castle Milk & Corrie Estates)	Agricultural use	Ewe Hill Substation to Newfield Substation	Rented farm consisting of permanent pasture land and hills. Land used for grazing of sheep/cattle and silage production. No environmental agreements. Field drains present. Private (spring) water supply.	Medium	n/a
Cumstone Farm	Agricultural and sporting use	Ewe Hill Substation to Newfield Substation	Rented farm consisting of arable and permanent pasture land. Land used for grazing of ewes/cattle and silage and cereals production. Farm in Rural Stewardship Scheme. Rough shooting undertaken. Field drains present. Mains and private (spring) water supply.	Medium	Low

Appendix 11.4 Impact Tables

Gretna Substation to Ewe Hill Substation – Effect on Agricultural Activities							
Land Interest	Phase of Impact	Description of potential impact	Sensitivity	Magnitude	Significance	Mitigation measures to be employed (refer to Appendix X for full descriptions)	Significance of residual effects
Aldermanseat Farm	C	No overhead line proposed for this area. Underground cable proposed to connect with Gretna Substation. One terminal pole on agricultural land. (Land Class 4_2). Stock exclusion/temporary fencing required. Disruption to field drainage where field drains present. Access to areas around terminal pole restricted during construction.	Medium	Low	Minor	LU1, LU3, LU4, LU5, LU6, LU7, LU9, LU10, LU11, LU12, LU13, LU14, LU15, LU16, LU17, LU18, LU19, LU20, LU21	None
	O	Agricultural activity compromised on footprint of terminal pole (approx. 185m2)		Medium	Moderate		Minor
Staffler Farm	C	665m of overhead transmission line traverses agricultural land (Land Class 4_1, 4_2, 5_2). Estimated 7 poles (intermediate) in cropping and grazing areas. Crop production/grazing and access to field partially restricted during construction process. Stock exclusion/temporary fencing required. Disruption to field drainage where field drains present. Access to areas around poles restricted during construction.	Medium	Medium	Moderate	LU1, LU2, LU3, LU4, LU5, LU6, LU7, LU8, LU9, LU10, LU11, LU12, LU13, LU14, LU15, LU16, LU17, LU18, LU19, LU20, LU21	Minor
	O	Agricultural activity compromised on footprint of poles and associated stays (approx. 70m2).		Medium	Moderate		Minor
Greenwrae Farm	C	1035m of overhead transmission line traverses agricultural land (Land Class 3_2, 4_1, 4_2). Estimated 11 poles (8 intermediate; 3section/angle) in cropping and grazing areas. Crop production/grazing and access to field partially restricted during construction process. Stock exclusion/temporary fencing required. Disruption to field drainage where field drains present. Access to areas around poles restricted during construction. Private water supply may be disrupted.	High	Medium	Moderate/major	LU1, LU2, LU3, LU4, LU5, LU6, LU7, LU8, LU9, LU10, LU11, LU12, LU13, LU14, LU15, LU16, LU17, LU18, LU19, LU20, LU21	Minor
	O	Agricultural activity compromised on footprint of poles and associated stays (approx. 260m2).		Medium	Moderate/major		Minor/moderate
Cadgillfoot Farm	C	827m of overhead transmission line traverses agricultural land (Land Class 4_1, 5_2, 6_2). Estimated 9 poles (7 intermediates; 2 section/angle) in silage and grazing areas. Silage production/grazing and access to field partially restricted during construction process. Stock exclusion/temporary fencing required. Disruption to field drainage where field drains present. Access to areas around poles restricted during construction.	High	Medium	Moderate/major	LU1, LU2, LU3, LU4, LU5, LU6, LU7, LU8, LU9, LU10, LU11, LU12, LU13, LU14, LU15, LU16, LU17, LU18, LU19, LU20	Minor
	O	Agricultural activity compromised on footprint of poles and associated stays (approx. 190m2).		Medium	Moderate/major		Minor/moderate
Tympanheck Farm	C	1054 m of overhead transmission line traverses agricultural land (Land Class 3_2, 4_1). Estimated 12 poles (10 intermediates; 1	Medium	Medium	Moderate	LU1, LU2, LU3, LU4, LU5, LU6,	Minor

Gretna Substation to Ewe Hill Substation – Effect on Agricultural Activities							
Land Interest	Phase of Impact	Description of potential impact	Sensitivity	Magnitude	Significance	Mitigation measures to be employed (refer to Appendix X for full descriptions)	Significance of residual effects
		section/angle;1 FC(wood)) in silage and grazing areas. Silage production/grazing and access to field partially restricted during construction process. Stock exclusion/temporary fencing required. Disruption to field drainage where field drains present. Access to areas around poles restricted during construction.				LU7, LU8, LU9, LU10, LU11, LU12, LU13, LU14, LU15, LU16, LU17, LU18, LU19, LU20	
	O	Agricultural activity compromised on footprint of poles and associated stays (approx. 260m2).		Medium	Moderate		Minor
Cadgillhead Farm (Solwaybank Estates)	C	2058m of overhead transmission line traverses agricultural land (Land Class 4_1, 5_2, 6_2). Estimated 25 poles (17 intermediates; 8 section/angle) in grazing areas. Grazing and access to field partially restricted during construction process. Stock exclusion/temporary fencing required. Disruption to field drainage where field drains present. Access to areas around poles restricted during construction.	Medium	Medium	Moderate	LU1, LU2, LU3, LU4, LU5, LU6, LU7, LU8, LU9, LU10, LU11, LU12, LU13, LU14, LU15, LU16, LU17, LU18, LU19, LU20	Minor
	O	Agricultural activity compromised on footprint of poles and associated stays (approx. 650m2).		Medium	Moderate		Minor
Berclees Farm	C	923m of overhead transmission line traverses agricultural land (Land Class 4_2, 5_2, 5_3). . Estimated 11 poles (10 intermediate; 1 section/angle) in silage and grazing areas. Silage production/grazing and access to field partially restricted during construction process. Stock exclusion/temporary fencing required. Disruption to field drainage where field drains present Access to areas around poles restricted during construction.	Medium	Medium	Moderate	LU1, LU2, LU3, LU5, LU6, LU7, LU8, LU9, LU10, LU11, LU12, LU13, LU14, LU15, LU16, LU17, LU19, LU20	Minor
	O	Agricultural activity compromised on footprint of poles and associated stays (approx. 160m2).		Medium	Moderate		Minor
Highstenries Farm	C	781m of overhead transmission line traverses agricultural land (Land Class 4_2, 5_3). . Estimated 10 poles (8 intermediate; 1 section/angle; 1 section) in silage and grazing areas. Silage production/grazing and access to field partially restricted during construction process. Disruption to field drainage where field drains present . Stock exclusion/temporary fencing required. Access to areas around poles restricted during construction.	Medium	Medium	Moderate	LU1, LU2, LU3, LU4, LU5, LU6, LU7, LU8, LU9, LU10, LU11, LU12, LU13, LU14, LU15, LU16, LU17, LU18, LU19, LU20	Minor
	O	Agricultural activity compromised on footprint of poles and associated stays (approx. 230m2).		Medium	Moderate		Minor
Allfornought Farm (Solwaybank	C	822m of overhead transmission line traverses agricultural land (Land Class 5_3, 6_3). . Estimated 9 poles (8 intermediate; 1 section/angle) in grazing areas. Grazing and access to field partially restricted	Medium	Medium	Moderate	LU1, LU2, LU3, LU4, LU5, LU6, LU7, LU8, LU9,	Minor

Gretna Substation to Ewe Hill Substation – Effect on Agricultural Activities							
Land Interest	Phase of Impact	Description of potential impact	Sensitivity	Magnitude	Significance	Mitigation measures to be employed (refer to Appendix X for full descriptions)	Significance of residual effects
Estates)		during construction process. Disruption to field drainage where field drains present Stock exclusion/temporary fencing required. Access to areas around poles restricted during construction.				LU10, LU11, LU12, LU13, LU14, LU15, LU16, LU17, LU18, LU19, LU20	
	O	Agricultural activity compromised on footprint of poles and associated stays (approx. 140m2).		Medium	Moderate		Minor
Chapelhill Farm	C	620m of overhead transmission line traverses agricultural land (Land Class 4_1, 5_3, 6_3). Estimated 10 poles (8 intermediate; 1 section/angle;1 FC(wood)) in silage and grazing areas. Silage production/grazing and access to field partially restricted during construction process. Stock exclusion/temporary fencing required. Disruption to field drainage where field drains present Access to areas around poles restricted during construction. Private water supply may be disrupted.	Medium	Medium	Moderate	LU1, LU2, LU3, LU4, LU5, LU6, LU7, LU8, LU9, LU10, LU11, LU12, LU13, LU14, LU15, LU16, LU17, LU18, LU19, LU20	Minor
	O	Agricultural activity compromised on footprint of poles and associated stays (approx. 240m2).		Medium	Moderate		Minor
Conhess Farm	C	179m of overhead transmission line traverses agricultural land (Land Class 4_1). . Estimated 2 poles (1 intermediate; 1 section) in silage, cropping and grazing areas. Silage & crop production/grazing and access to field partially restricted during construction process. Stock exclusion/temporary fencing required. Disruption to field drainage where field drains present . Access to areas around poles restricted during construction. Private water supply may be disrupted.	Medium	Low	Minor	LU1, LU2, LU3, LU4, LU5, LU6, LU7, LU8, LU9, LU10, LU11, LU12, LU13, LU14, LU15, LU16, LU17, LU18, LU19, LU20, LU21	None
	O	Agricultural activity compromised on footprint of poles and associated stays (approx. 100m2).		Medium	Moderate		Minor
Alderwell Forest and Conhess Forest	C	1391m of overhead transmission line traverses non-agricultural land. Estimated 16 poles (15 intermediate; 1 section)	n/a				
	O	Non-agricultural activity compromised on footprint of poles and associated stays .					
Kirtleton House	C	1318m of overhead transmission line traverses non-agricultural land. Estimated 15 poles (14 intermediate; 1 FC(wood))	n/a				
	O	Non-agricultural activity compromised on footprint of poles and associated stays.					
Setthoms Farm	C	513m of overhead transmission line traverses agricultural land (Land Class 5_2, 5_3). . Estimated 6 poles (6 intermediate poles) in grazing areas. Grazing and access to field partially restricted during construction process. Stock exclusion/temporary fencing required.	Medium	Medium	Moderate	LU1, LU2, LU3, LU4, LU5, LU6, LU7, LU8, LU9, LU10, LU11, LU12,	Minor

Gretna Substation to Ewe Hill Substation – Effect on Agricultural Activities							
Land Interest	Phase of Impact	Description of potential impact	Sensitivity	Magnitude	Significance	Mitigation measures to be employed (refer to Appendix X for full descriptions)	Significance of residual effects
		Disruption to field drainage where field drains present . Access to areas around poles restricted during construction.				LU13, LU14, LU15, LU16, LU17, LU18, LU19, LU20	
	O	Agricultural activity compromised on footprint of poles and associated stays (approx. 60m2).		Medium	Moderate		Minor
Crowdieknowe Farm	C	682m of overhead transmission line traverses agricultural land (Land Class 5_3). . Estimated 8 poles (7 intermediate; 1 section) in grazing areas. Grazing and access to field partially restricted during construction process. Stock exclusion/temporary fencing required. Disruption to field drainage where field drains present .Access to areas around poles restricted during construction.	Medium	Medium	Moderate	LU1, LU2, LU3, LU4, LU5, LU6, LU7, LU8, LU9, LU10, LU11, LU12, LU13, LU14, LU15, LU16, LU17, LU18, LU19, LU20	Minor
	O	Agricultural activity compromised on footprint of poles and associated stays (approx. 160m2).		Medium	Moderate		Minor
Winterhope Farm	C	1694m of overhead transmission line traverses agricultural land (Land Class 5_2, 5_3). Estimated 20 poles (15 intermediate; 2 section/angle; 2 section; 1 FC(wood)) in silage and grazing areas. Silage production/grazing and access to field partially restricted during construction process. Stock exclusion/temporary fencing required. Disruption to field drainage where field drains present .Access to areas around poles restricted during construction.	Medium	Medium	Moderate	LU1, LU2, LU3, LU4, LU5, LU6, LU7, LU8, LU9, LU10, LU11, LU12, LU13, LU14, LU15, LU16, LU17, LU18, LU19, LU20,	Minor
	O	Agricultural activity compromised on footprint of poles and associated stays (approx. 550m2).		Medium	Moderate		Minor
Crawthat Farm	C	889m of overhead transmission line traverses agricultural land (Land Class 5_2) . Proposed Ewe Hill Substation located on farm; footprint unknown. Estimated 11 poles (1 terminal; 9 intermediate; 1 section/angle) in silage and grazing areas. Silage production/grazing and access to field partially restricted during construction process. Stock exclusion/temporary fencing required. Disruption to field drainage where drainage ditches present .Access to areas around poles restricted during construction. Private water supply may be disrupted.	Medium	Medium	Moderate	LU1, LU2, LU3, LU5, LU6, LU7, LU8, LU9, LU10, LU11, LU12, LU13, LU14, LU15, LU16, LU17, LU19, LU20	Minor
	O	Agricultural activity compromised on footprint of poles and associated stays (approx. 335m2).		Medium	Moderate		Minor

Gretna Substation to Ewe Hill Substation – Effect on Sporting Activities							
Land Interest	Phase of Impact	Description of potential impact	Sensitivity	Magnitude	Significance	Mitigation measures to be employed	Significance of Residual Effects
Aldermanseat Farm	C	No sporting activity					
	O	No sporting activity					
Staffler Farm	C	Access to field partially restricted during construction process for rough shooting. Temporary fencing required.	Low	Low	None	LU6, LU8, LU9, LU16, LU22	None
	O	Sporting activity limited in vicinity of overhead transmission line.		Low			None
Greenwrae Farm	C	No sporting activity					
	O	No sporting activity					
Cadgillfoot Farm	C	No sporting activity					
	O	No sporting activity					
Tympanheck Farm	C	No sporting activity					
	O	No sporting activity					
Cadgillhead Farm (Solwaybank Estates)	C	No sporting activity					
	O	No sporting activity					
Berclees Farm	C	No sporting activity					
	O	No sporting activity					
Highstenries Farm	C	No sporting activity					
	O	No sporting activity					
Allfornought Farm (Solwaybank Estates)	C	No sporting activity					
	O	No sporting activity					
Chapelhill Farm	C	Access to field partially restricted during construction process for rough shooting. Temporary fencing required..	Low	Low	None	LU6, LU8, LU9, LU16, LU22	None
	O	Sporting activity limited in vicinity of overhead transmission line.		Low	None		None
Conhess Farm	C	Access to field partially restricted during construction process for rough shooting. Temporary fencing required.	Low	Low	None	LU6, LU8, LU9, LU16, LU22	None
	O	Sporting activity limited in vicinity of overhead transmission line.		Low	None		None
Alderwell Forest and Conhess Forest	C	No sporting activity					
	O	No sporting activity					

Gretna Substation to Ewe Hill Substation – Effect on Sporting Activities							
Land Interest	Phase of Impact	Description of potential impact	Sensitivity	Magnitude	Significance	Mitigation measures to be employed	Significance of Residual Effects
Kirtleton House	C	No sporting activity					
	O	No sporting activity					
Setthoms Farm	C	Access to field partially restricted during construction process for rough shooting. Temporary fencing required.	Low	Low	None	LU6, LU8, LU9, LU16, LU22	None
	O	Sporting activity limited in vicinity of overhead transmission line.		Low	None		None
Crowdieknowe Farm	C	No sporting activity					
	O	No sporting activity					
Winterhope Farm	C	Access to field partially restricted during construction process for driven shooting. Temporary fencing required.	High	Low	Minor/Moderate	LU6, LU8, LU9, LU16, LU22, LU23	Minor
	O	Sporting activity limited in vicinity of overhead transmission line.		Low	Minor/Moderate		Minor
Crawthat Farm	C	Access to field partially restricted during construction process for rough shooting. Temporary fencing required.	Low	Low	None	LU6, LU8, LU9, LU16, LU22	None
	O	Sporting activity limited in vicinity of overhead transmission line.		Low	None		None

Ewe Hill Substation to Newfiled Substation – Effect on Agricultural Activities							
Land Interest	Phase of Impact	Description of potential impact	Sensitivity	Magnitude	Significance	Mitigation measures to be employed	Significance Post Mitigation
Crawthat Farm	C	68m of overhead transmission line traverses agricultural land (Land Class 5_3). Estimated 1 pole (terminal) in silage and grazing areas. Silage production/grazing and access to field partially restricted during construction process. Stock exclusion/temporary fencing required. Access to areas around poles restricted during construction. Sub-station proposed on this land-details unknown. Possible disruption to private water supply.	Medium	Medium	Moderate	LU1, LU3, LU5, LU6, LU7, LU9, LU10, LU11, LU12, LU13, LU14, LU15, LU16, LU17, LU18, LU19, LU20	Minor
	O	Agricultural activity compromised on footprint of poles and associated stays (approx. 185m2).		Medium	Moderate		Minor
Pearsby Hall Farm	C	1966m of overhead transmission line traverses agricultural land (Land Class 5_3 & 5_2). Estimated 26 poles (18 intermediate; 6 section/angle; 1 section; 1 FC(wood)) in silage and grazing areas. Silage production/grazing and access to field partially restricted during construction process. Disruption to field drainage where field drains present . Stock exclusion/temporary fencing required. Access to areas around poles restricted during construction.	Medium	Medium	Moderate	LU1, LU3, LU4, LU5, LU6, LU7, LU9, LU10, LU11, LU12, LU13, LU14, LU15, LU16, LU17, LU18, LU19, LU20	Minor
	O	Agricultural activity compromised on footprint of poles and associated stays (approx. 730m2).		Medium	Moderate		Minor
Craighousesteads Farm	C	775m of overhead transmission line traverses agricultural land (Land Class 5_2). Estimated 9 poles (6 intermediate; 2 section/angle 1 section) in grazing areas. Grazing and access to field partially restricted during construction process. Disruption to field drainage where field drains present . Stock exclusion/temporary fencing required. Access to areas around poles restricted during construction. Possible disruption to private water supply.	Medium	Medium	Moderate	LU1, LU3, LU4, LU5, LU6, LU7, LU9, LU10, LU11, LU12, LU13, LU14, LU15, LU16, LU17, LU18, LU19, LU20	Minor
	O	Agricultural activity compromised on footprint of poles and associated stays (approx. 270m2).		Medium	Moderate		Minor
Whitcastles Farm (Castle Milk & Corrie Estates)	C	1410m of overhead transmission line traverses agricultural land (Land Class 5_2). Estimated 14 poles (9 intermediate; 3 section/angle; 1 section; 1 FC(wood)) in silage , cropping and grazing areas. Silage production/grazing/cropping and access to field partially restricted during construction process. Disruption to field drainage where field drains present . Stock exclusion/temporary fencing required. Access	Medium	Medium	Moderate	LU1, LU3, LU4, LU5, LU6, LU7, LU9, LU10, LU11, LU12, LU13, LU14, LU15, LU16, LU17, LU18, LU19, LU20,	Minor

Ewe Hill Substation to Newfiled Substation – Effect on Agricultural Activities							
Land Interest	Phase of Impact	Description of potential impact	Sensitivity	Magnitude	Significance	Mitigation measures to be employed	Significance Post Mitigation
		to areas around poles restricted during construction.				LU21	
	O	Agricultural activity compromised on footprint of poles and associated stays (approx. 460m2).		Medium	Moderate		Minor
Castlemilk and Corrie Estates	C	517m of overhead transmission line traverses agricultural land (Land Class 5_2). Estimated 6 poles (6 intermediate).	n/a				
	O						
Whitehill Farm	C	923m of overhead transmission line traverses agricultural land (Land Class 5_2). Estimated 12 poles (11 intermediate; 1 section/angle) in hay and grazing areas. Hay production/grazing and access to field partially restricted during construction process. Disruption to field drainage where field drains present . Stock exclusion/temporary fencing required. Access to areas around poles restricted during construction.	Medium	Medium	Moderate	LU1, LU3, LU4, LU5, LU6, LU7, LU9, LU10, LU11, LU12, LU13, LU14, LU15, LU16, LU17, LU18, LU19, LU20, LU21	Minor
	O	Agricultural activity compromised on footprint of poles and associated stays (approx. 170m2).		Medium	Moderate		Minor
Moss Plantation	C	80 m of overhead transmission line traverses agricultural land (Land Class 5_2). Estimated 1 poles (1 intermediate).	n/a				
	O						
Little Whitriggs Farm (Castle Milk & Corrie Estates)	C	1745m of overhead transmission line traverses agricultural land (Land Class 5_2). Estimated 23 poles (21 intermediate; 1 section, 1 FC (wood)) in silage and grazing areas. Silage production/grazing and access to field partially restricted during construction process. Disruption to field drainage where field drains present . Stock exclusion/temporary fencing required. Access to areas around poles restricted during construction. Possible disruption to private water supply.	Medium	Medium	Moderate	LU1, LU3, LU4, LU5, LU6, LU7, LU9, LU10, LU11, LU12, LU13, LU14, LU15, LU16, LU17, LU18, LU19, LU20	Minor
	O	Agricultural activity compromised on footprint of poles and associated stays (approx. 400m2).		Medium	Moderate		Minor
Cumstone Farm	C	1426m of overhead transmission line traverses agricultural land (Land Class $5_1, 5_3, 4_2$). Estimated 18 poles (1 terminal, 13 intermediate; 2 section/angle; 1 section and 1 FC(wood)) in silage and grazing areas. Silage production/grazing and access to field partially restricted during construction process. Disruption to field drainage where field drains present . Stock exclusion/temporary fencing required. Access to areas around poles restricted during construction. Possible disruption to private water supply.	Medium	Medium	Moderate	LU1, LU3, LU4, LU5, LU6, LU7, LU9, LU10, LU11, LU12, LU13, LU14, LU15, LU16, LU17, LU18, LU19, LU20	Minor

Ewe Hill Substation to Newfiled Substation – Effect on Agricultural Activities							
Land Interest	Phase of Impact	Description of potential impact	Sensitivity	Magnitude	Significance	Mitigation measures to be employed	Significance Post Mitigation
	O	Agricultural activity compromised on footprint of poles and associated stays (approx. 625m2).		Medium	Moderate		Minor

Ewe Hill Substation to Newfiled Substation – Effect on Sporting Activities							
Land Interest	Phase of Impact	Description of potential impact	Sensitivity	Magnitude	Significance	Mitigation measures to be employed	Significance Post Mitigation
Crawthat Farm	C	Access to field partially restricted during construction process for rough shooting. Temporary fencing required.	Low	Low	None	LU6, LU8, LU9, LU16, LU22	None
	O	Sporting activity limited in vicinity of overhead transmission line.		Low	None		None
Pearsby Hall Farm	C	Access to field partially restricted during construction process for rough shooting. Temporary fencing required.	Low	Low	None	LU6, LU8, LU9, LU16, LU22	None
	O	Sporting activity limited in vicinity of overhead transmission line.		Low	None		None
Craighousesteads Farm	C	n/a					
	O	n/a					
Whitcastles Farm (Castle Milk & Corrie Estates)	C	Access to field partially restricted during construction process for deer stalking and rough shooting. Temporary fencing required.	Medium	Low	Minor	LU6, LU8, LU9, LU16, LU22, LU23	None
	O	Sporting activity limited in vicinity of overhead transmission line.		Low	Minor		None
Castlemilk and Corrie Estates	C	n/a					
	O	n/a					
Whitehill Farm	C	n/a					
	O	n/a					
Moss Plantation	C	n/a					
	O	n/a					
Little Whitriggs Farm (Castle Milk & Corrie Estates)	C	n/a					
	O	n/a					
Cumstone Farm	C	Access to field partially restricted during construction process for rough shooting. Temporary fencing required.	Low	Low	None	LU6, LU8, LU9, LU16, LU22	None
	O	Sporting activity limited in vicinity of overhead transmission line.		Low	None		None

Appendix 11.5 Mitigation Measures

Mitigation Item Number	Mitigation objective	Mitigation Measure
LU1	Reduction	The permanent loss of land to agriculture would be reduced by micro-siting of poles, planning of access routes and careful development of access tracks in consultation with the land interest, and re-instatement of agricultural land post construction.
LU2	Reduction	Access for the land interests to their agricultural land would be provided at all times during the construction process and post construction.
LU3	Reduction and Offset	Damage to the agricultural capability of soils would be avoided by the adoption of appropriate measures during construction.
LU4	Reduction and Offset	Existing field drainage systems would be re-instated to ensure that land capability is maintained and flooding issues would not be worsened.
LU5	Reduction and Offset	Financial compensation would be provided for the loss of any areas of land that would be lost to agriculture according to the Scottish Power wayleave agreement.
LU6	Reduction	Notice of intention to commence construction or ongoing maintenance work would be given to the owners and occupiers of all land along the proposed route before entry is made to such land. Consultation with the landowners and occupiers would allow agreement to a programme of works that minimises disturbance. Any work would be carried out in accordance with the agreed programme as far as is practically possible.
LU7	Reduction	Preparation of a schedule of condition would be undertaken for agricultural land (including drainage), roads and paths likely to be affected. This would be made available to the owner or occupier and would ensure that land, roads and paths are restored to the reasonable satisfaction of the landowner or occupier.
LU8	Reduction and Enhancement	Agriculture and sporting roads and paths would be re-instated to a condition equivalent to that subsisting before the commencement of any works.
LU9	Reduction and Offset	Agricultural and sporting land would be re-instated to a condition as near as is reasonably practicable to that subsisting before the commencement of the works. Topsoil where disturbed would be left in a loose friable condition and where agreed appropriate cover would be replaced.
LU10	Reduction and Offset	Where ancillary apparatus and material is sited on agricultural land it would be done so with agreement of the land owner/occupier.
LU11	Reduction	There would be provision of temporary fences, lights and guards in appropriate locations for the protection of the health and safety of the public and animals and to avoid trespass. Where appropriate, fencing of the working area to a standard adequate for the purpose of excluding any stock kept on adjoining land would be undertaken. All temporary fencing would be maintained in position during constructional work and thereafter unless otherwise agreed with the occupier.
LU12	Reduction and Enhancement	Where boundary features such as fences, walls and hedges have to be removed to allow construction or operation these would be reinstated with appropriate materials in each case.

Mitigation Item Number	Mitigation objective	Mitigation Measure
LU13	Reduction	Precautions relating to the exclusion of stock would be combined with due care and attention by SHETL, SPT or subcontract staff to prevent the straying of livestock.
LU14	Reduction	Where access would require to be altered either temporarily or permanently as a result of construction or operation alternative access for stock and machinery would be provided where appropriate in consultation with the land owner/occupier.
LU15	Reduction	All reasonable precautions would be taken during construction or operation to prevent as far as is possible, the spreading of soil borne pests and diseases, and animal and crop diseases. Precautions as recommended by the Scottish Executive Environment and Rural Affairs Department would be observed.
LU16	Reduction	Within construction constraints, micro-siting of poles will be employed to minimise disruption to future agricultural and sporting activity.
LU17	Reduction	Careful excavation, storage and replacement of topsoil and subsoil would prevent damage to soils and soil structure and to protect the agricultural capability.
LU18	Reduction and Enhancement	Particular care would be taken to ensure that the minimum amount of damage or disturbance to field drains is caused. Laying of new drains would be undertaken as required to keep the affected and adjoining land in good order. Repairing and reinstatement of field drains would be agreed with the land owner/occupier. Where appropriate the integrity of the drainage system would be secured in advance through the installation of header drains (cut off drains) to facilitate construction of the poles. All remaining remedial and new drainage works would be undertaken post construction.
LU19	Reduction	Water supplies for livestock would be protected at all times and alternative supplies would be provided where access would be compromised by any works.
LU20	Reduction	By programming of construction in consultation with the land owner/occupier, disruption to agricultural livestock activity would be minimised as far as is practically possible including: • Avoidance of work in lambing parks during lambing time (March to May); • Avoidance of works in dedicated calving fields during calving time; and • Avoidance of work where muirburn planned (1st October to 15th April or 30th April over 450m).
LU21	Reduction	By programming of construction in consultation with the land owner/occupier, disruption to agricultural cropping activity would be minimised as far as is practically possible, with consideration to: • Timing of construction works to prevent sowing operations; and • Timing of construction to prevent harvest operations.
LU22	Reduction	By programming of construction in consultation with the land owner/occupier, disruption to shooting based sporting

Mitigation Item Number	Mitigation objective	Mitigation Measure
		activity would be minimised as far as is practically possible, through: • Avoidance of construction works in nesting areas during April to May (see Chapter 22, Ecology). In addition, cognisance would be given to the following activities: • Grouse Aug 12th to Dec 12th; • Common Snipe Aug 12th to Jan 31st; • Partridge Sep 1st to Jan 31st; • Woodcock Oct 1st to Jan 31st; • Pheasant Oct 1st to Feb 1st.
LU23	Prevent and Reduction	By programming of construction in consultation with the land owner/occupier, disruption to stalking based sporting activity would be minimised as far as is practically possible. Key dates are as follows: • Roe Bucks April 1st to Oct 20th; • Red Stags July 1st to Oct 20th; • Sika Stags July 1st to Oct 20th; • Fallow Bucks Aug 1st to April 30th; • Red Hinds Oct 21st to Feb 15th; • Fallow Does Oct 21st to Feb 15th; • Sika Hinds Oct 21st to Feb 15th; • Roe Does Oct 21st to Mar 31st;
LU24	Prevent and Reduction	By programming of construction in consultation with the owner/occupier, disruption to angling based sporting activity will be minimised as far as is practically possible. Key dates are: • Brown Trout Mar 15th to Oct 6th • Salmon (Spey) Feb 11th to Sep 30th • Salmon (Beauly) Feb 11th to Oct 15th
LU25	Offset	Reasonable claims in respect of damage to agricultural land or sporting rights shall be payable, as shall professional charges (according to the Electricity Supply Industry scale fee for professional agent). Wayleave payment rates as set by agreement between the Electricity Companies, the NFU Scotland and the Scottish Rural Property and Business Association would also be payable.

Appendix 12.1 Site Notes

Gretna – Ewehill Site Assessment Report

1. Gretna – Ewehill Section

Woodland Site 001

Location	Immediately south of Conhess & Alderwood forests.
Context	Line impacts on edge of conifer woodland (semi mature) to the north east of the line from grid point NY 2852 7829 for a distance of 149m to grid point NY2846 7842.
Proposed Works	Requirement to fell edge of woodland to a distance of 35m from centre line.
Mitigation Options	Felling to be kept to a minimum. There is an opportunity for Crown reduction to reduce risk of windblow into retained forest edge.
Designation	No ASNW designation.
Conclusion	No landscape significance of the proposed tree felling.

Gretna – Ewehill Site Assessment Report

1. Gretna – Ewehill Section

Woodland Site 002

Location	South of Conhess & Alderwell forests
Context	Line passes through area of scattered young mixed broadleaf trees. This area appears to be a semi failed broadleaf planting with possibly some natural regeneration. Line enters area at grid ref NY2845 7842 and passes for a distance of 130m to NY2840 7854 where it then enters an area of commercial conifer woodland.
Proposed Works	Line can currently overfly these trees without impact. Future management of trees in proximity to line could aim to retain those lower and slower growing species and undertake a programme of crown reduction on the remaining trees.
Mitigation Options	Minimise impact on trees and retention of all trees not having a medium or long term impact on the line. Regular monitoring of tree growth and crown reduction works undertaken as necessary.
Designation	None.
Conclusion	No adverse landscape impact.

Gretna – Ewehill Site Assessment Report

1. Gretna – Ewehill Section

Woodland Site 003

Location	Alderwell forest.
Context	Line enters Alderwell forest, a commercial conifer forest (predominately Sitka spruce) at grid ref NY 2840 7854. The line then passes in a north westerly direction for a distance of 1090m to grid ref NY 2792 7951 where it exits Alderwell forest and enters the adjoining Conhess forest.
Proposed Works	To allow for the safe construction and operation of the proposed line an 80m wide corridor of trees requires to be felled. Due to the nature of the site, soil conditions, altitude, ground preparation and the age of the forest crop, it is anticipated this would lead to windblow spreading from the newly created 'brown' forest edge.
Mitigation Options	Due to the anticipated risk of windblow, it is proposed to extend the area of felling outwith the 80m corridor to the nearest existing internal green forest edge where there is reduced risk of further windblow. These edges have been identified on the forest felling proposals plan for this area.
Designation	None.
Conclusion	There is a requirement for a large area of additional felling outwith the 80m corridor, due to the proposed mitigation to address the windthrow risk.

Gretna – Ewehill Site Assessment Report

1. Gretna – Ewehill Section

Woodland Site 004

Location	Conhess forest.
Context	Line exits Alderwell forest and immediately enters Conhess forest at grid ref NY 2792 7951. It then passes for a distance of 235m to grid ref NY 2781 7971 where it exits the Conhess forest into open farm ground. The Conhess forest is of similar age to Alderwell and is also a semi-mature conifer woodland.
Proposed Works	Requirement is to fell an 80m corridor. However due to lack of existing green edges there is a need to fell outwith the 80m corridor to the edges as shown.
Mitigation Options	To avoid windblow at edge of 80m corridor trees to the nearest green edge (outwith the 80m corridor) will be felled.
Designation	None.
Conclusion	Felling of area as shown will not have an adverse impact on the local landscape due to areas of forest behind (NE) of the felled area.

Gretna – Ewehill Site Assessment Report

1. Gretna – Ewehill Section

Woodland Site 006

Location	Cadgillhead wood.
Context	Line enters Cadgillhead woodland a linear woodland area following the Cadgill burn at grid reference NY 3036 7560 At this point the line passes into an approximately 15 year old predominately conifer block of forest the route utilises ,in part, an existing access track(forest ride). This track will require to be widened by felling a strip of the conifer woodland to achieve the required 70m in width. The proposed line then exits the young conifer area and passes over an area of mature and semi mature mixed broadleaf tree prior to exiting the woodland and grid ref NY 3081 7535 and passing over a section of open farmland to the south of Cadgillhead farm house. The line then passes over some hedgerow mature broadleaf trees which will require to be reduced in height adjacent to the minor public road. To the east of the public road the line crosses the farm fields and then passes alongside the Cadgillhead wood. At grid reference NY 3142 7516 the line passes close to the woodland edge where 9 year old mixed conifer and broadleaf woodland has been established. There will be a need to fell a narrow strip, approximately 10m wide off this woodland to the south of the line to ensure a sufficient wayleave corridor is created. The line then passes over a short section of open field prior to passing through a hedgerow of mature broadleaves which will require felling of approximately 3 mature trees. The line finally passes through riparian woodland known as Ned's Beck. This is a mixed broadleaf woodland combining mature broadleaf species (Oak, Beech and Ash).In addition there is a well established understorey of naturally regenerating Birch, Alder, Rowan and Hazel. This will require a corridor approximately 70m in width felled to achieve the required wayleave corridor.
Proposed Works	Requirement is to create a tree free 70m corridor.
Mitigation Options	Micro siting of the line as it passes to the east of the Gadgillhead wood will minimise the need for felling which will then be restricted to the sections described above where the line passes through the woodland
Designation	With the exception of the first section of line which passes through the young conifer forest the remaining woodland in this section is all classified as ASNW. However parts of this ASNW have been previously restocked with conifer and as such the removal of this conifer and the opportunity to allow regeneration of a native shrub layer could be investigated along with the landowner as additional mitigation.
Conclusion	Felling of area as shown will not have an adverse impact on the local landscape .This is primarily due to the local topography and those areas of retained woodland.

Ewehill –Newfield Site Assessment Report

1. Ewehill –Newfield Section

Woodland Site 005

Location	Forest area of Corrie Common village.
Context	Line enters commercial conifer woodland north east of Corrie Common. This woodland is part of the Castlemilk and Corrie Estate. The line enters an area of approximately 30 year old spruce dominated woodland at grid ref NY 2222 8621 and travels for 570m to grid ref NY 2172 8630 where it cuts across the extreme north corner of field before re-entering the Corrie Common forest at grid ref NY 2169 8630. From this point the line passes through an area of recently restocked woodland (2-3 years old). The line covers a distance of 495m to grid ref NY 2121 8639 before exiting the forest over an area of adjoining farm land. The line then re-enters the same forest (this part shown on plan as Moss Plantation) at grid ref NY 2087 8644 and passes through this area of young restocked woodland for a distance of 157m to grid ref NY 2072 8647 where it exits the woodland into open farmland.
Proposed Works	As the line passes through the semi mature woodland there is a need to fell the 80m corridor plus additional forest area out to the nearest existing green edge. The existing forest has examples of windblow in neighbouring compartments and this emphasises the risk of damage to retained trees. Over the recently restocked woodland, clearance of trees can be minimised to the 80m corridor. Within this where there are lower growing broadleaf trees these could be retained with only future crown reduction if required.
Mitigation Options	Additional felling to reduce the risk of windblow. Minimised felling in restock areas.
Designation	None.
Conclusion	The forest is currently going through a period of restructuring and the proposed felling will only continue this process, albeit to a different design to that currently proposed by the landowner.

Appendix 12.2 Glossary of Forestry Terms

Ancient Woodland AWI	Sites shown as woodland on readily available map sources from 1750 onwards, and as semi-natural woodland on the 1750 map. These are sites with a proven continuity of woodland cover for at least 230 years, and which are likely to be the modified remnants of Scotland's original forest cover. The total area of each site is divided into the present day extent of semi-natural and plantation woodland.
Long-established Woodland of Semi-Natural Origin	Sites which appear to be semi-natural woodland in c 1860 (i.e. those on the OS 6 First Edition maps) but not shown as woodland on the 1750 maps. These are woods that have apparently arisen between 1750 and 1860 and have a proven continuity of woodland cover for at least 120 years. However, omissions from the 1750 maps were such that many of these sites will be ancient, but cannot be proved to be so. The total area of each site is divided into the present day extent of semi-natural and a plantation woodland.
Long-Established Woodland of Plantation Origin	Sites which appear to be plantation woodland in c 1860 but not shown as woodland at all in 1750 (or shown as plantation on these maps). These are woods that were apparently planted between 1750 and 1860 (or even before 1750) and thus have a proven continuity as woodland for at least 120 years. Omissions from the 1750 maps will mean that some of these sites may be ancient in origin. Many of the older plantations have considered conservation value in their own right. The total area of each site is divided into the present day extent of semi-natural and plantation woodland.
Other Woods on "Roy" Woodland Sites	Sites which were shown as unwooded in 1860 but which were present as woodland in 1750 and are wooded on the current maps. Such sites have had only a short break in continuity of woodland cover, and though some groups may have been lost (e.g. lichens) much of the value of the site may have remained. Because the maps of 1860 omitted some remote woods, some of these sites may in fact be ancient. The total area of each site is divided into the present day extend of semi-natural and plantation woodland.
Other Woodland	Any other woodland known from recent ground survey to be important for nature conservation. These are frequently small woods in narrow valleys which have often been omitted from the maps. Many are believed to be fragments of ancient woodland. The total area of each site is divided into the present day extend of semi-natural and plantation woodland.
Recent plantations	Plantations established on sites which have had a non-wooded phase (arable, pasture, moorland etc) in the last 300 - 400 years. Most of these plantations are in the uplands and are of conifers.
Brashing	Cutting away the dead side branches from young conifers, to a height of about 6ft, to aid fire protection or provide easier access.
Broad-leaved tree	A tree of the natural order Dicotyledones, having a typically broad leaf which, in Britain, is usually deciduous; a hardwood; examples are oak, ash, beech.
Canopy	Collectively, the mass of branches and foliage formed by the crowns of trees.

Clear Felling	Complete removal of the whole tree crop at one time.
Compartment	A distinct sub-division of the woodland suitable as a basis for long term management and record keeping.
Conifer	Tree of the natural order Coniferae, which have, as a general rule, long and narrow evergreen leaves or needles, and bear their seeds in woody cones; a softwood; examples are pine, larch, spruce.
Coppice	Broad-leaved woodland which is cut over at comparatively short periods of years (1 to 25), causing the growth of many small shoots from each stump.
Critical height	The tree height at which windthrow is likely to start.
Crown	The canopy of the branches of the tree.
EIA	Environmental Impact Assessment.
Forest	Predominantly tree covered land (woodland) whether in large tracts (generally called forests) or smaller units (known by a variety of terms such as woodlands, woods, copses and shelterbelts).
Forest Gales	Forestry Commission's method of assessing the probability of average trees within a forest stand being damaged by wind.
Forestry Commission (Scotland)	Forestry Commission Scotland is the devolved department of the Forestry Commission with responsibility for forestry policy. It has an agency (known as Forest Enterprise) which is charged with the management of the Forestry Commission's own forests. For all woodland not owned by the Forestry Commission, the Forestry Commission Scotland is charged with the promotion of high standards of sustainable forestry management and administration of grant aid. This work is undertaken by that part of the FCS historically known as the Forest Authority.
Holford Rules	A series of planning guidelines first developed in 1959 and reviewed in 1990. These relate to principles to be followed in the design of new powerlines with regard to landscape consideration.
Natural regeneration	The re-growth of a forest crop from self-sown seed, without artificial planting or sowing.
Pollard	Tree cut off about 6ft above ground level, resulting in a tuft of branches which is harvested, and grows again, at intervals of a few years.
Premature felling	The felling of trees prior to them attaining full mature status.
Rack	A narrow unpaved pathway left or cut through a tree crop to give access and to facilitate the extraction of timber to a wide ride or road.
Ride	Broad track running through a wood; a ride has a natural surface, whereas a road is metalled and made up.
Rotation	Interval of years between the repetition of an operation; a felling rotation naturally equals the maximum age to which trees are grown in a given forest or compartment.
Semi-natural Ancient Woodland SNAWI	Ancient and Semi-natural Woodlands are defined as those known to be continuously present since 1600 AD (1750 AD in Scotland)
Severance felling	A felling design or practice not following normal forestry practice.
Shelterbelt	Woodland, normally a long narrow strip, designed primarily for agricultural

	shelter. May also perform a visual screening or sporting function
Silviculture	The growing and tending of trees in woodlands, plantations or natural forests.
Stand	A defined area of woodland, usually of similar size, species and age.
Sterilisation	The imposition of a non forestry management regime on an area. No woodland can be established in this area.
Thicket stage	A stage in the growth of a plantation or natural regeneration during which the lower branches of the growing trees meet and interlace.
Thinning	Removing selected stems from a crop of trees, so as it give the remaining stems more growing space; a tree so removed.
Topping	The removal of up to 50% of the live crown of a tree as a means to reducing the tree height in proximity to the overhead line conductors.
Windblow	Uprooting of trees by the wind, or a tree so uprooted.
Wind-break	Breakage of tree stems by the wind, or a tree so broken.
Windfirm	Considered unlikely to suffer the effects of windthrow
Windthrow	Uprooting of trees by the wind, or a tree so uprooted.
Windthrow risk	A technical assessment of risk based on local climate, topography, site conditions and tree height

Appendix 13.1 Scott Wilson Transport Assessment

1 Traffic Assessment

1.1 Introduction

This chapter assesses the likely significant environmental effects arising from the anticipated levels of traffic movements associated with the proposed Ewe Hill Wind Farm Substation.

As defined in this statement, the proposed wind farm substation is located approximately 6 miles east of Lockerbie, in Dumfries and Galloway, Scotland.

Access for construction traffic, plant, and ongoing management / maintenance will be via the B7068 which travels east-west and links the communities of Lockerbie and Langholm.

From the B7068, the substation will be accessed via a new track with the junction located 280m west of the Grange Quarry Access. The proposed access track is shared between the substation and the proposed Wind Farm. The Wind Farm is the subject of a separate planning application.

It is not proposed that this assessment include the construction movements associated with the proposed overhead transmission line routes. Due to the nature and design of the overhead lines (OHL), and the rate of construction, it is expected that vehicle movements at any one pole location would be limited to three or four visits over the course of the construction period. Therefore it is unlikely to yield any significant effects arising from traffic and transport on the local road network.

1.2 Methodology

The assessment of potential effects of the wind farm substation in terms of transportation and access has been based on the following structured sequence of activities:

- Acquisition of traffic flow data on the B7068 at the location of the proposed access point.
- Consultation with local authority and stakeholders.
- Project design / options development.
- Development of outline construction programme and activity schedule.
- Analysis of data against planning policy / guidelines for assessment of significance.
- Project design / options appraisal.
- Development of mitigation strategy.
- Review of operational and decommissioning effects.

This structured approach to the assessment is intended to deliver the most beneficial solution for transportation and access, mitigating potential effects where possible; and

where effects cannot be mitigated in whole, reviewing the nature of the effect and defining measures that can be adopted by the developer to manage the specific effect in an acceptable manner.

1.2.1 Assessment Methodology

The transport and access issues described in the following planning advice and guidance documents have been taken into account in assessing the potential impact of the proposed wind farm substation and access track on the existing public road network during construction and operational phases:

- Scottish Planning Policy (SPP), February 2010
- Planning Advice Note (PAN) 75: Planning for Transport
- Transport Assessment and Implementation: A Guide, SEDD August 2005
- Guidelines for the Environmental Assessment of Road Traffic, Institute of Environmental Assessment (IEA), 1993

It is noted that PAN 75 refers to the superseded SPP 17; however the principles outlined within remain relevant and are reflected in this report.

1.2.2 Relevant Guidance

SPP: Strategic Transport Network

Paragraph 175 notes that:
"Providing for the safe and efficient movement of traffic on the strategic road network requires the implications of development proposals on the traffic and road safety to be taken into account in development plans and development management decisions. New junctions onto the motorway and trunk road network are not normally acceptable, but the case for such junctions will be considered where significant economic growth or regeneration benefits can be demonstrated. Direct access onto any strategic road should be avoided as far as practicable. Access should be from a secondary road unless there is no alternative."

Transport Assessment and Implementation: A Guide

Paragraph 4.1 of the guide notes that:
"An early indication of the scale of any potential transport impact arising from a development will influence the type of analysis required. A simple Transport Assessment Form will provide sufficient information to indicate the extent of further steps required. In most cases the completion of the Transport Assessment Form will provide a clear indication of whether or not further analysis is required."

A formal Transport Assessment under the terms of the above guidance is not required for this proposed development, as the guide principally relates to developments that generate significant increases in travel as a direct consequence of their function, such as retail parks. This section does however address the local transport impacts of the development during construction and operation.

1.2.3 Consultation

As part of the consultation process, a Consultation Report which covered both the proposed OHL routes and the substation was written by environmental consultants Gillespies and WSP. The report outlined the scheme as a whole, with the preferred OHL routes being the dominant focus.

Along with the report, a public exhibition was set up at Waterbeck Hall between 31st August and 3rd of September 2009, and the following statutory consultees were sent a copy of the report requesting comment:

- Dumfries and Galloway Council
- Scottish Natural Heritage
- Historic Scotland
- Scottish Environment Protection Agency

At the time of writing this chapter, none of the above consultees responded with comments regarding traffic or transportation aspects of the project.

Therefore, the assessment will focus on the potential environmental effects of:

- The increase in traffic along the public road network in general, and
- The significance of the effects on sensitive receptors.

1.3 Baseline Studies

To define conditions for the proposed wind farm substation development in terms of access and transportation, baseline studies have comprised desktop route reviews of the B7068 for site access from Lockerbie to the west and from Eaglesfield (via the B722) to the southeast.

In terms of baseline information surveyed for assessing potential traffic effects; 2 way traffic count data for the B7068 was acquired at the point of the proposed access track junction for seven days from the 25th of September 2009.

Given the rural location of the proposed access track junction, it is assumed that the levels of traffic at the monitoring site are generally consistent along the B7068 corridor, acknowledging that there may be slight deviations along the route in respect to specific sources / destinations of traffic (i.e. on approaches to villages or larger towns, and access and egress from the adjacent quarry).

1.4 Assessment of Effects

As defined in the previous section, a review of potential access routes to the site has been carried out based on a desktop study of the B7068 approaching the site both from the west and the southeast.

Whilst access from the west would primarily be along the B7068, from the M74; access from the southeast has a number of different options. Assuming vehicles access the local road network from the M74 and Eaglesfield, there are at least three possible options to the B7068 leading to the site access itself.

It must be noted that preferred access to the site over the public road network will be largely dependant upon the appointed Contractor's location relative to the site, preferred methods of work, and the proposed works programme.

1.4.1 Constraints and Sensitive Receptors

Geometric constraints and sensitive receptors potentially exist along the various approaches to the site.

Determination of receptors will require confirmation of a preferred route or routes over the public road network, and additional consultation with potentially affected parties and statutory consultees.

1.4.2 Significance of Effects

The Guidelines for the Environmental Assessment of Road Traffic (GEART) suggest that two broad rules can be used as a screening process to determine the scale and extent of a proposed development and related traffic flows. These are:

Rule 1 - Include highway links where traffic flows will increase by more than 30% (or the number of HGVs will increase by more than 30%)

Rule 2 - Include any other specifically sensitive areas where traffic flows will increase by 10% or more

Where the predicted increase in traffic flow is lower than these thresholds, the significance of the effects will be considered insignificant.

These guidelines are intended for the assessment of the environmental impact of road traffic associated with major new developments. The assessment is therefore more pertinent to the operational phase of a wind farm than the construction phase of a wind farm substation. However, in the absence of other guidance, it shall also be used to assess the associated short term construction phase effects.

1.5 Baseline Description

The B7068 is the main link road between Lockerbie and Langholm. The following baseline 2 way traffic count data was obtained at the proposed access location on the 25th of September for a duration of seven days. (Refer to Table 1 below).

Table 1 Baseline 2 way traffic counts for the B7068

Road	Date	Location	Duration	Cars	OGV1	OGV2	HGV Total	HGV %	Total
B7068	September 2009	280m W of Grange Quarry	12 Hour	270	58	10	68	20	338

1.6 Assessment of Potential Effects

1.6.1 Potential Construction Effects

The construction phase of the project will comprise the following operations:

- Stripping and stockpiling of topsoil and overburden along the track alignment and the hardstand.
- Excavation of material at the substation hardstand location.
- Rough formation of the access track.
- Installation of culverts and other drainage components.
- Crushing and sorting of material excavated at the substation hardstand site.
- Formation of the structural earthworks slopes and track subbase.
- Redistribution of the stockpiled topsoil over earthworks slopes.
- Locally regrade approaches from existing farm access tracks to tie in with new access track.
- Import and distribute track and hardstand surfacing material.
- Pour the substation concrete foundations.
- Construct the substation control building / facilities.
- Erect the substation electrical components and commission.

During the 6 month construction period, the following vehicles will access the site:

- Low loaders and HGVs, to deliver equipment and materials;
- Dump trucks, to deliver stone for access track and hardstand surfacing;
- Flat-bed trucks, to deliver control building components;
- Concrete trucks;
- Road crane;
- Fuel tanker; and

- Construction personnel, by private car

The total number of vehicle movements generated during the construction of the proposed development is estimated as 11,073 (total 2 way movements) over a 6 month period as shown in Table 2. This takes account of all vehicle movements generated by the above activities, and assumes 1.3 construction personnel per vehicle.

Geological mapping and site investigations suggest suitable material to construct the substation and access track subbase can be won and processed on site. Confirmation of the suitability and availability of the material at the detailed design stage will be subject to agreement between the Principal Contractor for the proposed substation and the Ewe Hill Wind Farm developer and its Principal Contractor, but could result in up to 60% of the required construction movements being contained within the site.

If agreement cannot be reached between the Principal Contractor for the proposed substation and the Ewe Hill Wind Farm developer and its Principal Contractor, then it is assumed that an alternative borrow pit will require to be developed by the Principal Contractor for the proposed substation in close proximity to the substation and its access road. However it is acknowledged that this will be subject to separate planning consent with associated planning conditions from D&GC.

For the purposes of this assessment, it is assumed that suitable aggregate material will be made available from those borrow pits developed as part of the Ewe Hill Wind Farm Section 36 planning consent.

Therefore, it is assumed that of the 11,073 total movements, 6,818 are internal and therefore do not impact on the public road network.

Deliveries of equipment and materials to the site (HGV's) are likely to result in 566 movements to and from site, with the remainder (3,689) being construction personnel (cars).

As seen in Table 2 the 2 way traffic movements are not uniform throughout the construction period, and the maximum number of vehicle movements (1102) occurs during month three. This equates to 51 vehicle movements per day, assuming a 5 day working week. Of these 51 vehicle movements, 39 movements are cars and 12 movements are HGV`s.

Table 2 predicted traffic levels associated with the construction of the access track and substation hardstand.

Activity	*Number Of Vehicles Per Month*						
	1	2	3	4	5	6	Total
Construction of access track and hardstand earthworks and subbase	1848	1848	1374				5070
Site Restoration				1748			1748
Total Site Movements (HGV`s)	1848	1848	1374				6818
Pre construction (mobilisation)	120						120
Track and Hardstand Surfacing			252				252
Concrete				108			108
Materials/Equipment Deliveries	28	4		10	8	18	68
Fuel Deliveries	4	4	4	4	2		18
Activity	*Number Of Vehicles Per Month*						
Total Movements to/from Site (HGV`s)	152	8	256	122	10	18	566
Site personnel to/from Site (1.3 per car)	643	643	846	677	508	372	3689
Total Vehicle Movements to/from Site per Month	795	651	1102	799	518	390	4255
Average Daily Car Movements	29.2	29.2	**38.5**	30.8	23.1	16.9	
Average Daily HGV's Movements	6.9	0.4	**11.6**	5.5	0.5	0.8	
Average Daily Movements	36.1	29.6	**50.1**	36.3	23.5	17.7	
Percentage Change in Total Daily Car Flow (%)	10.8	10.8	**14.2**	11.4	8.5	6.3	
Percentage Change in Total Daily HGV Flow (%)	10.2	0.5	**17.1**	8.2	0.7	1.2	
Percentage Change in Total Daily Traffic Flow (%)	10.7	8.8	**14.8**	10.7	7.0	5.2	

Peak HGV traffic occurs with the delivery of track and hardstand surfacing during month 3 with an average of 12 movements per day.

Assuming that construction traffic will be spread evenly over a 12 hour period the following worst case scenarios are predicted:

- An increase in car numbers of 14.2% on the B7068 due to the departure and arrival of personnel (39 average vehicle movements per day) during month 3.
- An increase in HGV traffic of 17.1% on the B7068; based on 12 average HGV movements per day during month 3 of construction.
- A total increase in traffic of 14.8% on the B7068 (based on the average 12 hour baseline count of daily vehicle movements) during month 3 of construction.

The significance of the above increases in terms of the two sensitivity rules in the GEART guidelines are detailed in Table 3.

Table 3 Summary of Construction Traffic Effects

Road	Type of Traffic	30% threshold, applied to non-sensitive areas	10% threshold, applied to sensitive areas
B7068	Overall	Below threshold Not significant	**Above threshold** (Months 1, 3, and 4)
	Cars	Below threshold Not significant	**Above threshold** (Months 1 - 4)
	HGV	Below threshold Not significant	**Above threshold** (Months 1 and 3)

1.6.2 Potential Operational Effects

It is predicted that during the operational phase of the wind farm substation there will only be a slight increase in traffic due to operation and maintenance. No more than an average of 12 No. two way vehicle movements per month is predicted. This represents an increase in traffic movements of 3.6% on the B7068 over a 12-hour working day.

These traffic levels fall substantially below Rule 1's 30% increase considered significant in non-sensitive areas, and below Rule 2's 10% increase considered significant in sensitive areas.

1.6.3 Potential Decommissioning Effects

Prior to decommissioning, a further traffic assessment will be carried out and traffic management procedures agreed with the appropriate authorities and the local communities. The levels of traffic associated with decommissioning are however likely to be lower than those required during construction.

1.7 Mitigation

1.7.1 Construction Mitigation Measures

Upon confirmation of the Scottish Power's preferred construction schedule, the Contractor will be required to produce a traffic management plan (TMP) to minimise effects on the road network and environment. Furthermore, the TMP will be produced in consultation with Dumfries and Galloway Council Combined Services, and ultimately providing the following information (as required):

- Restrictions and approved access routes;
- Road condition survey information for routes to the site prior to commencement;
- Removal and replacement of street furniture such as bollards and handrails and road signs;
- Arrangements with Police for escort of oversized abnormal loads;
- Signage warning other users of oversized load movements;
- Ground preparation including protection of services and lowering of pavements;
- Arrangements for road maintenance and cleaning;
- Timing of deliveries (taking into account identified sensitive receptors);
- Arrangements for parking restrictions along access route;
- Road maintenance and cleaning; and
- Wheel cleaning arrangements.

In order to further reduce traffic effects from construction of the proposed substation, construction personnel will be encouraged to car-share where practicable.

Abnormal load deliveries will be prior approved through Transport Scotland and Dumfries and Galloway Council and accompanied by a police escort if deemed necessary.

Materials and components will be transported via the approved transport route. The route is to be agreed between the Contractor and the Local Authority to minimise disruption.

A further reduction in effect could be gained by obtaining the track and hardstand surfacing material from the adjacent Grange Quarry. In doing so, less than a mile of public road would be trafficked per lorry load (an estimated 252 total lorry loads are required). However, this will be subject to agreement between the Principal Contractor for the construction of the substation and access road and the operator of the Grange Quarry.

In construction of the access within the site, excavated materials where suitable will be re-used in the formation of the track to minimise off site material import. Unsuitable material will be redistributed over fill slopes to negate the requirement for materials to be taken off site.

Maximum side slopes to earthworks should be 1 in 3, although flatter gradients should be achieved where possible. The stockpiled topsoil will be used to dress the embankment faces to aid in vegetation reinstatement.

All construction works, whilst complying with the appropriate planning consents, will take cognisance of best practice in terms of control of pollution as defined in the following documents:

- CIRIA Report C532 - Control of Water Pollution from Construction Sites
- SEPA Pollution Prevention Guidelines:
  - PPG01 General guide to the prevention of water pollution
  - PPG02 Above ground oil storage tanks
  - PPG03 The use and design of oil separators
  - PPG05 Works in near or liable to affect watercourses
  - PPG06 Working at construction and demolition sites
  - PPG07 Refueling Facilities
  - PPG08 Storage and disposal of used oils
  - PPG21 Pollution Incident Response Planning
  - PPG26 Pollution Prevention Storage and Handling of Drums & Intermediate Bulk Containers

A further reduction in HGV impact could be achieved by lengthening the construction programme, or by spreading out delivery of track and hardstand surfacing material. However, in doing so, the material would have to be stockpiled on site and therefore require double handling which has an increased impact on the environment.

1.7.2 Operational Mitigation Measures

As defined in section 1.6.2, operational movements of traffic will not have significant effects on the existing road network.

Suitable signage shall be provided for both pedestrians and vehicles acknowledging the routes' role as an access for operation and maintenance vehicles.

Access within the site should be controlled, and adhere to appropriate strategies for public safety. Furthermore, access arrangements between Scottish Power and the landowner will need to be agreed as the track bisects a number of grazing fields.

Condition of the access track, culverts, and other elements of the works shall be inspected as part of the operations strategy to ensure failure of any such features do not result in an impact on the local environment.

Operation of plant, storage of materials, and maintenance activities should be undertaken in a manner that complies with the guidance defined in Section 1.7.1.

1.7.3 Decommissioning Mitigation Measures

Decommissioning of existing plant would comprise either complete removal of the facility, or replacement of substations key components to extend the operation lifespan.

Where complete decommissioning is proposed, removal of plant and associated installations will be required, incorporating demolition activities and partial or total removal of the access track.

Replacement of key components will involve supply and construction activities of a lesser extent than those of initial commissioning.

In both instances, a revised TMP and decommissioning method statement should be undertaken and agreed with Dumfries and Galloway Council to address the activities proposed relative to policy and constraints at the time of decommissioning.

1.8 Residual Effects

1.8.1 Construction Effects

The mitigation measures described above and the careful management of the short term increase in construction traffic will ensure that there will be minimal residual environmental effects. This is justified by:

- The B7068 having sufficient capacity to cater for the predicted levels of construction and operational traffic;
- The increase in site traffic will be short term with the highest levels concentrated during month 3; and
- Although HGV movements will have a short term impact on the road network in month 3, this can be reduced to 1 mile of public road by sourcing surfacing material from the adjacent quarry.

1.8.2 Operational Effects

Residual effects on the public road networks as a result of the substation will not be significant.

The mitigation measures proposed should result in the operational phase having no significant residual effect.

1.8.3 Decommissioning Effects

Decommissioning effects would potentially be of a similar nature to Construction Effects as defined in Section 1.8.1 but of reduced magnitude. This is principally in recognition of the fact that the majority of the trips generated during the construction phase are the result of the import of suitable surfacing material, concrete deliveries, and construction personnel. Decommissioning would mainly comprise the removal of materials from site on wagons.

Substation components would be removed from site in a controlled manner similar to their delivery.

Culverts would be removed with the stream beds and channels returned to a more natural configuration.

The access track and hardstand would be either partially regraded to provide a path for farm or recreation access, or completely regraded to match the existing ground profile.

As a majority of the decommissioning work would be contained within the site, the effects on the road network are to be minimal and below the threshold of significance.

1.9 Summary of Effects

A summary of the potential effects, mitigation and residual effects defined within this statement are summarised in Table 4 below.

Table 4 Summary of Effects Table

Potential Effect	**Mitigation**	**Residual Effect**
Construction Effects		
Short-term significant increase in HGV and car numbers on the B7068.	Traffic management plan to be agreed with Dumfries & Galloway Council, Transport Scotland, police and local communities. Source surfacing material from adjacent quarry to reduce impact on public road. Car-sharing for site personnel.	Significant short-term adverse effect to sensitive receptors.
Traffic delay due to police escorted abnormal loads.	Timings of deliveries to be agreed with Dumfries & Galloway Council, Transport Scotland, police and local communities.	No significant effect.
Increase in HGV traffic on B7068	Traffic management plan to be agreed with Dumfries & Galloway Council, Scottish Executive, police and local communities.	Significant short-term adverse effect to sensitive receptors. (Months 1 and 3 ONLY)
Short term impact on conditions of existing public roads	Traffic management plan to be agreed with Dumfries and Galloway Council. Condition survey to be undertaken prior to commencement of works, and repairs to be undertaken as appropriate during the construction process.	No significant effect.
Formation of access track	Detailed design to be developed to achieve cut/fill balance. Detailed Geological/Geotechnical site investigation to be undertaken to maximise re-use of material on site. Earthworks slopes to replicate natural conditions to permit stabilisation and vegetation establishment.	No significant effect.
Crossings of watercourses	Culverts to be used at watercourse crossings. Invert levels to be set below natural bed level through structure.	No significant effect.
Operational Effects		
Effect of track on pedestrians, public, and farmer.	Signage to be provided for pedestrian and vehicle users. Access arrangement to be agreed between Scottish Power and the landowner.	No significant effect.
Risks arising during maintenance of the access road and culverts	Access road and culvert condition to be inspected regularly as part of the facility management regime. Mitigation works to be undertaken promptly to avoid excessive degradation.	No significant effect.
Decommissioning Effects		
Possible removal of plant and associated installations, culverts and access track.	Management plan, impact assessment, and decommissioning method statement to be undertaken at decommissioning stage to reflect future	Significant effect unlikely.

Effects are likely to be similar to the construction impacts, but likely to be of lower magnitude	use of site.	

1.10 Statement of Significance

This traffic assessment concludes that there will be a temporary, significant increase in traffic levels at the location of any sensitive receptors on the B7068 approaching the site. The increase is associated with construction of the substation access track and hardstand and will occur over a period of 6 months, with the greatest increase in month 3 of the construction programme.

In accordance with the EIA significance criteria these increases are judged to be short term adverse, due to the current low levels of traffic on the public road network in the area including the B7068.

The greatest concentration of traffic will be associated with the site personnel entering and exiting the site.

Analysis has demonstrated that increases in traffic on the B7068 will be below the thresholds of significance for non-sensitive receptors. However, the increase in traffic over months 1 – 4 is above the acceptable 10% threshold of significance for sensitive receptors.

Abnormal loads will be timed in order to avoid delays to other road users and will be escorted by the police if required.

The busiest period of construction will be during months 3 and 4 where approximately 25 personnel are expected to be on-site.

Traffic generated during the operation and maintenance of the substation is minimal and will not result in any significant impact.

Traffic generated during decommissioning of the substation is likely to be lower than the levels associated with construction.

Appendix 13.1 Interpretating Noise & Vibration

Interpreting Noise

1.1.1 Noise is defined as unwanted sound. The human ear is able to respond to sound in the frequency range 18 Hz (deep bass) to 18,000 Hz (high treble) and over the audible range of 0 dB (the threshold of perception) to 140 dB (the onset of pain). The ear does not respond equally to different frequencies of the same magnitude, but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting (filtering) mechanism is used. This reduces the importance of lower and higher frequencies, approximating the response of the human ear.

1.1.2 Furthermore, the perception of noise may be determined by a number of other factors, which may not necessarily be acoustic. Noise can be perceived to be louder or more noticeable if the source of the noise is observed; e.g. roads, trains, factories, building sites etc. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features such as tonality may be important, as may the disposition of the affected individual. Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source. Various noise indices have been derived to describe the fluctuation of noise levels that vary over time. Usually, these noise indices relate to specific types of noise, and as such different noise indices are used to describe road traffic noise, background noise, construction noise, etc.

1.1.3 The weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurement and the levels are denoted as dB(A) or LAeq, LA90, etc, according to the parameter being measured.

1.1.4 The usual noise index used to describe road traffic noise in the UK is the LA10,18h, which is defined as the noise level that is exceeded for 10% of the time during an 18 hour period between 0600 hours and 2400 hours. Also used is the LA10,1h, which is defined as the noise level exceeded for 10% of the time during a one hour period, usually used to define traffic noise levels in the peak rush-hour periods.

1.1.5 The usual noise index used to describe background noise is the LA90,T, which is defined as the noise level that is exceeded for 90% of the time during a specified period T.

1.1.6 The usual noise index used to describe both mechanical plant and construction site noise is the LAeq,T, the equivalent continuous noise level. This can be defined as the level of a notional steady sound that, if continued over the time period (T), would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded during that same time period.

1.1.7 The decibel scale is logarithmic rather than linear. As a result of this, a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a general guide a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) of a steady source is generally regarded as the minimum difference needed to perceive a change. The following Table 8.1 demonstrates a few examples of noise levels typically experienced during everyday activities.

Table 8.1: Typical Sound Levels found in the Environment

Sound Level	Location
0 to 10dB(A)	Threshold of hearing
10 to 20dB(A)	Broadcasting studio

20 to 30dB(A)	Quiet bedroom at night
30 to 40dB(A)	Living room during the day
40 to 50dB(A)	Typical office
50 to 60dB(A)	Inside a car
60 to 70dB(A)	Typical high street
70 to 90dB(A)	Inside a factory or noisy pub
100 to 110dB(A)	Alarm clock at 1m away
110 to 130dB(A)	Pneumatic drill at 1m away
140dB(A)	Threshold of Pain

Interpreting Vibration

1.1.8 Vibration is defined as a repetitive oscillatory motion. Groundborne vibration can be transmitted to the human body through the supporting surfaces; the feet of a standing person, the buttocks, back and feet of a seated person or the supporting area of a recumbent person. In most situations, entry into the human body will be through the supporting ground or through the supporting floors of a building. Vibration from road traffic can also be airborne. Such airborne vibration is transmitted as a low-frequency sound wave and is often perceived when the sound wave causes windows or other objects to rattle.

1.1.9 Vibration is often complex, containing many frequencies, occurring in many directions and changing over time. There are many factors that influence human response to vibration. Physical factors include vibration magnitude, vibration frequency, vibration axis, duration, point of entry into the human body and posture of the human body. Other factors include the exposed persons experience, expectation, arousal and activity.

1.1.10 Experience shows that disturbance or annoyance from vibration in residential situations is likely to arise when the magnitude of vibration is only slightly in excess of the threshold of perception.

1.1.11 The threshold of perception depends on the frequency of vibration. The human body is most sensitive to vibration in the frequency range 1 to 80Hz and especially sensitive to vibration in the range 4 to 8Hz. As with noise, a frequency weighting mechanism is used to quantify vibration in a way that best corresponds to the frequency response of the human body. For occupants within buildings, the frequency-weighting curve is defined in British Standard (BS) 6472: 1992 ‘Evaluation of Human Exposure to Vibration in Buildings’. In general, vibration is only perceptible in residential situations when the building is close to a railway, construction site or very close to a road that carries large and heavy vehicles.

Appendix 14.2 Glossary of Noise Terminology

A-WEIGHTING

The human ear is not equally sensitive to all frequencies of sound. It is relatively much less sensitive to very low frequencies such as 'mains hum', and to very high frequencies such as the call of a bat, than to the 'mid-frequencies' important for human voice communication. In order to make sound level meters, which would otherwise be indiscriminate in registering sound pressures, respond in a way which reflects human perception of sound, they usually are fitted with a set of filters to progressively filter out the high and low frequency energy. The filters are made to an internationally standardised specification and the filtered noise level is said to be 'A-weighted'.

Sometimes A-weighted decibel levels are denoted 'dB(A)', but the correct, internationally standardised format for reporting requires the 'A' to be appended to the noise descriptor e.g. $L_{Aeq,T}$, L_{Amax}, etc.

AIRBORNE SOUND

Sound transmitted through the air rather than through the structure of a building or the ground.

AMBIENT NOISE

This is the totally encompassing sound at the measurement position over a specified time interval and usually comprises sound from many different sources both near and far.

ATTENUATION

A general term used to indicate the reduction of noise or vibration, or the amount (in decibels) by which it is reduced.

AVERAGING

In the absence of a dominant steady source, the sound level at a point, indoors or outdoors, varies continuously. For example, the variation may be over a few dB about an average value in a quiet room, or over 10 dB or more in a noisy outdoor environment. In order to define a level to represent the noisiness of the space it is necessary to define that average value. The most common averaging methods are energy averaging (L_{Aeq}) and statistical averaging (L_{AN} where N is a percentage between 1 and 100).

BACKGROUND NOISE LEVEL, $L_{A90,T}$

Background noise level is a term used to describe that level to which the noise falls during quiet spells, when there is lull in passing traffic for example. It is quantified by the $L_{A90,T}$ which is the noise level that is exceeded for 90% of the measurement time interval, T.

DECIBELS

Noise conventionally is measured in decibels (dB). The decibel is a logarithmic unit and decibel levels do not add and subtract arithmetically. An increase or decrease of 3 dB in the level of a steady noise is about the smallest that is noticeable. It represents a doubling or halving of noise energy. An increase or decrease of 10 dB represents a ten-fold change in noise energy, and is perceived as a doubling or halving of loudness.

The threshold of hearing for a typical young, healthy adult is 0 dB A-weighted sound pressure level. A noise level of 140 dB(A) can cause physical pain. Most people listen to their televisions at about 60 to 65 dB(A). Alongside a busy main road the ambient noise level may be in the 70 to 80 dB(A) range; on a quiet day in the country it might be as low as 30 dB, in town 40 to 50 dB(A).

DECIBEL ADDITION

If two similar noise sources operate together their combined noise level at an observer's position some distance away is 3 dB higher than the noise level generated by just one of them. If two further machines are switched on the noise level generated by all four at the observer's position is 3 dB higher than the level generated by the two. If the number of machines is again doubled, to eight, the noise level increases by another 3 dB, and so on.

EQUIVALENT CONTINUOUS A-WEIGHTED SOUND PRESSURE LEVEL, $L_{Aeq,T}$

The 'equivalent continuous A-weighted sound pressure level' is an average of the fluctuating sound energy in a space. It is the value of the A-weighted sound pressure level of a continuous, steady sound that, over the specified time period, T seconds, has the same root mean square sound pressure as the varying sound. It can be likened to the mean petrol consumption of a car over a specific journey during which the instantaneous consumption peaked during periods of acceleration and fell during periods of coasting or braking.

FAÇADE SOUND LEVELS

Road and railway traffic noise levels often are specified in terms of the sound level at a position 1m in front of the most exposed façade of potentially noise sensitive premises. Such levels are assumed to be 3 dB(A) higher than sound levels measured at an equivalent position away from the noise reflected off the building façade and any other surfaces (excluding the ground).

FREE-FIELD SOUND LEVELS

The free-field refers to sound level measurement positions in an open area well away from any buildings or other sound reflecting surfaces other than the ground. Generally the minimum distance from building facades for free-field measurements is taken to be 3.5m.

FREQUENCY

The number of cycles per second that the sound pressure fluctuates about the ambient static air pressure. High frequency noises are often described as having a high pitch and low frequency noises as having a low pitch. Frequency is measured in Hertz (Hz). The frequency limit of human hearing ranges from 20 Hz to 20 kHz.

FREQUENCY SPECTRUM

The complete range of frequencies.

LINE, POINT AND PLANE SOURCE

A noise source may be characterised either as a ‘point source’, a ‘plane source’ or a ‘line source’.

Point sources usually are fixed sources of relatively small dimensions (although an aircraft in flight behaves as a point source) the sound from which generally decreases at a rate of 6 dB per doubling of distance.

Plane sources generally are large sources such as the wall of a factory building where the noise originates within the building and is emitted uniformly through the wall. Attenuation of sound from a plane source is related to the size of the sound radiating surface and the distance of the receiver from it but as the distance increases so the attenuation rate tends towards that of a point source.

Railways and roads are the most common examples of a line source. The attenuation rate from a line source is 3 dB per doubling of distance.

MAXIMUM SOUND LEVEL, L_{Amax}

This is the maximum instantaneous sound level occurring during the measurement period. Because of the standardised response time characteristics of the sound level meter a L_{Amax} level

measured on Slow response normally will be a lower value than the same noise measured using Fast response.

OCTAVE BAND

The frequency spectrum is measured using an internationally standardised set of octave and 1/3 octave bands. These bands are identified by their nominal centre frequency specified in Hz (one hertz [Hz] is one cycle per second).

RESIDUAL NOISE

The ambient noise remaining at a given position in a given situation when the specific noise is suppressed to a degree such that it does not contribute to the ambient noise.

L_{AE} (SEL)

The sound exposure level in dB(A) which, if it lasted for 1 second, would produce the same A-weighted sound energy as the actual event.

SOUND POWER

The sound energy radiated per unit time by a sound source. Measured in Watts (W).

SOUND POWER LEVEL, L_w

Sound power measured on a decibel scale, relative to a reference value of 10^{-12} W.

SPECIFIC NOISE LEVEL, $L_{Aeq,Tr}$

The noise of the particular source under investigation.

Legend

- Substations

GILLESPIES WSP

Notes

Figure 1.1
Project Context Plan

Size: A3
Scale: Not to Scale
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

SP TRANSMISSION

Date: 05.07.10
Revision: -
Drawn by: AD
Checked by: AR

Legend

- Study Area
- Buffer Area
- Substation Locations

GILLESPIES WSP

Notes

Figure 2.1
Study Area, Buffer Area and Substation Locations

Size: A3
Scale: Not to Scale
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

SP TRANSMISSION

Date: 05.07.10
Revision: -
Drawn by: AD
Checked by: AR

Ewe Hill Windfarm Substation

Gretna Substation

N

0 1 2 4 Kilometres

Legend

- Study Area
- Existing Transmission Lines
- Substation

Environmental Constraints

- Site of Special Scientific Interest
- Ancient Woodland Inventory Site
- Local Wildlife Site
- Intermediate Bog Inventory Site
- Blanket Bog
- Bog / Mire
- Scheduled Ancient Monument
- Category A Listed Building
- Category B Listed Building
- Category C Listed Building
- Residential Property
- Right of Way

Landscape Constraints

- Residential Settlements (150m buffer)
- Regional Scenic Area
- Non-Inventory Designated Landscape
- Landscape of County Importance (Cumbria County Council)
- 'Double climbing'
- Impact setting of historic features
- Intimate landscapes
- Varied topography and slopes
- Upland landscapes
- Impact views from settlements

GILLESPIES WSP

Notes

Figure 2.2A
Gretna to Ewe Hill - Constraints Map

Size: A3
Scale: Not to Scale
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

SP TRANSMISSION

Date: 06.07.10
Revision: -
Drawn by: AD
Checked by: AR

Newfield Windfarm Substation

Ewe Hill Windfarm Substation

0 0.5 1 2 Kilometres

Legend

- Study Area
- Existing Transmission Lines
- Substation

Environmental Constraints

- Site of Special Scientific Interest
- Ancient Woodland Inventory Site
- Local Wildlife Site
- Intermediate Bog Inventory Site
- Blanket Bog
- Bog / Mire
- Scheduled Ancient Monument
- Category A Listed Building
- Category B Listed Building
- Category C Listed Building
- Residential Property
- Right of Way

Landscape Constraints

- Non-Inventory Designated Landscape
- Regional Scenic Area
- 'Double climbing'
- Impact setting of historic features
- Intimate landscapes
- Residential receptor (150m buffer)
- Varied topography and slopes
- Upland landscapes
- Impact views from settlements

GILLESPIES WSP

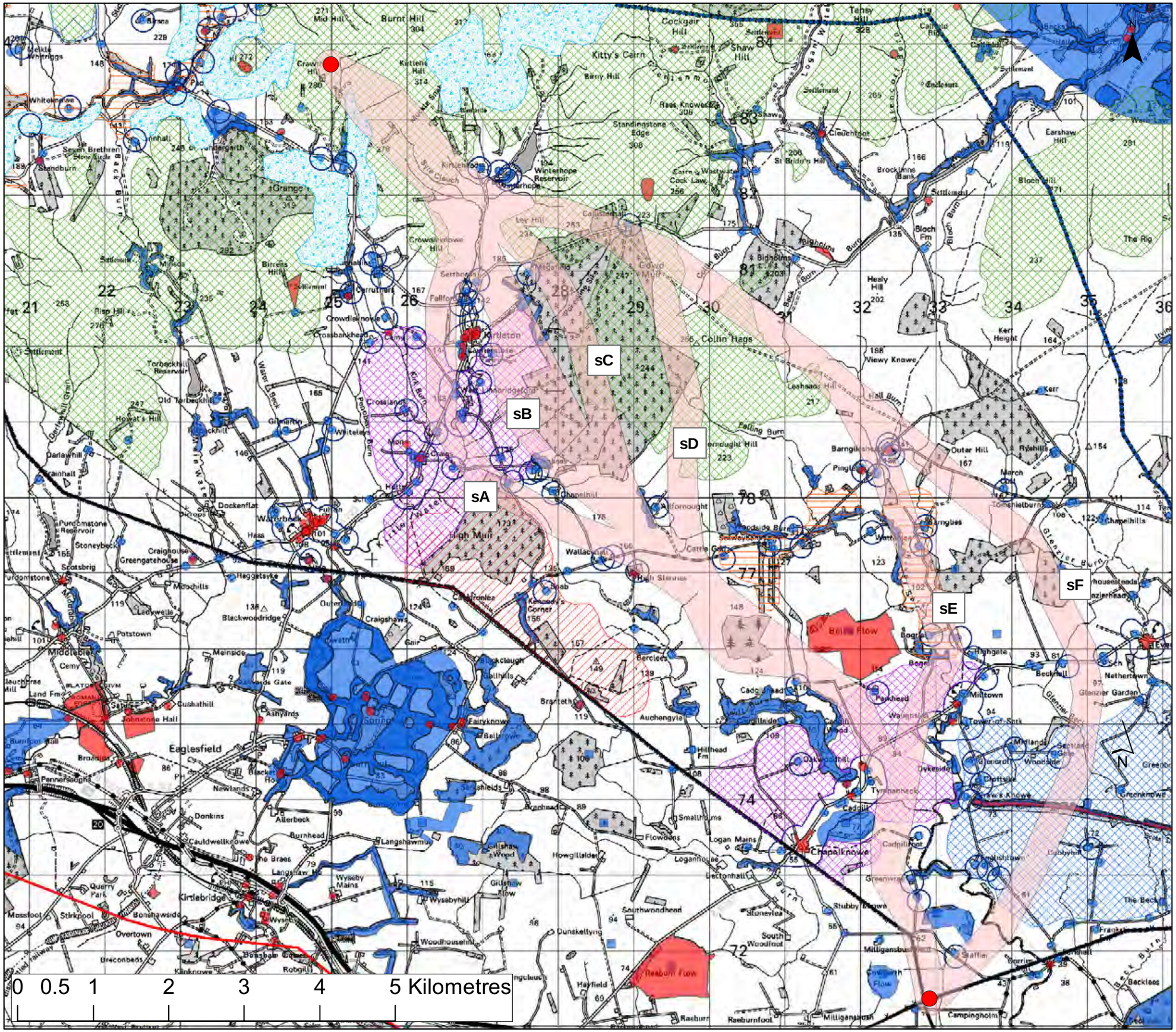
Notes

Figure 2.2b
Ewe Hill to Newfield - Constraints Map

Size: A3
Scale: Not to Scale
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

SP TRANSMISSION

Date: 06.07.10
Revision: -
Drawn by: AD
Checked by: AR



Legend

- Study Area
- Substation Locations
- Narrow Corridor
- Highest amenity constraints
- High amenity constraints
- Impact on views from settlements
- Impact on setting of historic features
- Varied topography and slopes
- Upland landscape
- Intimate landscape
- 'Double climbing'

GILLESPIES WSP

Notes

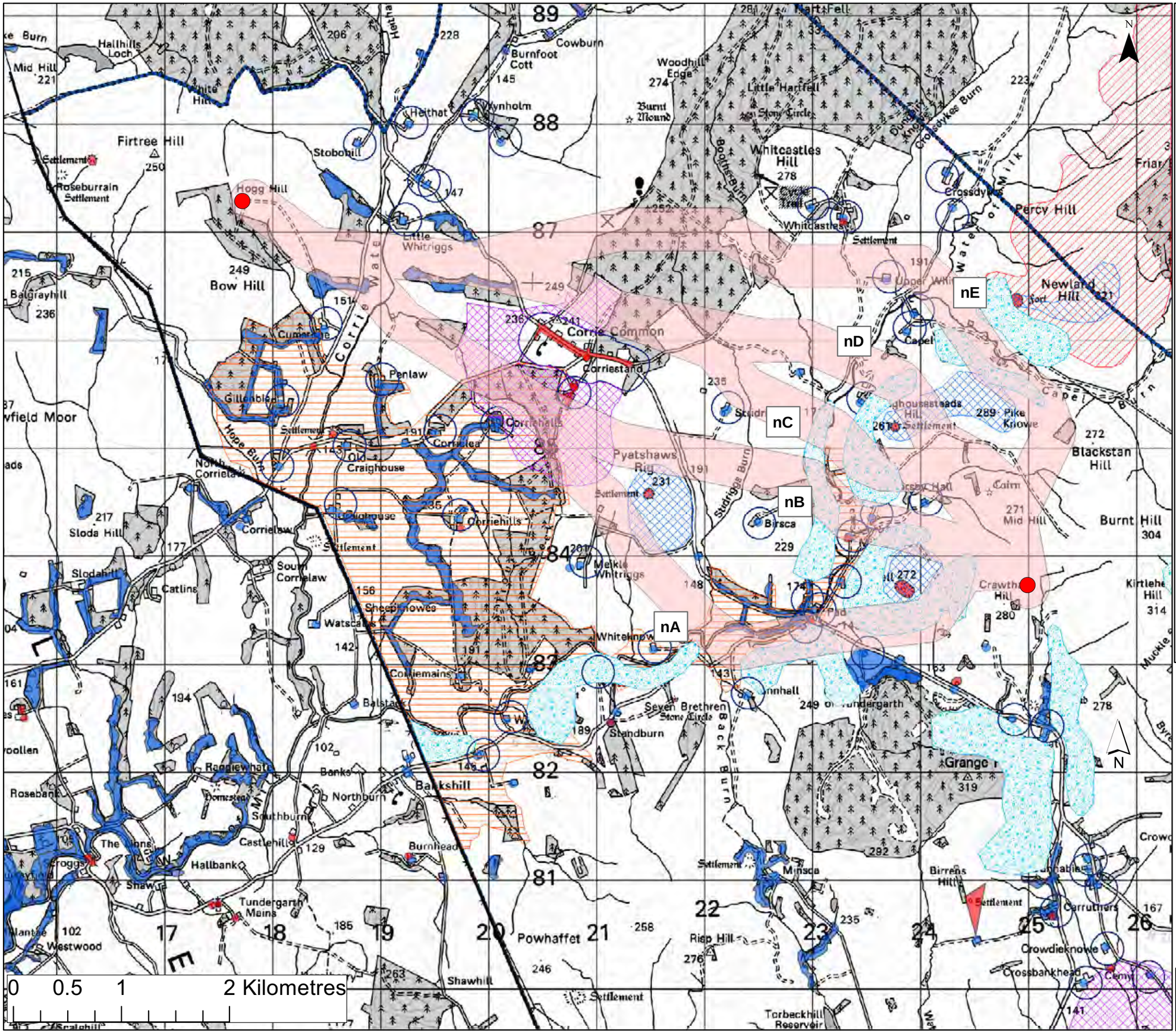
Ridge lines, summits and plateaus have not been annotated but have been considered, as read off the OS base mapping.

Figure 2.3A
Gretna to Ewe Hill -
Narrow Corridors

Size: A3
Scale: Not to Scale
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

SP TRANSMISSION

Date: 06.07.10
Revision: -
Drawn by: AD
Checked by: AR



Legend

- Study Area
- Substation Locations
- Narrow Corridor
- Highest amenity constraints
- High amenity constraints
- Impact on views from settlements
- Impact on setting of historic features
- Varied topography and slopes
- Intimate landscape
- 'Double climbing'

GILLESPIES WSP

Notes

Ridge lines, summits and plateaus have not been annotated but have been considered, as read off the OS base mapping.

Figure 2.3B
Ewe Hill to Newfield - Narrow Corridors

Size: A3
Scale: Not to Scale
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

SP TRANSMISSION

Date: 06.07.10
Revision: -
Drawn by: AD
Checked by: AR

Legend

- Study Area
- Substation Locations
- Narrow Corridor
- Highest amenity constraints
- High amenity constraints
- Impact on views from settlements
- Impact on setting of historic features
- Varied topography and slopes
- Upland landscape
- Intimate landscape
- 'Double climbing'
- Preferred Route Alignment

GILLESPIES WSP

Notes

Ridge lines, summits and plateaus have not been annotated but have been considered, as read off the OS base mapping.

Figure 2.4A
Gretna to Ewe Hill -
Preferred Alignment

Size: A3
Scale: Not to Scale
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

SP TRANSMISSION

Date: 06.07.10
Revision: -
Drawn by: AD
Checked by: AR

0 1.25 2.5 5 Kilometres

Legend

- Study Area
- Substation Locations
- Narrow Corridor
- Highest amenity constraints
- High amenity constraints
- Impact on views from settlements
- Impact on setting of historic features
- Varied topography and slopes
- Intimate landscape
- 'Double climbing'
- Preferred Route Alignment

GILLESPIES WSP

Notes

Ridge lines, summits and plateaus have not been annotated but have been considered, as read off the OS base mapping.

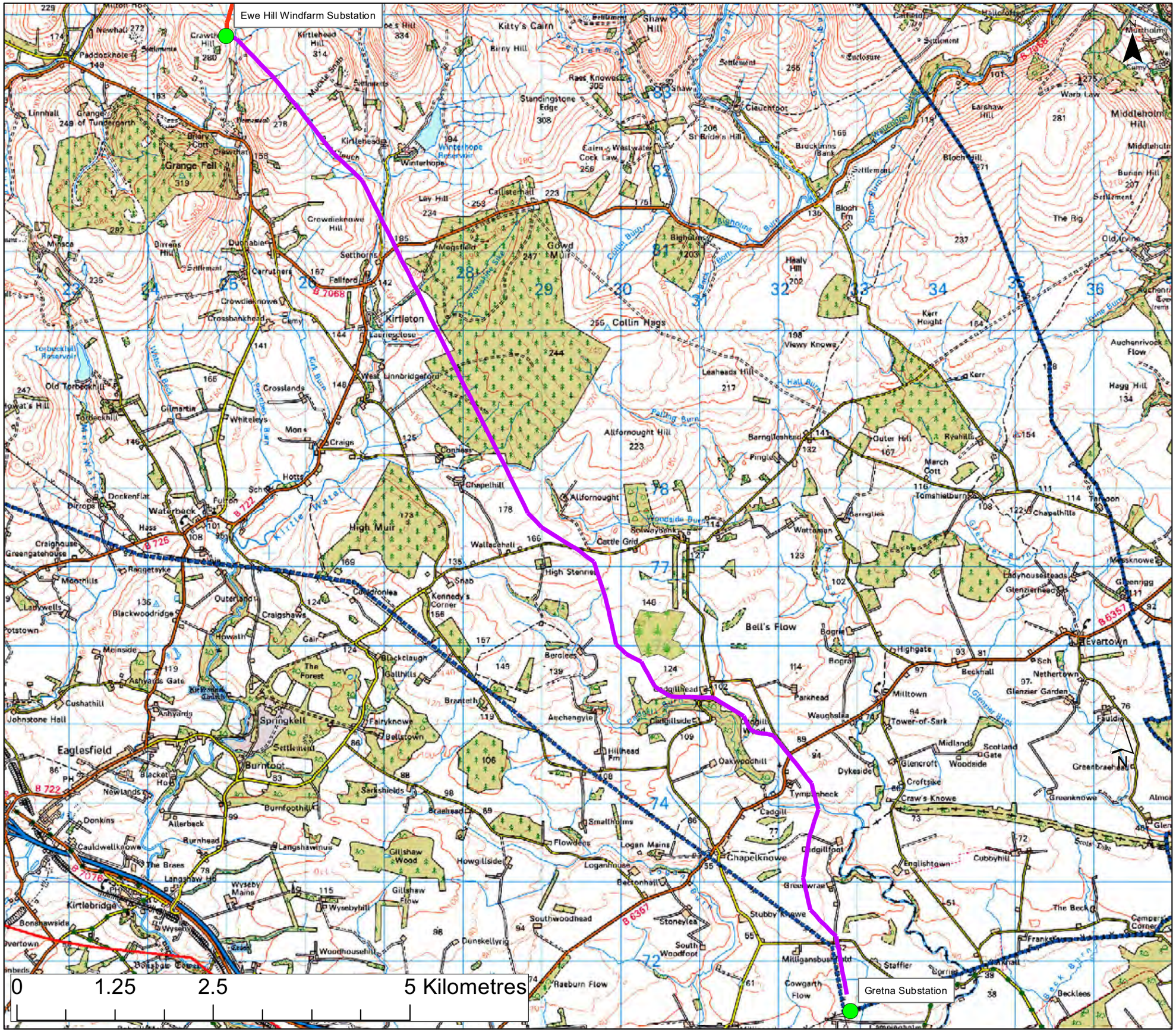
Figure 2.4B
Ewe Hill to Newfield - Preferred Alignment

Size: A3
Scale: Not to Scale
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

SP TRANSMISSION

Date: 06.07.10
Revision: -
Drawn by: AD
Checked by: AR

0 0.5 1 2 Kilometres



Legend

- Study Area
- Gretna to Ewe Hill Preferred Alignment
- Ewe Hill to Newfield Preferred Alignment
- Substation Locations

GILLESPIES WSP

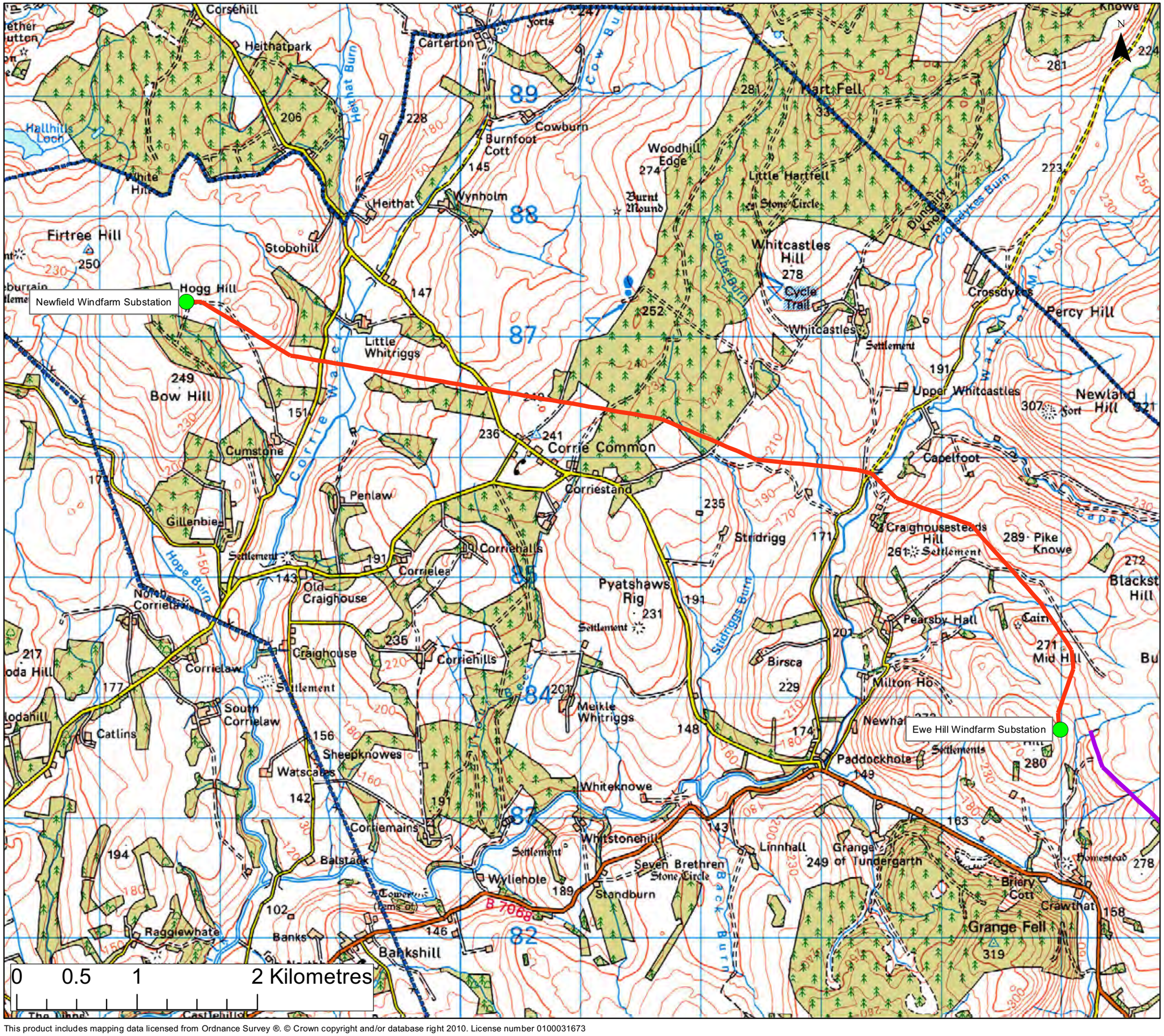
Notes

Figure 3.1 Gretna to Ewe Hill - Preferred Alignments

Size: A3
Scale: Not to Scale
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

SP TRANSMISSION

Date: 06.07.10
Revision: -
Drawn by: AD
Checked by: AR



Legend

- Study Area
- Gretna to Ewe Hill Preferred Alignment
- Ewe Hill to Newfield Preferred Alignment
- Substation Locations

GILLESPIES WSP

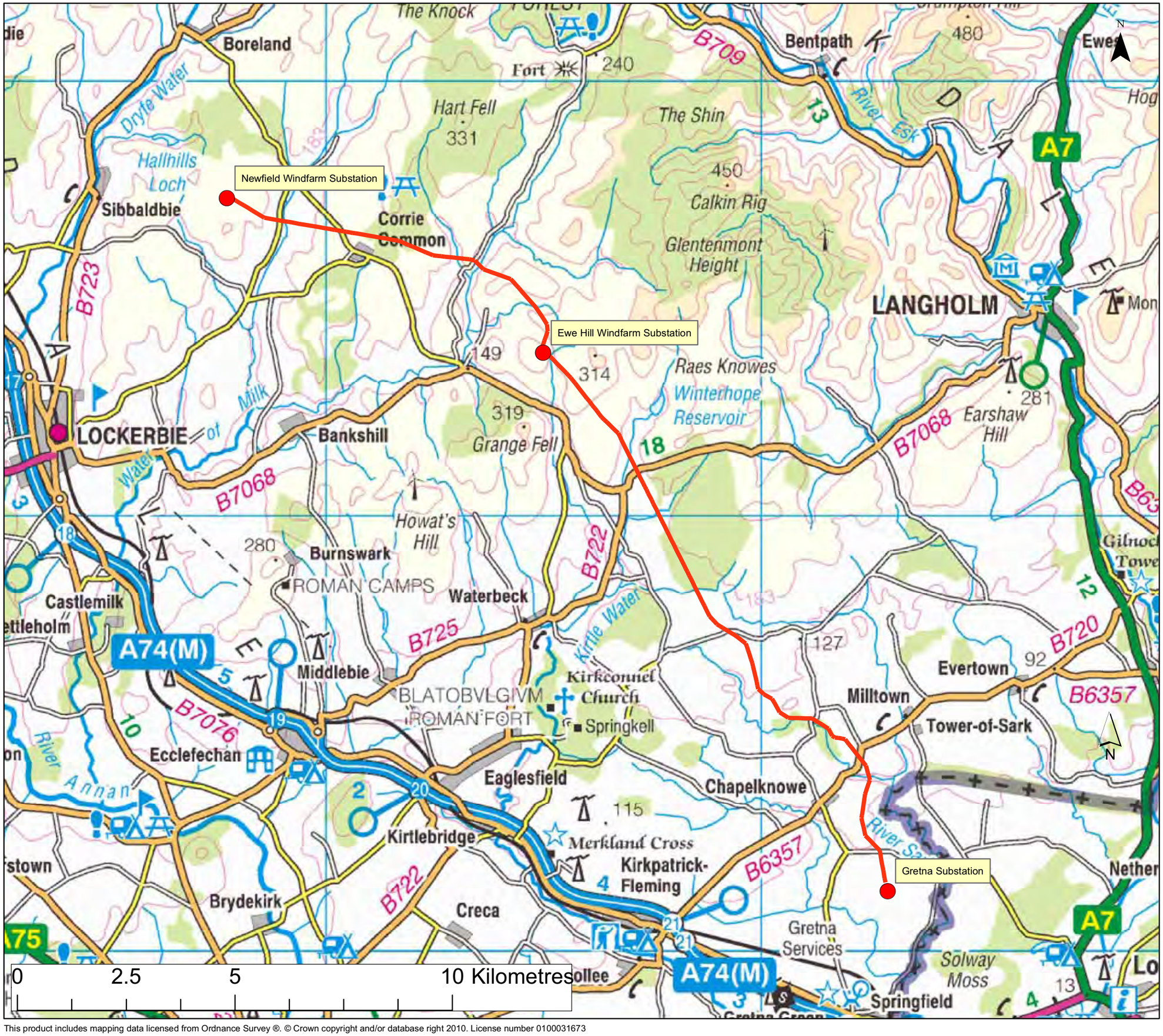
Notes

Figure 3.2 Ewe Hill to Newfield - Preferred Alignments

Size: A3
Scale: Not to Scale
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

SP TRANSMISSION

Date: 06.07.10
Revision: -
Drawn by: AD
Checked by: AR



Legend

- Proposed OHL Alignment
- Substation

GILLESPIES WSP

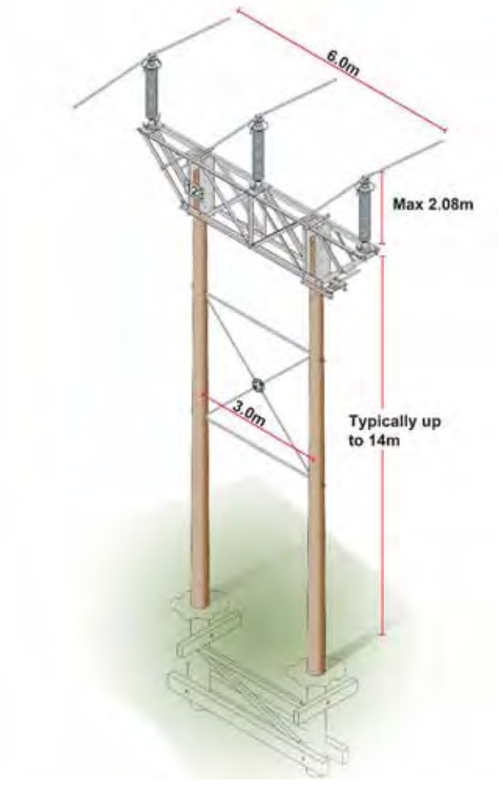
Notes

Figure 3.3
Overview of Proposed Alignment

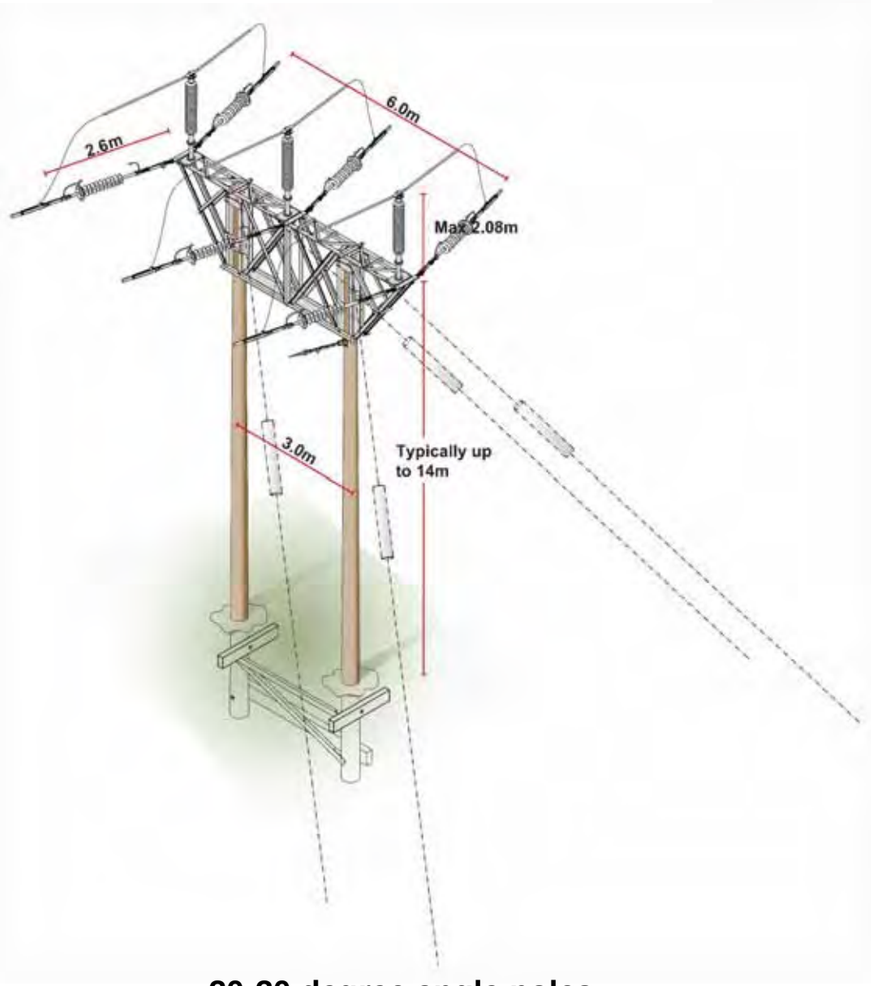
Size: A3
Scale: Not to Scale
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

SP TRANSMISSION

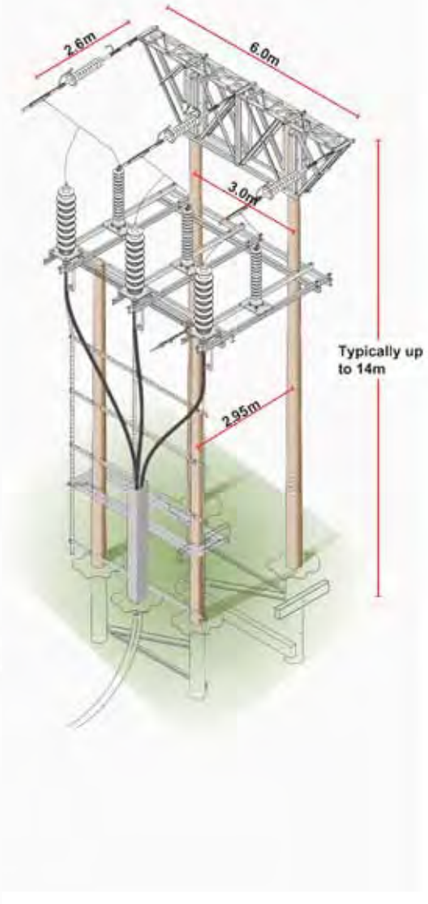
Date: 11.04.11
Revision: -
Drawn by: AD
Checked by: AR



Straight line poles



20-30 degree angle poles



Terminal structure

Legend

GILLESPIES WSP

Notes

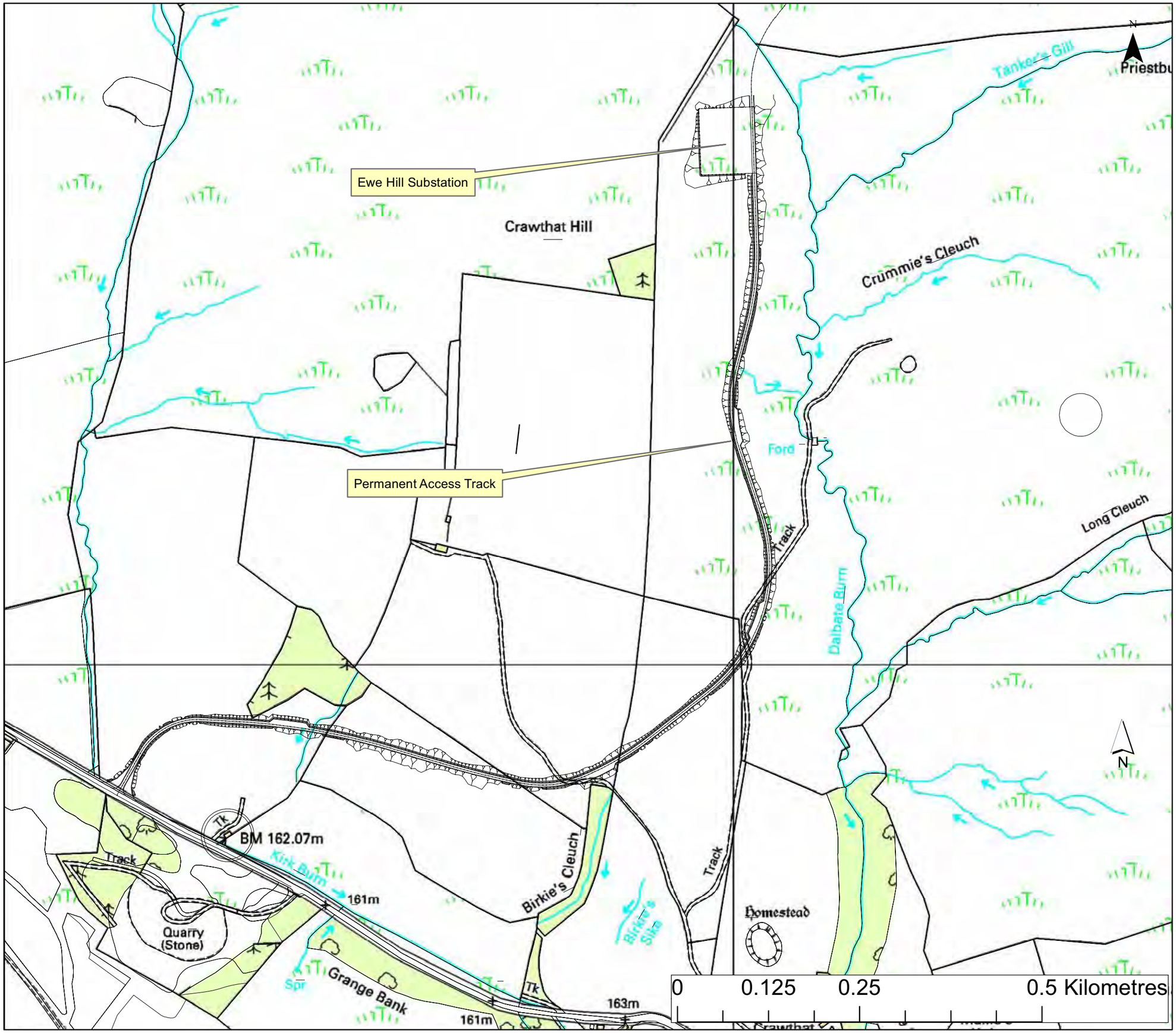
Images provided by CAPITA LOVEJOY

Figure 3.4
Typical Heavy Duty Wood Pole Construction Images

Size: A3
Scale: Not to Scale
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

SP TRANSMISSION

Date: 07.07.10
Revision: -
Drawn by: AD
Checked by: AR



Legend

GILLESPIES WSP

Notes

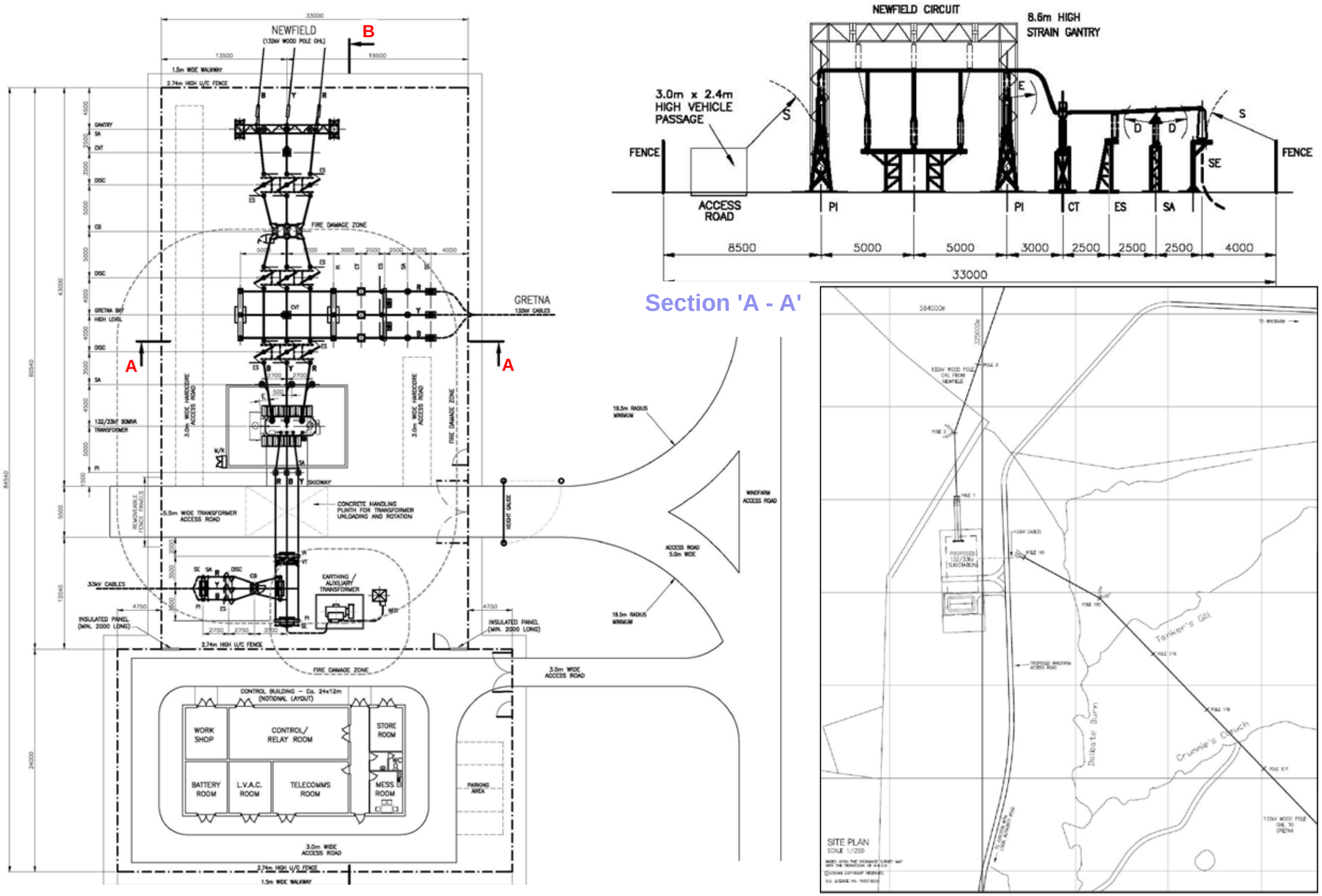
Access track drawings provided by Scott Wilson Ltd

Figure 3.5
Permanent Access Track to Ewe Hill Substation

Size: A3
Scale: Not to Scale
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

SP TRANSMISSION

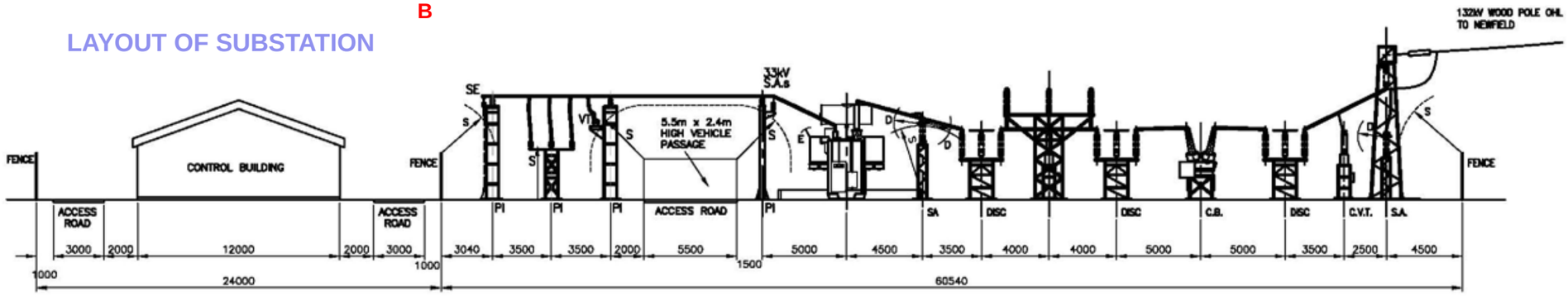
Date: 06.07.10
Revision: -
Drawn by: AD
Checked by: AR



B

LAYOUT OF SUBSTATION

Section 'A - A'



Section 'B - B'

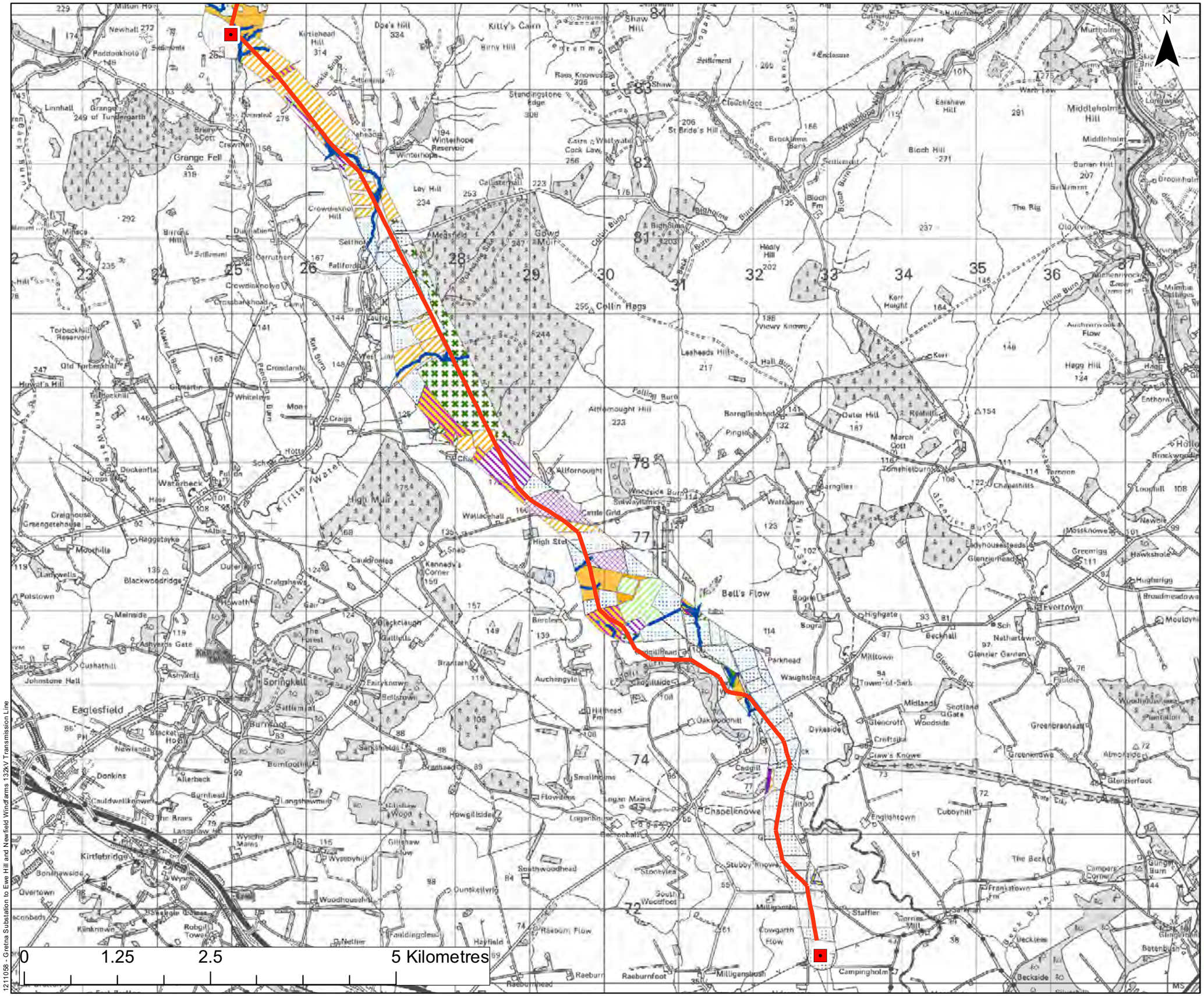
Notes

Reproduced from SP Energy Networks drawing SP 2146911:Revision 6

Figure 3.6
Electrical layout of proposed Ewe Hill substation

Size: A3
Scale: Not to Scale
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

Date:	12.04.11
Revision:	-
Drawn by:	AD
Checked by:	AR



Legend

- Transmission Line Alignment
- Proposed Substation
- Running Water
- Standing water
- Mixed woodland plantation
- Coniferous woodland plantation
- Scattered scrub
- Unimproved neutral grassland
- Unimproved/Semi-improved acid grassland
- Improved/Poor semi-improved grassland
- Arable cultivated land
- Introduced scrub
- Raised sphagnum bog
- Dry modified bog
- Marshy grassland
- Wet modified bog
- Bare ground
- Buildings

GILLESPIES WSP

Notes

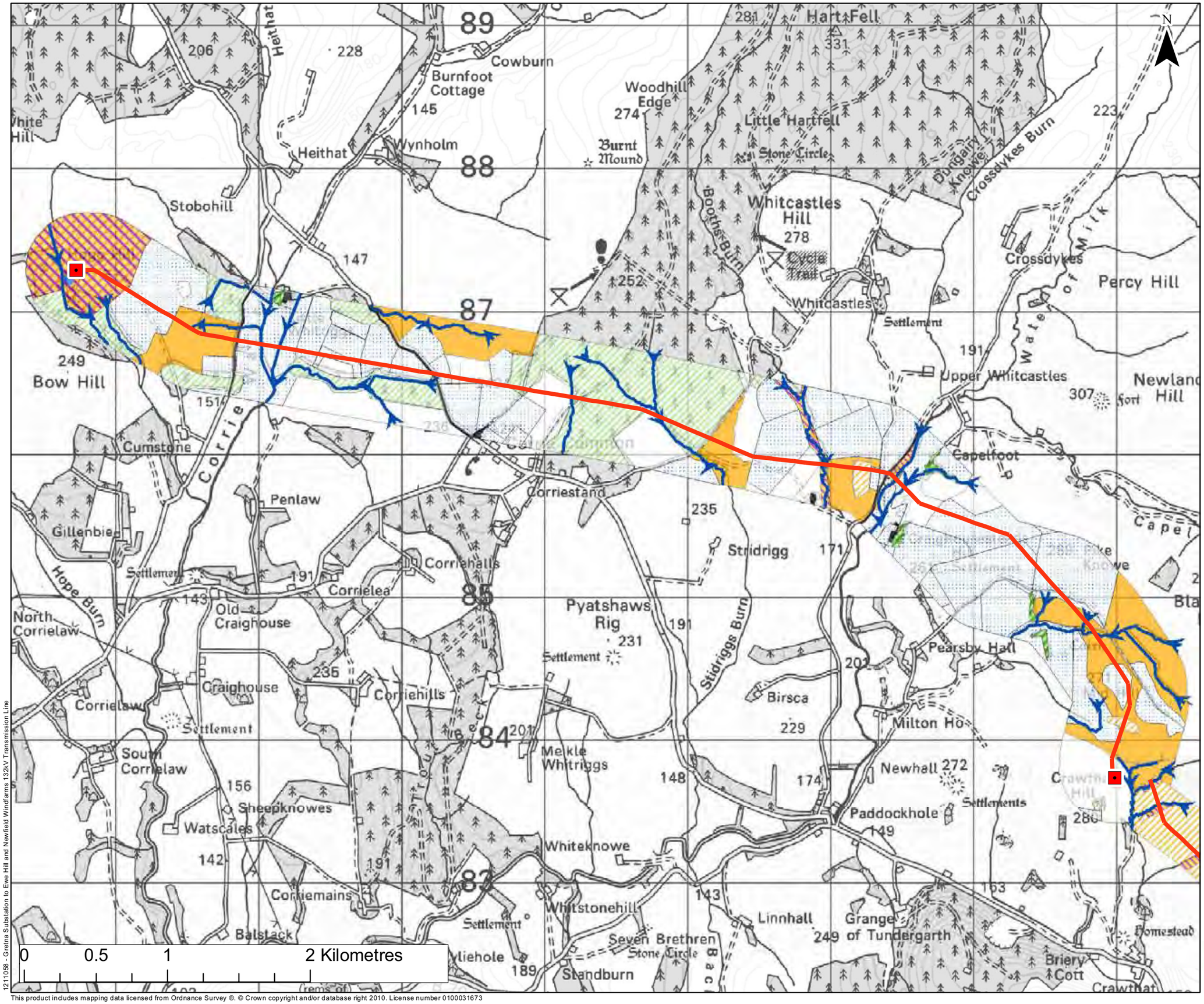
Figure 7.1
Phase 1 Habitat Map - Gretna to Ewe Hill

Size: A3
Scale: Not to Scale
Project: 1211554 - Gretna Substation to Ewe Hill and Newfield Windfarms 132kV Transmission Line

SP TRANSMISSION

Date: 16.07.10
Revision: A
Drawn by: AD
Checked by: AR

1211068 - Gretna Substation to Ewe Hill and Newfield Windfarms 132kV Transmission Line



Legend

- Transmission Line Alignment
- Proposed Substation
- Running Water
- Standing water
- Mixed woodland plantation
- Coniferous woodland plantation
- Scattered scrub
- Unimproved neutral grassland
- Unimproved/Semi-improved acid grassland
- Improved/Poor semi-improved grassland
- Arable cultivated land
- Introduced scrub
- Raised sphagnum bog
- Dry modified bog
- Marshy grassland
- Wet heath/acid grassland mosaic
- Wet modified bog
- Bare ground
- Buildings/Hardstanding

GILLESPIES WSP

Notes

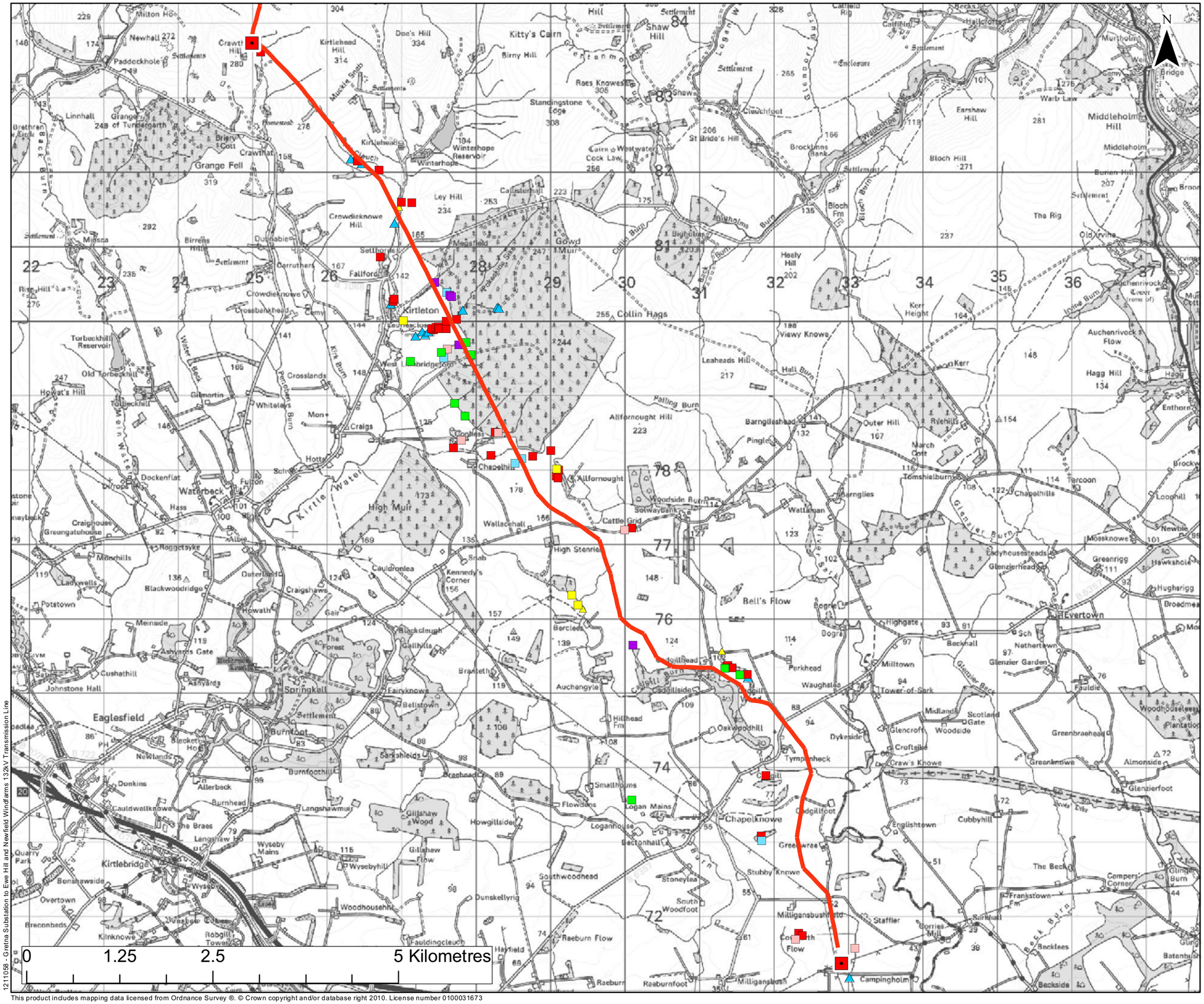
Figure 7.2
Phase 1 Habitat Map - Ewe Hill to Newfield

Size: A3
Scale: Not to Scale
Project: 1211554 - Gretna Substation to Ewe Hill and Newfield Windfarms 132kV Transmission Line

SP TRANSMISSION

Date: 16.07.10
Revision: A
Drawn by: AD
Checked by: AR

1211058 - Gretna Substation to Ewe Hill and Newfield Windfarms 132kV Transmission Line



Legend

- Transmission Line Alignment
- Proposed Substation

Badger Field Signs

- Sett
- Prints
- Snuffle Hole
- Path & Prints
- Dropping
- Latrine

Otter Field Signs

- Prints
- Spraint
- Spraint & Prints

Water Vole Field Signs

- Burrow & Dropping

GILLESPIES WSP

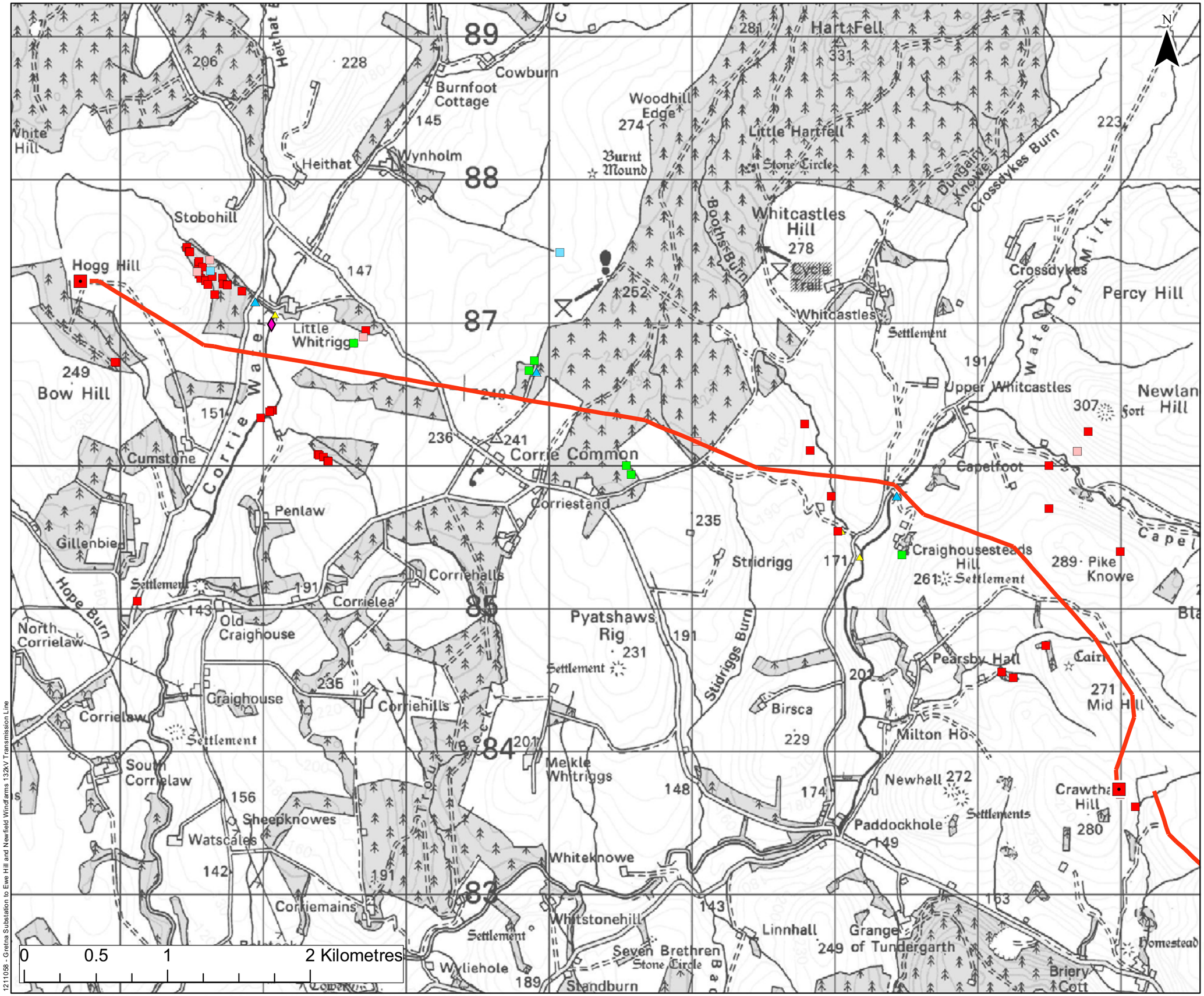
Notes

Figure 7.3
Protected Species from Grenta to Ewe Hill

Size: A3
Scale: Not to Scale
Project: 1211554 - Gretna Substation to Ewe Hill and Newfield Windfarms 132kV Transmission Line

SP TRANSMISSION

Date: 16.07.10
Revision: A
Drawn by: AD
Checked by: AR



Legend

- Transmission Line Alignment
- Proposed Substation

Badger Field Signs

- Sett
- Prints
- Snuffle Hole
- Path & Prints
- Dropping
- Latrine

Otter Field Signs

- Prints
- Spraint
- Spraint & Prints

Water Vole Field Signs

- Burrow & Dropping

GILLESPIES WSP

Notes

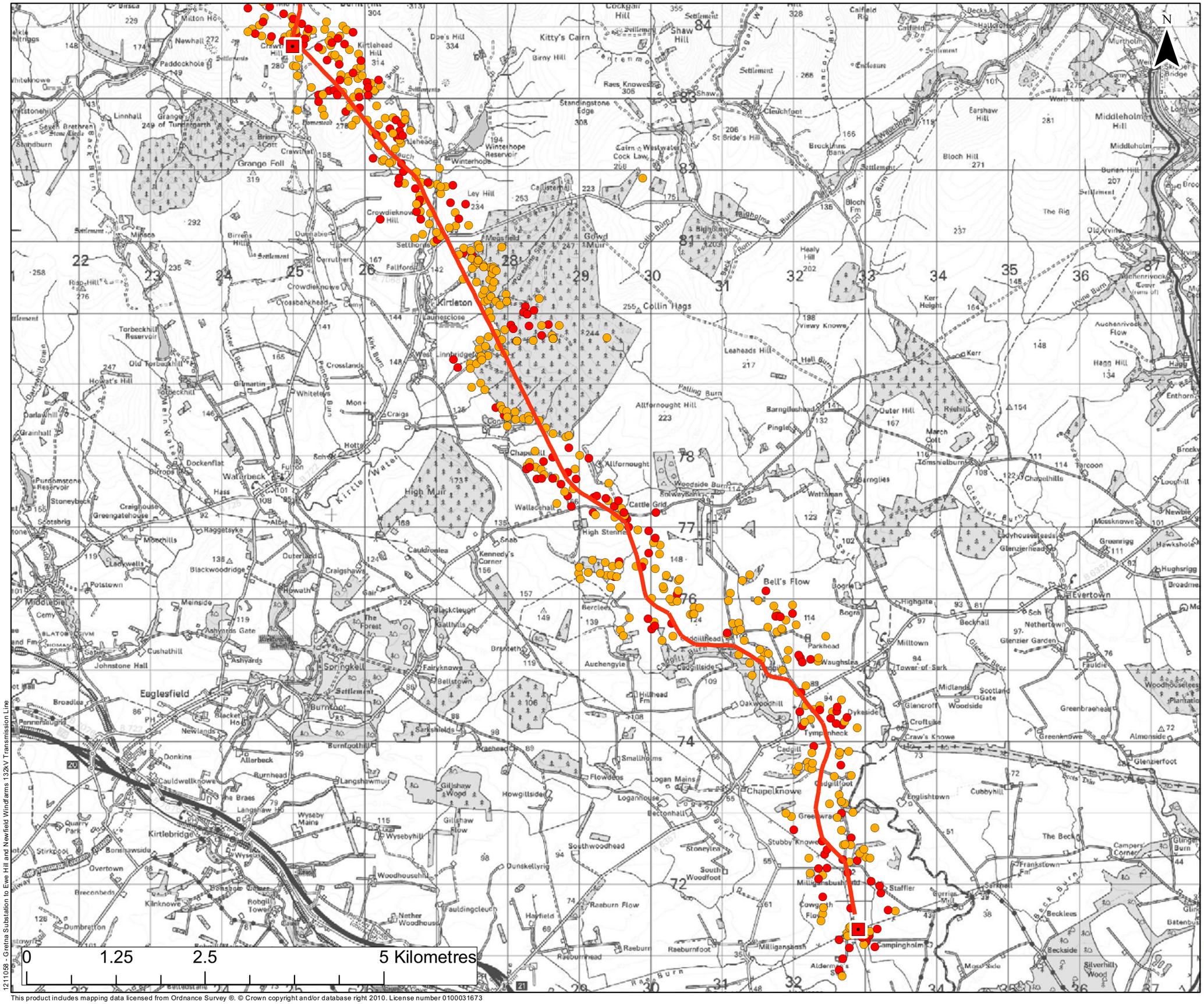
Figure 7.4
Protected Species from to Ewe Hill to Newfield

Size: A3
Scale: Not to Scale
Project: 1211554 - Gretna Substation to Ewe Hill and Newfield Windfarms 132kV Transmission Line

SP TRANSMISSION

Date: 16.07.10
Revision: A
Drawn by: AD
Checked by: AR

1211058 - Gretna Substation to Ewe Hill and Newfield Windfarms 132kV Transmission Line



Legend

- Transmission Line Alignment
- Proposed Substation

Birds of Conservation Concern Criteria

- Red
- Amber

GILLESPIES WSP

Notes

Figure 7.5a
Distribution of Breeding Birds - April
Gretna to Ewe Hill

Size: A3
Scale: Not to Scale
Project: 1211554 - Gretna Substation to Ewe Hill and Newfield Windfarms 132kV Transmission Line

SP TRANSMISSION

Date: 26.07.10
Revision: A
Drawn by: AD
Checked by: AR

1211058 - Gretna Substation to Ewe Hill and Newfield Windfarms 132kV Transmission Line

Legend

Transmission Line Alignment

Proposed Substation

Birds of Conservation Concern Criteria

Red

Amber

GILLESPIES WSP

Notes

Figure 7.5b
Distribution of Breeding Birds - May
Gretna to Ewe Hill

Size: A3
Scale: Not to Scale
Project: 1211554 - Gretna Substation to Ewe Hill and Newfield Windfarms 132kV Transmission Line

SP TRANSMISSION

Date: 26.07.10
Revision: A
Drawn by: AD
Checked by: AR

0 1.25 2.5 5 Kilometres

1211058 - Gretna Substation to Ewe Hill and Newfield Windfarms 132kV Transmission Line

Legend

Transmission Line Alignment

Proposed Substation

Birds of Conservation Concern Criteria

Red

Amber

GILLESPIES WSP

Notes

Figure 7.5c
Distribution of Breeding Birds - June
Gretna to Ewe Hill

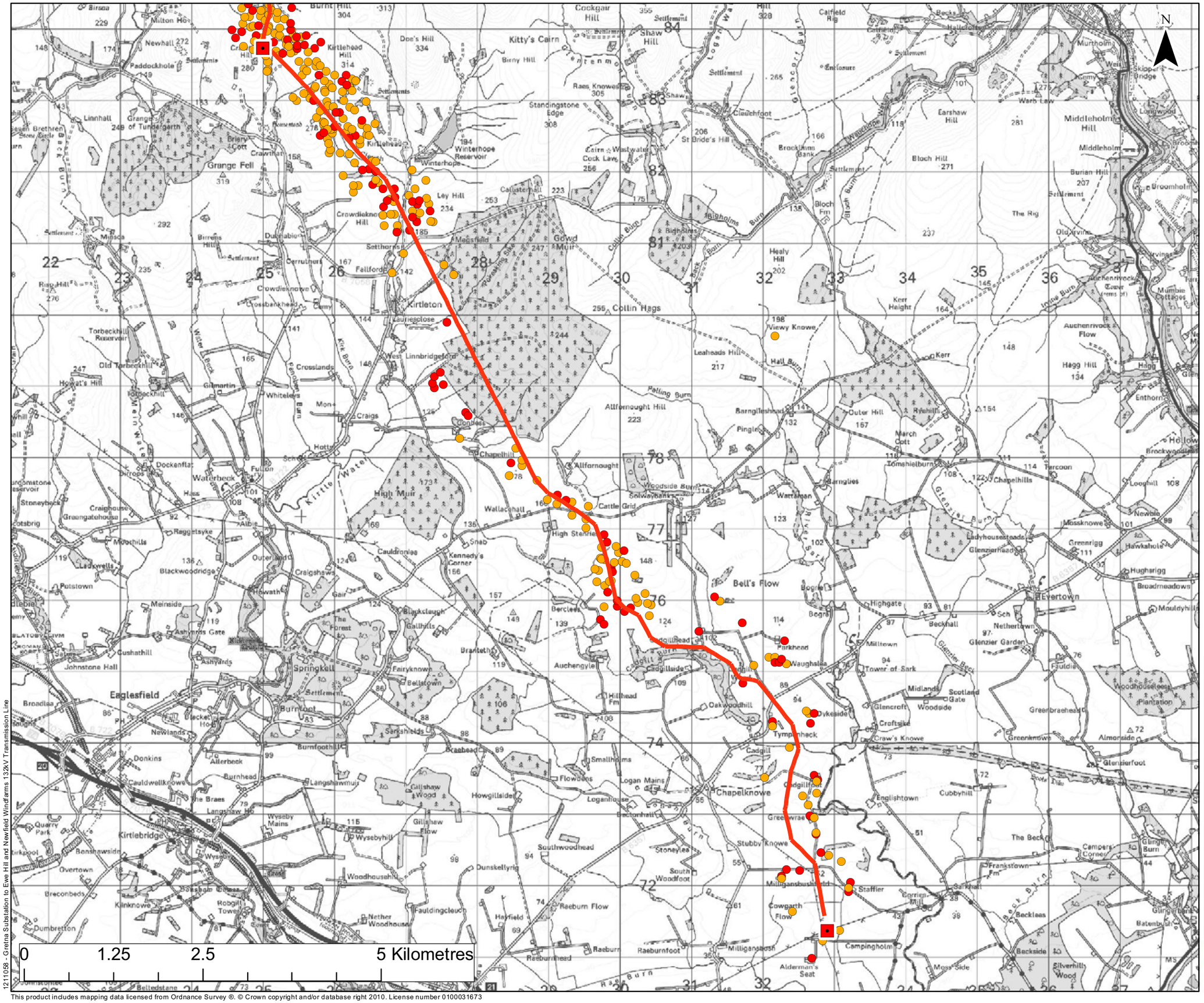
Size: A3
Scale: Not to Scale
Project: 1211554 - Gretna Substation to Ewe Hill and Newfield Windfarms 132kV Transmission Line

SP TRANSMISSION

Date: 26.07.10
Revision: A
Drawn by: AD
Checked by: AR

0 1.25 2.5 5 Kilometres

1211058 - Gretna Substation to Ewe Hill and Newfield Windfarms 132kV Transmission Line



Legend

- Transmission Line Alignment
- Proposed Substation

Birds of Conservation Concern Criteria

- Red
- Amber

GILLESPIES WSP

Notes

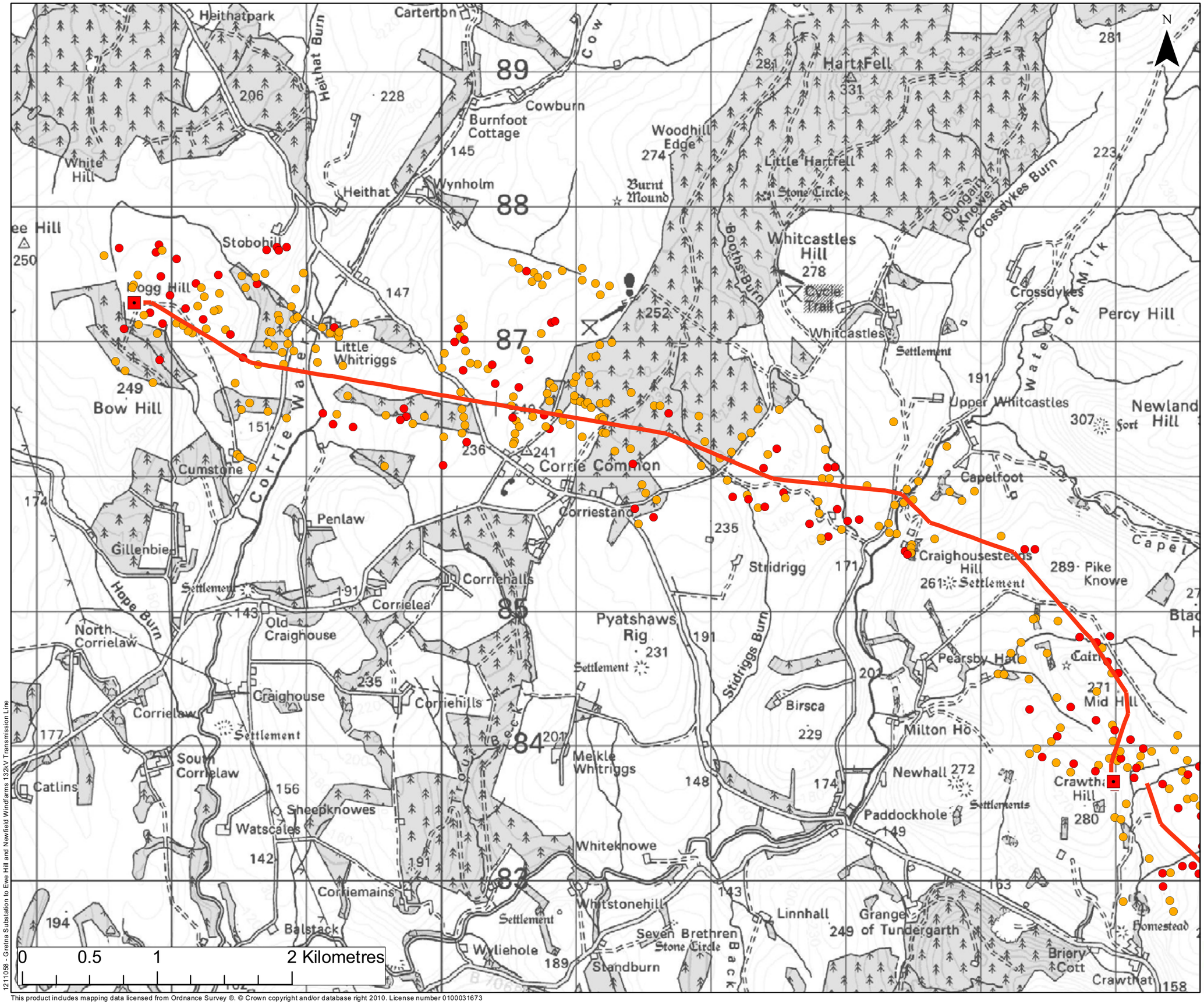
Figure 7.5d
Distribution of Breeding Birds - July
Gretna to Ewe Hill

Size: A3
Scale: Not to Scale
Project: 1211554 - Gretna Substation to Ewe Hill and Newfield Windfarms 132kV Transmission Line

SP TRANSMISSION

Date: 26.07.10
Revision: A
Drawn by: AD
Checked by: AR

1211058 - Gretna Substation to Ewe Hill and Newfield Windfarms 132kV Transmission Line



Legend

- Transmission Line Alignment
- Proposed Substation

Birds of Conservation Concern Criteria

- Red
- Amber

GILLESPIES WSP

Notes

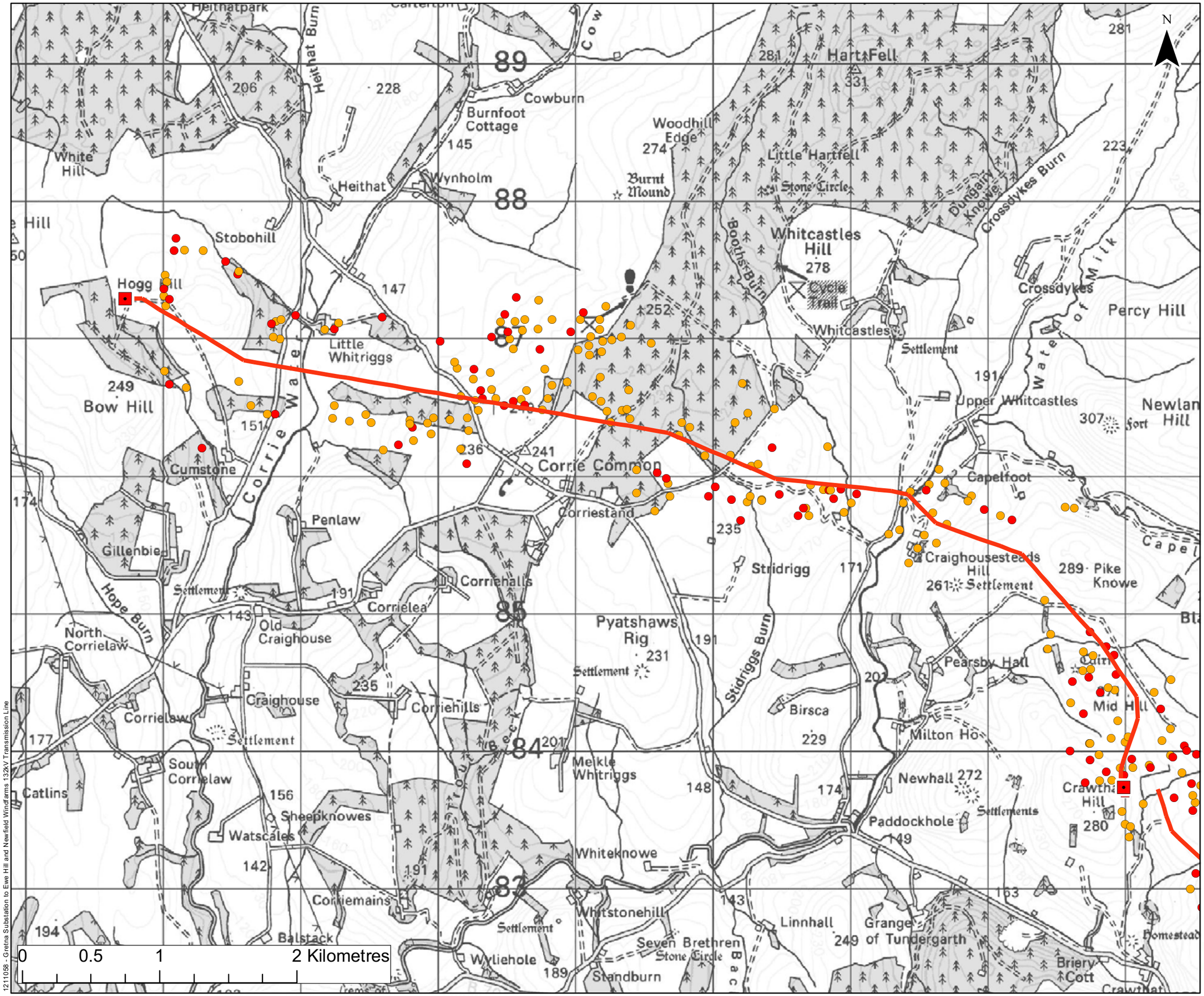
Figure 7.6a
Distribution of Breeding Birds - April
Ewe Hill to Newfield

Size: A3
Scale: Not to Scale
Project: 1211554 - Gretna Substation to Ewe Hill and Newfield Windfarms 132kV Transmission Line

SP TRANSMISSION

Date: 26.07.10
Revision: A
Drawn by: AD
Checked by: AR

1211058 - Gretna Substation to Ewe Hill and Newfield Windfarms 132kV Transmission Line



1211058 - Gretna Substation to Ewe Hill and Newfield Windfarms 132kV Transmission Line

Legend

- Transmission Line Alignment
- Proposed Substation

Birds of Conservation Concern Criteria

- Red
- Amber

GILLESPIES WSP

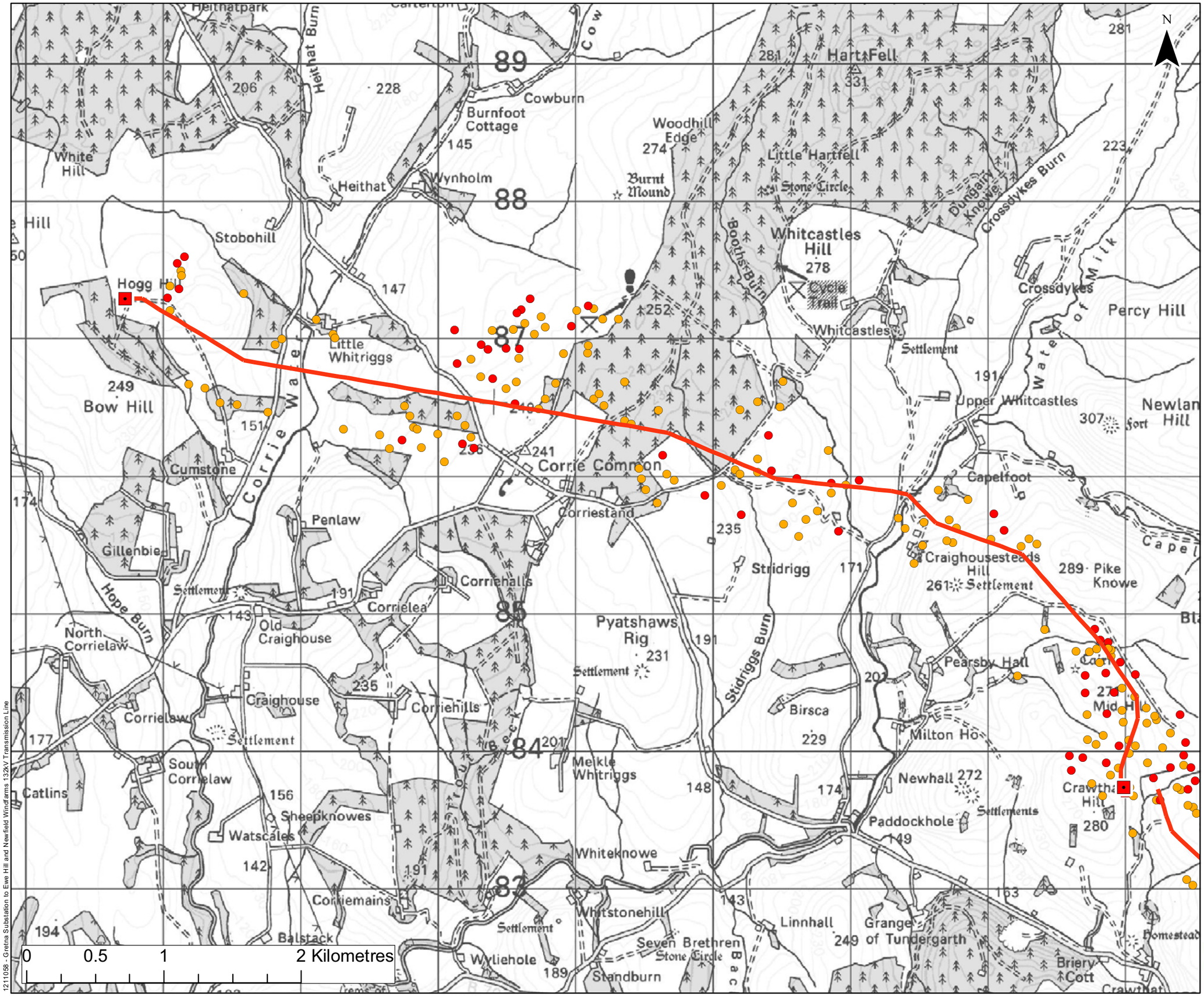
Notes

Figure 7.6b
Distribution of Breeding Birds - May
Ewe Hill to Newfield

Size: A3
Scale: Not to Scale
Project: 1211554 - Gretna Substation to Ewe Hill and Newfield Windfarms 132kV Transmission Line

SP TRANSMISSION

Date: 26.07.10
Revision: A
Drawn by: AD
Checked by: AR



Legend

- Transmission Line Alignment
- Proposed Substation

Birds of Conservation Concern Criteria

- Red
- Amber

GILLESPIES WSP

Notes

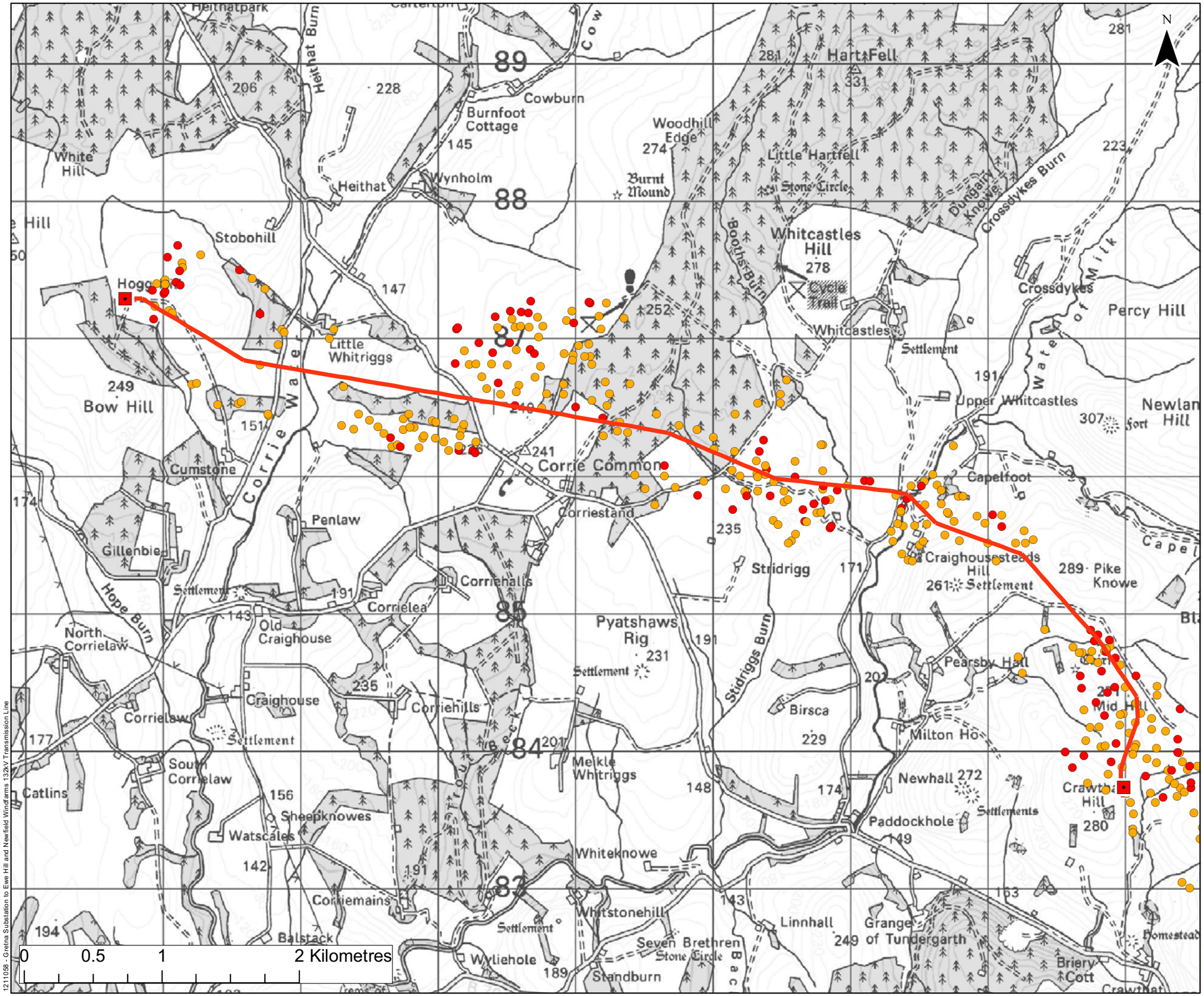
Figure 7.6c
Distribution of Breeding Birds - June
Ewe Hill to Newfield

Size: A3
Scale: Not to Scale
Project: 1211554 - Gretna Substation to Ewe Hill and Newfield Windfarms 132kV Transmission Line

SP TRANSMISSION

Date: 26.07.10
Revision: A
Drawn by: AD
Checked by: AR

1211058 - Gretna Substation to Ewe Hill and Newfield Windfarms 132kV Transmission Line



Legend

- Transmission Line Alignment
- Proposed Substation

Birds of Conservation Concern Criteria

- Red
- Amber

GILLESPIES WSP

Notes

Figure 7.6d
Distribution of Breeding Birds - July
Ewe Hill to Newfield

Size: A3
Scale: Not to Scale
Project: 1211554 - Gretna Substation to Ewe Hill and Newfield Windfarms 132kV Transmission Line

SP TRANSMISSION

Date: 26.07.10
Revision: A
Drawn by: AD
Checked by: AR

1211058 - Gretna Substation to Ewe Hill and Newfield Windfarms 132kV Transmission Line

12 - Dunnabie Hill Plantation
Amber (1)

11 - Gate Head Plantation
Red (1) Amber (1)

10 - Byre Cleuch South Plantation
Red (1) Amber (1)

9 - Fallford Plantation
Amber (1)

8 - Kirtleton Wood

7 - Conhess Plantation
Red (1) Amber (3)

6 - Allfornaught semi-natural Woodland
Red (1) Amber (2)

5 - Plantation Nr Berclees
Amber (1)

4 - Anniegill Plantation
Amber (2)

3 - Neds Beck Semi-natural/Ancient Wood
Amber (2)

2- Cadgill Flow Mire Woodland
Amber (2)

1- Greenwrae Flow Mire Woodland
Amber (2)

0 1.25 2.5 5 Kilometres

Legend

- Transmission Line Alignment
- Proposed Substation

GILLESPIES WSP

Notes

For further information regarding the woodlands and the birds species identified at each site, refer to Table 4.2 Gretna to Ewe Hill, in Appendix 7.4.

Figure 7.7
Location of Woodland Blocks from Gretna to Ewe Hill

Size: A3
Scale: Not to Scale
Project: 1211554 - Gretna Substation to Ewe Hill and Newfield Windfarms 132kV Transmission Line

SP TRANSMISSION

Date: 19.07.10
Revision: A
Drawn by: AD
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1211058 - Gretna Substation to Ewe Hill and Newfield Windfarms 132kV Transmission Line

16 - Hogg Hill Plantation
Red (1) Amber (2)

15 - Stobohill Linn Plantation
Red (3) Amber (3)

12 - Little Whitriggs Plantation
Amber (1)

9 - Corrie Plantation
Red (2) Amber (5)

7 - Corrie Plantation (N)
Amber (1)

8 - Corrie Plantation (S)
Amber (2)

6 - Carhead Plantation
Amber (2)

11 - Ladycleuch Plantation
Amber (3)

5 - Craighousesteads Plantation
Amber (1)

4 - Blackstan Plantation
Amber (2)

10 - Parkcleuch Plantation

13 - Cumstone North Plantation
Red (2) Amber (2)

2 - Alton Hill Plantation
Amber (1)

14 - Cumstone South Plantation
Red (1) Amber (3)

3 - Haggie's Brae Plantation

1 - Craw-that Hill Plantation
Amber (2)

0 0.5 1 2 Kilometres

Legend

Transmission Line Alignment

Proposed Substation

GILLESPIES WSP

Notes

For further information regarding the woodlands and the birds species identified at each site, refer to Table 4.2 Ewe Hill to Newfield, in Appendix 7.4.

Figure 7.8
Location of Woodland Blocks from Ewe Hill to Newfield

Size: A3
Scale: Not to Scale
Project: 1211554 - Gretna Substation to Ewe Hill and Newfield Windfarms 132kV Transmission Line

SP TRANSMISSION

Date: 19.07.10
Revision: A
Drawn by: AD
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1211058 - Gretna Substation to Ewe Hill and Newfield Windfarms 132kV Transmission Line

Kirkleton (Summer)

High Muir (Summer)

High Stenries (Summer)

Solwaybank (Summer & Winter)

Stubbyknowe (Summer & Winter)

0 1.25 2.5 5 Kilometres

1211058 - Gretna Substation to Ewe Hill and Newfield Windfarms 132kV Transmission Line

Legend

- Transmission Line Alignment
- Proposed Substation
- Vantage Point Location

GILLESPIES WSP

Notes

Figure 7.9
Location of Vantage Points
From Gretna to Ewe Hill

Size: A3
Scale: Not to Scale
Project: 1211554 - Gretna Substation to Ewe Hill and Newfield Windfarms 132kV Transmission Line

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Date: 02.09.10
Revision: A
Drawn by: AD
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Corrie
(Summer & Winter)

East Corrie
(Summer)

0 0.5 1 2 Kilometres

Legend

- Transmission Line Alignment
- Proposed Substation
- Vantage Point Location

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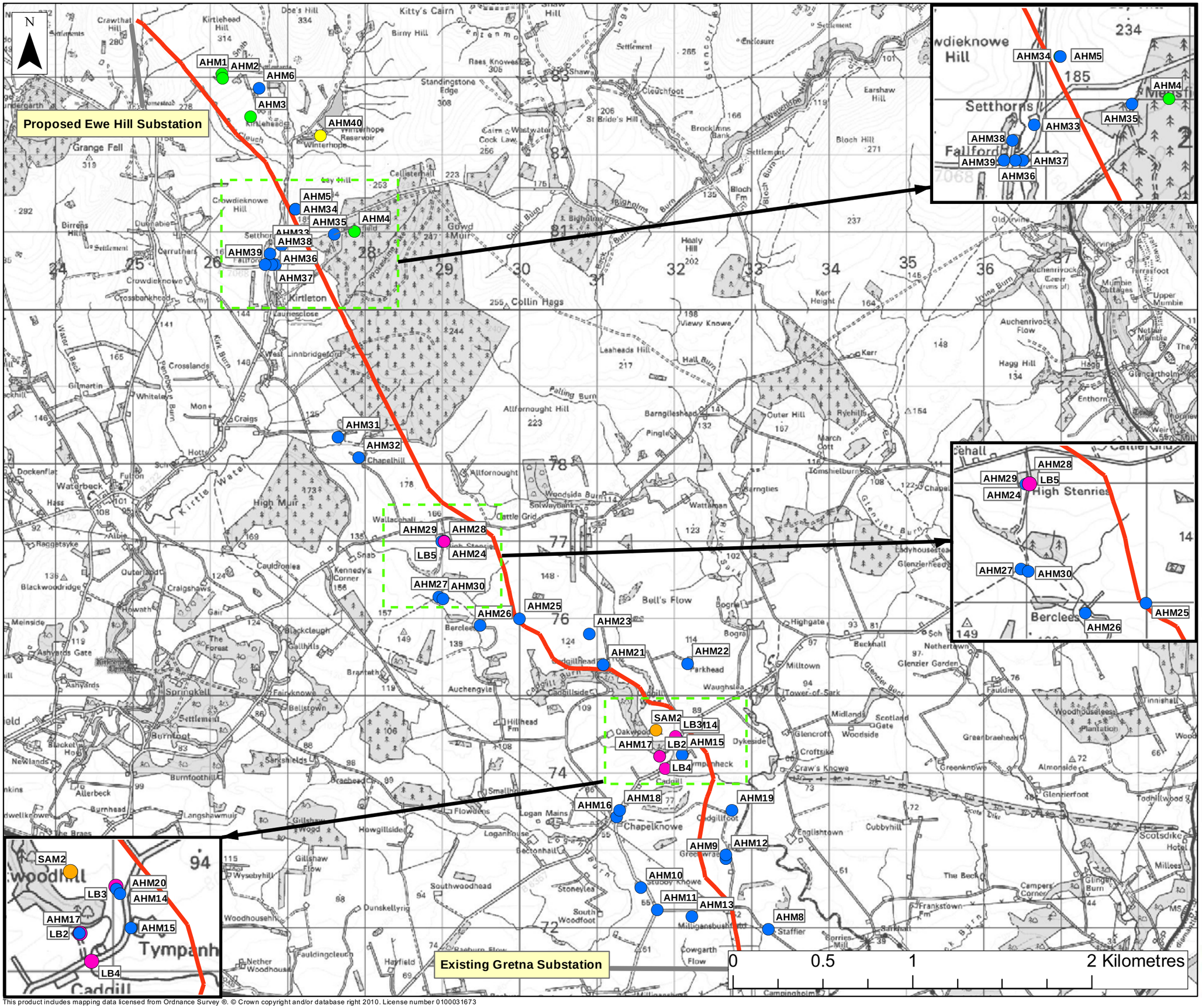
Notes

Figure 7.10
Location of Vantage Points
From Ewe Hill to Newfield

Size: A3
Scale: Not to Scale
Project: 1211554 - Gretna Substation to Ewe Hill and Newfield Windfarms 132kV Transmission Line

SP TRANSMISSION

Date: 02.09.10
Revision: A
Drawn by: AD
Checked by: AR



Legend

- Transmission Line Alignment
- Listed Building
- Scheduled Ancient Monument

Ancient & Historical Monuments

- Post Medieval
- Prehistoric
- Unknown
- Enlarged Area (Inset Map)

GILLESPIES WSP

Notes

Figure 8.1 Gretna to Ewe Hill Archaeological Records

Size: A3
Scale: Not to Scale
Project: 1211554 - Gretna Substation to Ewe Hill and Newfield Windfarms 132kV Transmission Line

SP TRANSMISSION

Date: 06.07.10
Revision: -
Drawn by: AD
Checked by: AR

Proposed Newfieldl Substation

Existing Ewe Hill Substation

AHM55 AHM54 AHM61 AHM60 AHM63 AHM62 AHM58 AHM56 AHM51 AHM50 AHM47 AHM57 AHM48 AHM45 AHM46 AHM44 SAM1 AHM49 AHM43 AHM41 AHM42 LB1 AHM59

Corsehill Heithatpark Heithat Burn Carterton forts Cow Burn Kirkslight Hill Crossdykes Knowe Cowburn Burnfoot Cottage Woodhill Edge Hart Fell Little Hartfell Stone Circle Burnt Mound Wynholm Heithat Stobohill Hogg Hill Booths Burn Whitcastles Hill Cycle Trail Crossdykes Burn Durngarry Knowe Crossdykes Water of Milk Percy Hill Whitcastles Settlement Little Whitriggs Bow Hill Upper Whitcastles Newland Hill Fort Cumstone Corrie Water Corrie Common Corriestand Penlaw Gillenbie Hope Burn Settlement Corriehalls Corrielea Old Craighouse North Corrielaw Capelfoot Craighousesteads Hill Settlement Pyatshaws Rig Stridrigg Stridriggs Burn Pearsby Hall Blackstan Hill Birsca Milton Ho Meikle Whitriggs Whiteknowe Whitstonehill Linnhall Grange Paddockhole Settlements Crawthat Hill

0 0.5 1 2 Kilometres

N

Legend

- Transmission Line Alignment
- Listed Building
- Scheduled Ancient Monument

Ancient & Historical Monuments

- Post Medieval
- Prehistoric
- Unknown
- Enlarged Area (Inset Map)

GILLESPIES WSP

Notes

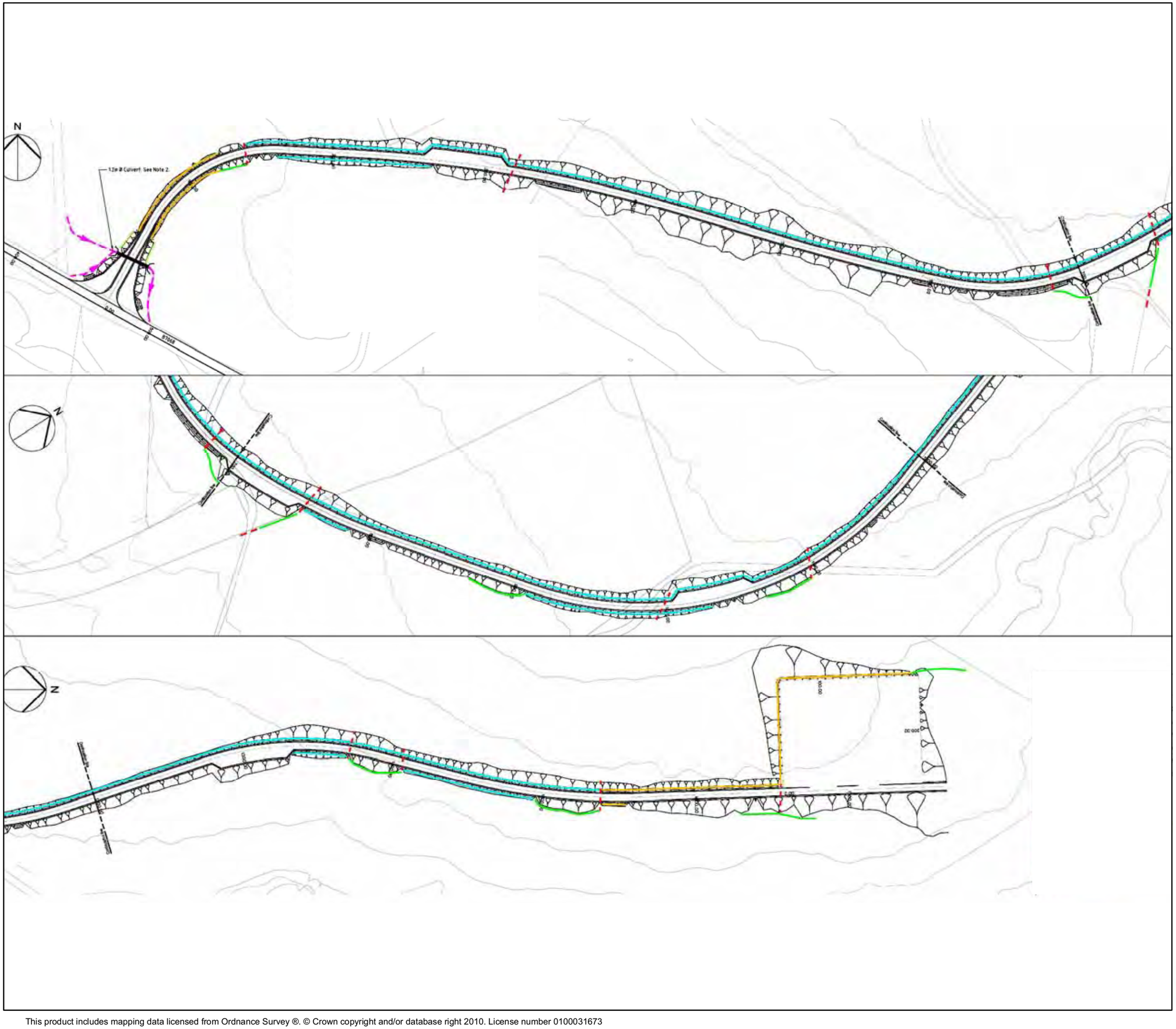
Figure 8.2 Ewe Hill to Newfield Archaeological Records

Size: A3
Scale: Not to Scale
Project: 1211554 - Gretna Substation to Ewe Hill and Newfield Windfarms 132kV Transmission Line

SP TRANSMISSION

Date: 06.07.10
Revision: -
Drawn by: AD
Checked by: AR

12151554 - Gretna Substation to Ewe Hill and Newfield Windfarms 132kV Transmission Line



Legend

- TYPE 3: DITCH IN CUT
- TYPE 1: FILTER DITCH IN CUT
- TYPE 8: SIMPLE SWALE
- SMALL CULVERT
- DITCH TYPE D1

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Notes

1. For drainage details refer to drawing S106757/P/011

2. This watercourse appears on Ordinance Survey 1:50,000 plans, and is therefore subject to The Water Environment (Controlled Activities)(Scotland) Regulations 2005. Consultation with SEPA will be carried out to determine what level of Authorisation is required for the culvert.
   The culvert has been sized by analysing the upstream catchment and determining its size using 5 meter DTM data. Futhermore, the culvert has been designed to accommodate a 1 in 100 year storm event plus 20% (to account for climate change) and is imbedded by 300mm to provide a natural culvert.

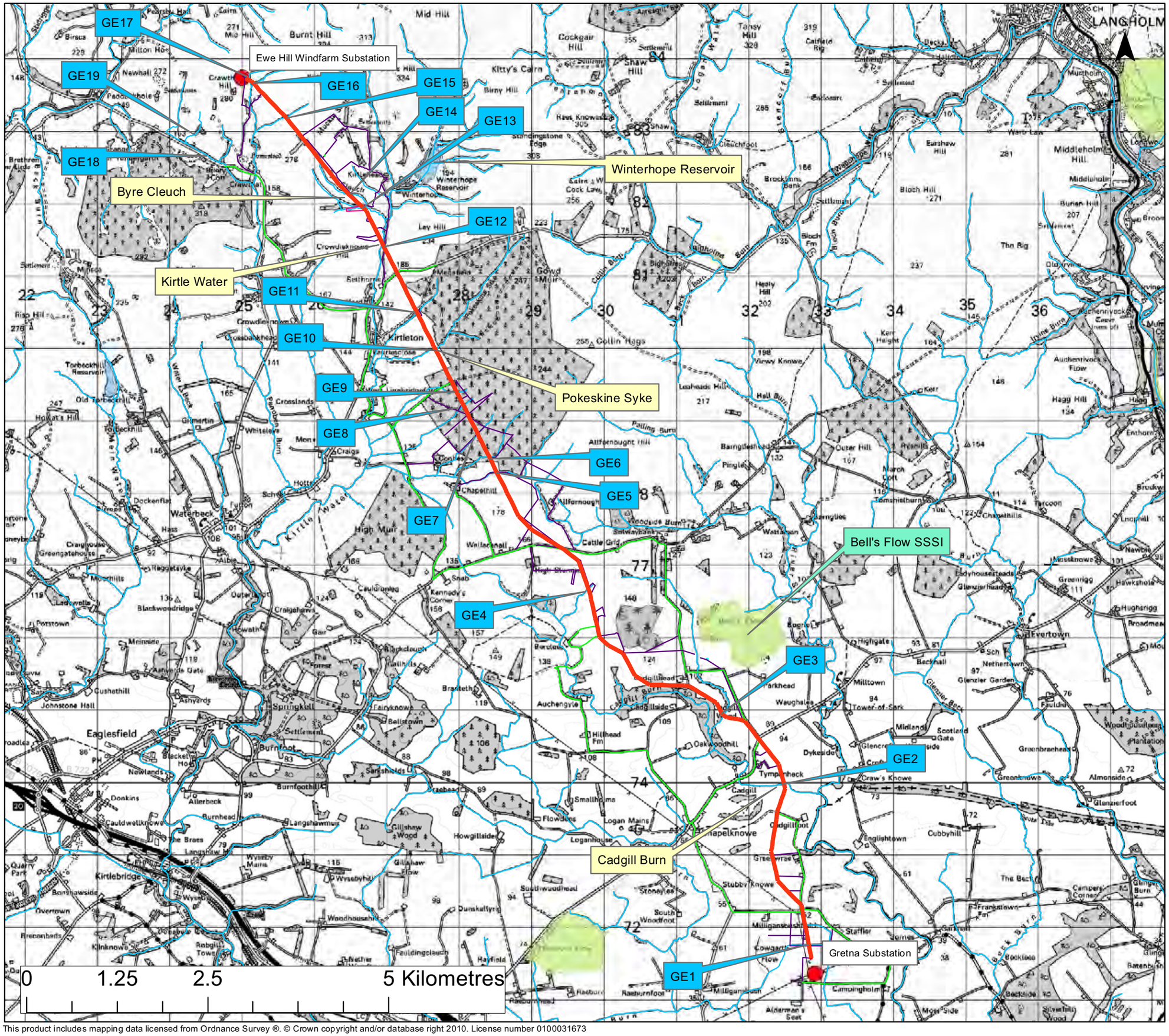
Reproduced from Scott Wilson drawing: S106757/P/010

Figure 10.1
Access Track Drainage Plan

Size: A3
Scale: Not to Scale
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

SP TRANSMISSION

Date: 06.07.10
Revision: -
Drawn by: AD
Checked by: AR



Legend

- Proposed OHL Alignment
- Watercourses
- Principle Access
- Secondary Access
- SSSI

GILLESPIES WSP

Notes

Figure 10.2 Gretna to Ewe Hill Watercourses and Access Tracks

Size: A3
Scale: Not to Scale
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

SP TRANSMISSION

Date: 06.07.10
Revision: -
Drawn by: AD
Checked by: AR

Proposed Ewe Hill Substation

Existing Gretna Substation

0 1.25 2.5 5 Kilometres

Legend

- Substation
- Transmission Line Alignment
- Dumfries & Galloway Council Private Water Supply Record
- Scottish Agricultural College Private Water Supply Record

GILLESPIES WSP

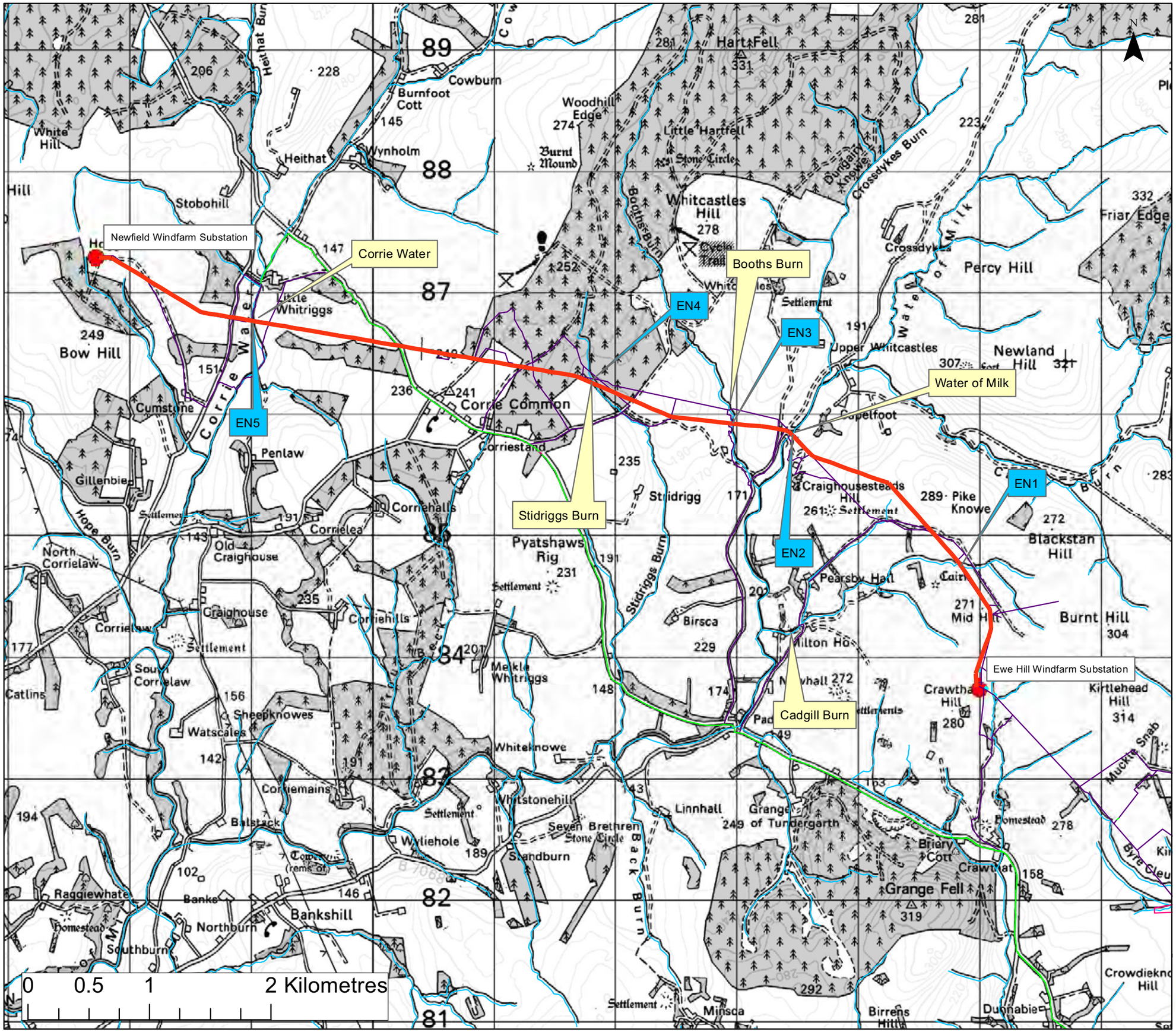
Notes

Figure 10.3 Gretna to Ewe Hill
Private Water Supply Records

Size: A3
Scale: Not to Scale
Project: 1211554 - Gretna Substation to Ewe Hill and Newfield Windfarms 132kV Transmission Line

SP TRANSMISSION

Date: 06.07.10
Revision: -
Drawn by: AD
Checked by: AR



Legend

- Proposed OHL Alignment
- Watercourses
- Principle Access
- Secondary Access

GILLESPIES WSP

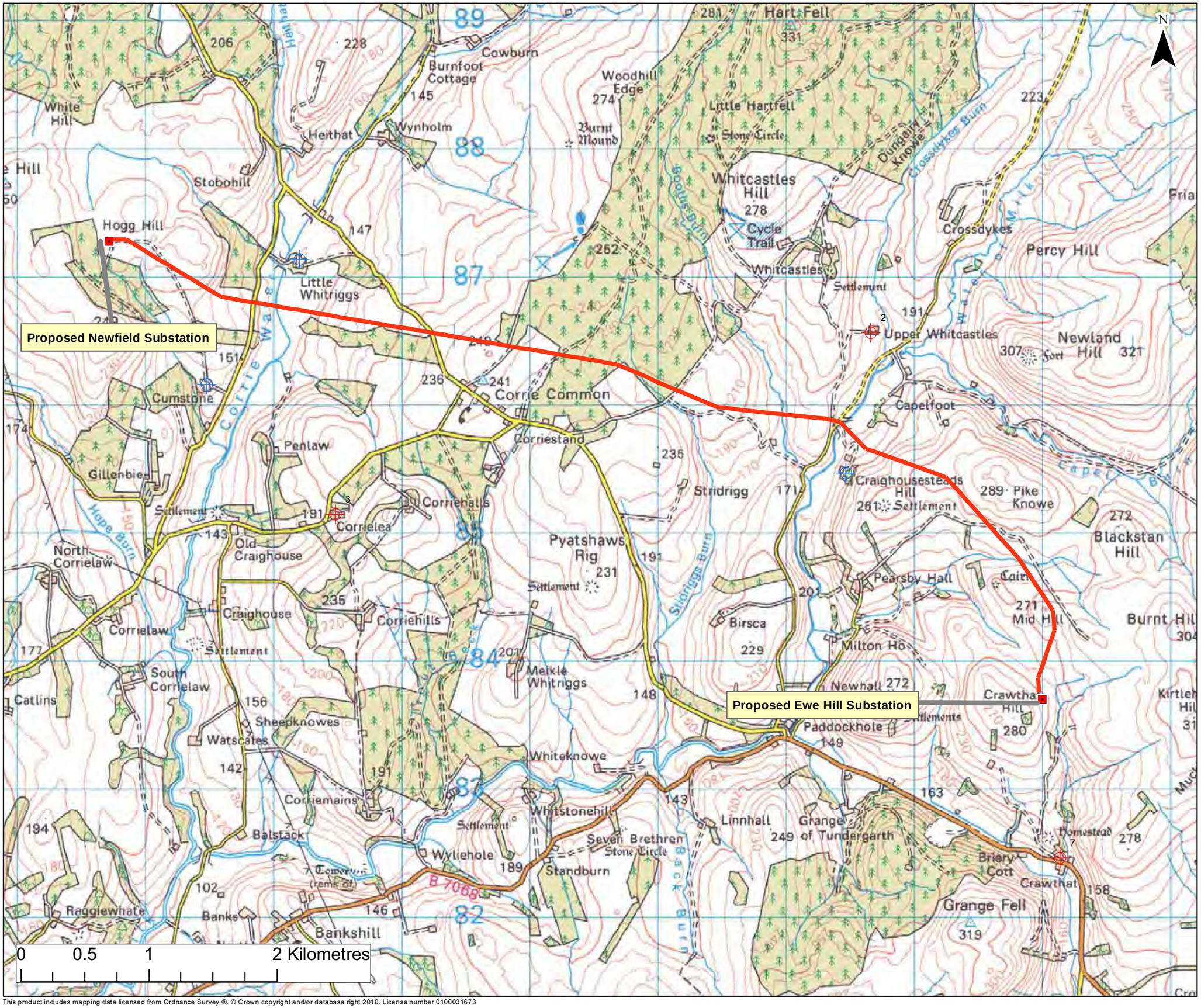
Notes

Figure 10.4 Ewe Hill to Newfield Watercourses and Access Tracks

Size: A3
Scale: Not to Scale
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

SP TRANSMISSION

Date: 06.07.10
Revision: -
Drawn by: AD
Checked by: AR



Legend

- Substation
- Transmission Line Alignment
- Dumfries & Galloway Council Private Water Supply Record
- Scottish Agricultural College Private Water Supply Record

GILLESPIES WSP

Notes

Figure 10.5 Ewe Hill to Newfield Private Water Supply Records

Size: A3
Scale: Not to Scale
Project: 1211554 - Gretna Substation to Ewe Hill and Newfield Windfarms 132kV Transmission Line

SP TRANSMISSION

Date: 06.07.10
Revision: -
Drawn by: AD
Checked by: AR

Proposed Ewe Hill Substation

Existing Gretna Substation

0 1.25 2.5 5 Kilometres

Legend

Transmission Line Alignment

Land Capability Code

Class 3 *Land capable of producing a moderate range of crops*

3.0

3.2

Class 4 *Land capable of producing a narrow range of crops*

4.1

4.2

Class 5 *Land capable of use as improved grassland*

5.1

5.2

5.3

Class 6 *Land capable of use only as rough grazings*

6.2

6.3

GILLESPIES WSP

Notes

For full desciptions of the Land Capability Classes, refer to Appendix 11.2 of this report.

Figure 11.1
Land Capability between Gretna and Ewe Hill

Size: A3
Scale: Not to Scale
Project: 1211554 - Gretna Substation to Ewe Hill and Newfield Windfarms 132kV Transmission Line

SP TRANSMISSION

Date: 13.07.10
Revision: -
Drawn by: AD
Checked by: AR

Proposed Newfield Substation

Proposed Ewe Hill Substation

0 0.5 1 2 Kilometres

N

Legend

Transmission Line Alignment

Land Capability Code

Class 3 *Land capable of producing a moderate range of crops*

- 3.0
- 3.2

Class 4 *Land capable of producing a narrow range of crops*

- 4.1
- 4.2

Class 5 *Land capable of use as improved grassland*

- 5.1
- 5.2
- 5.3

Class 6 *Land capable of use only as rough grazings*

- 6.2
- 6.3

GILLESPIES WSP

Notes

For full desciptions of the Land Capability Classes, refer to Appendix 11.2 of this report.

Figure 11.2
Land Capability between Ewe Hill and Newfield

Size: A3
Scale: Not to Scale
Project: 1211554 - Gretna Substation to Ewe Hill and Newfield Windfarms 132kV Transmission Line

SP TRANSMISSION

Date: 13.07.10
Revision: -
Drawn by: AD
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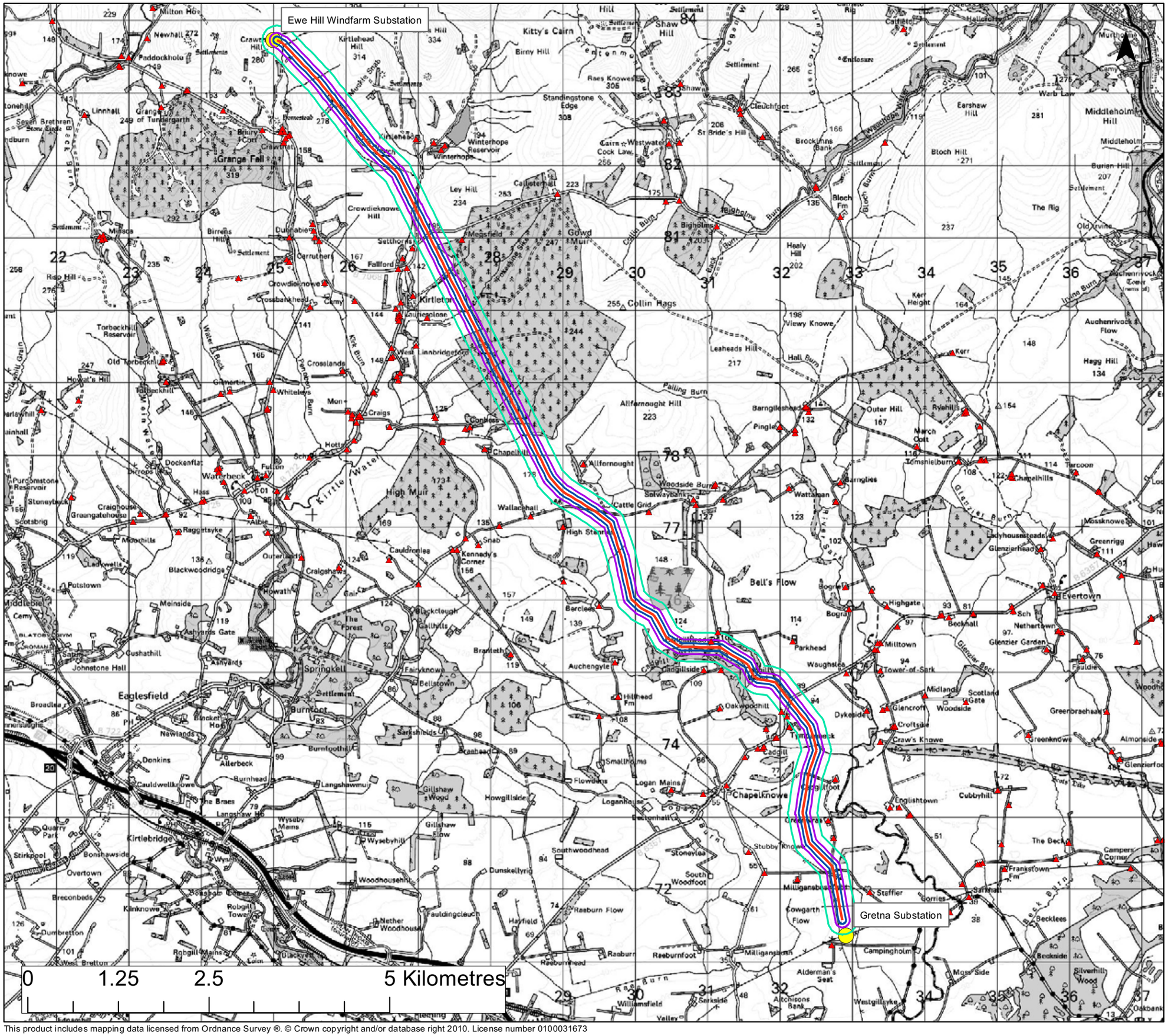


Legend

- Proposed OHL Alignment
- 50m Buffer
- 100m Buffer
- 200m Buffer
- Existing Transmission Lines
- Substation
- Residential Property

GILLESPIES WSP

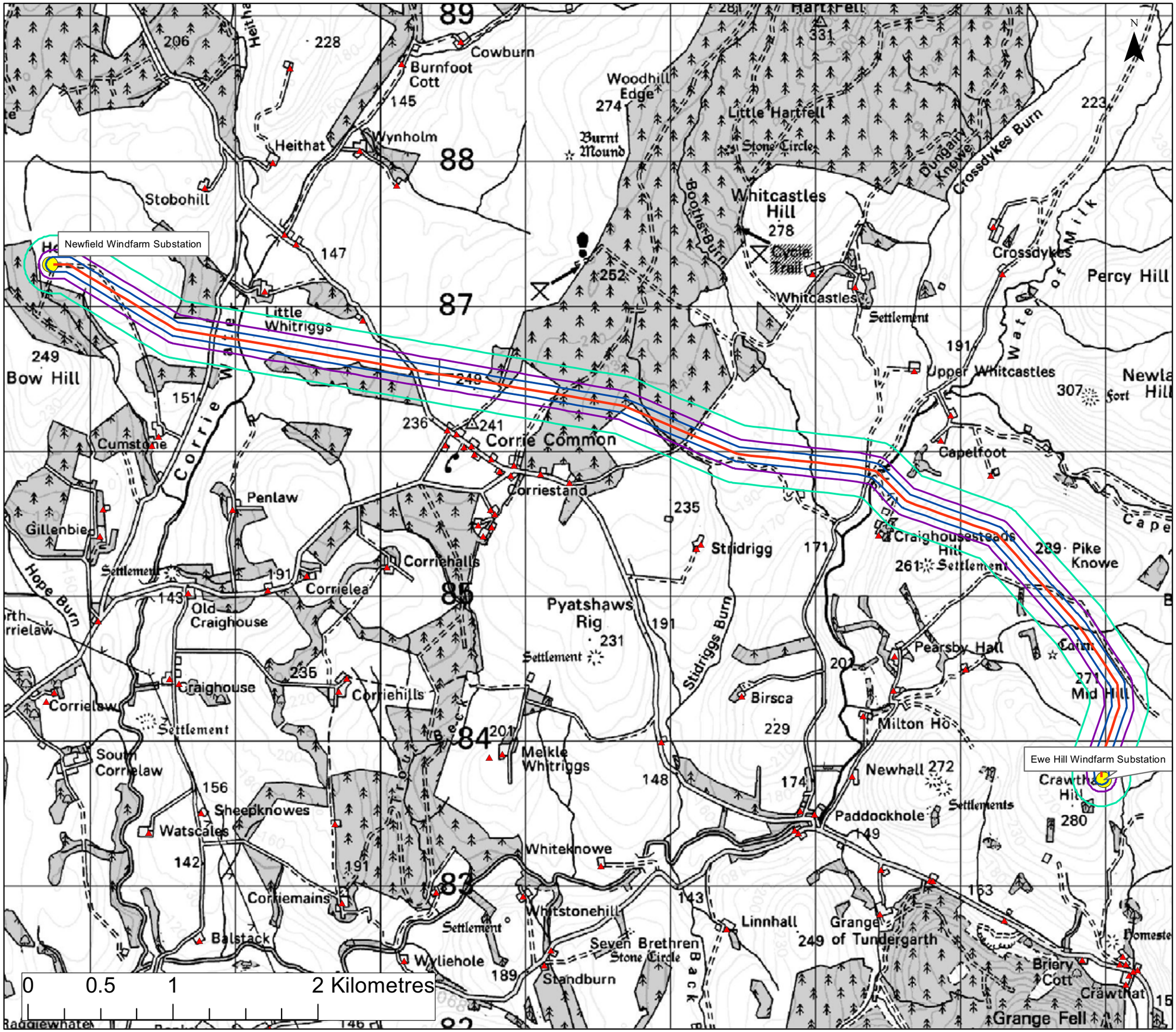
Notes

Figure 14.1 Gretna to Ewe Hill
50m, 100m and 200m Noise Buffers

Size: A3
Scale: Not to Scale
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

SP TRANSMISSION

Date: 06.07.10
Revision: -
Drawn by: AD
Checked by: AR



Legend

- Proposed OHL Alignment
- 50m Buffer
- 100m Buffer
- 200m Buffer
- Existing Transmission Lines
- Substation
- Residential Property

GILLESPIES
WSP

Notes

Figure 14.2 Ewe Hill to Newfield
50m, 100m and 200m Noise Buffers

Size: A3
Scale: Not to Scale
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

SP TRANSMISSION

Date: 06.07.10
Revision: -
Drawn by: AD
Checked by: AR