



## Appendices



## Appendix 2.1 Holford Rules

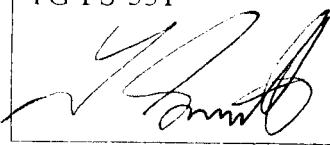


**ELECTRICITY TRANSMISSION DEVELOPMENT  
PROPOSALS IN SCOTLAND**

**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***

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# 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*

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

## 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 :*

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

#### *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 31<sup>st</sup> and September 3<sup>rd</sup> 2009.

## Section 1: Introduction

### 1.1 Background

SPT 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 routing 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](mailto: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 routing 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 routing 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 Barnghieshead 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 finely 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;
- routing the overhead line away from as many properties as possible;
- routing 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

**Notes**

**Figure 1**  
Project Context Plan

Size: A3  
Scale: Not to Scale  
Project: Gretna Substation to Ewe Hill and Newfield Windfarms

**GILLESPIES WSP**

**Notes**

**Figure 1**  
Project Context Plan

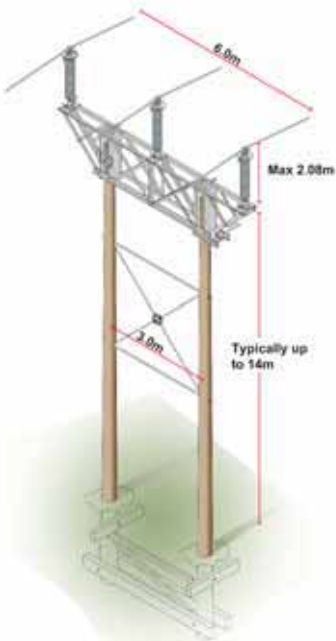
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Project: Gretna Substation to Ewe Hill and Newfield Windfarms

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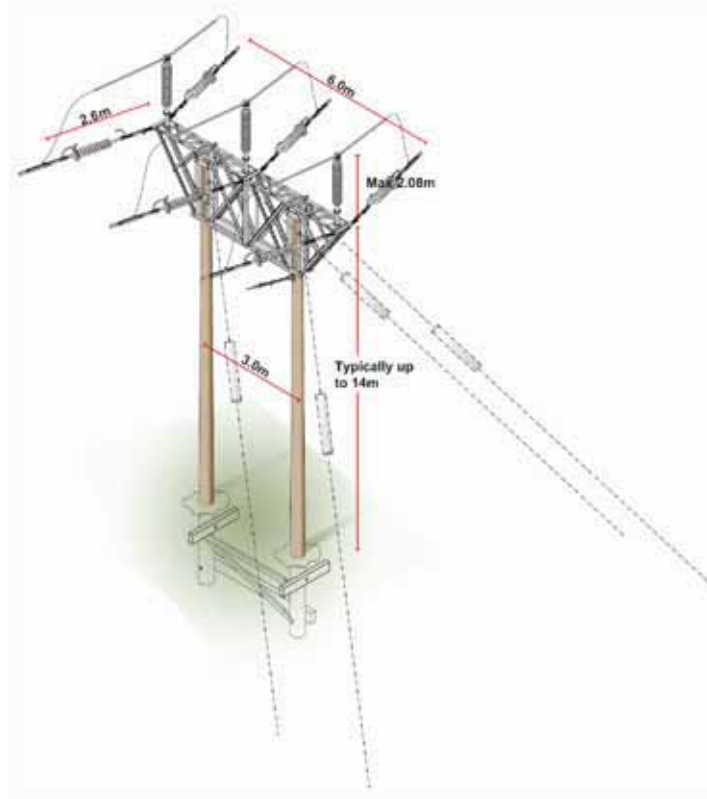
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Revision: -  
Drawn by: AR  
Checked by: SI

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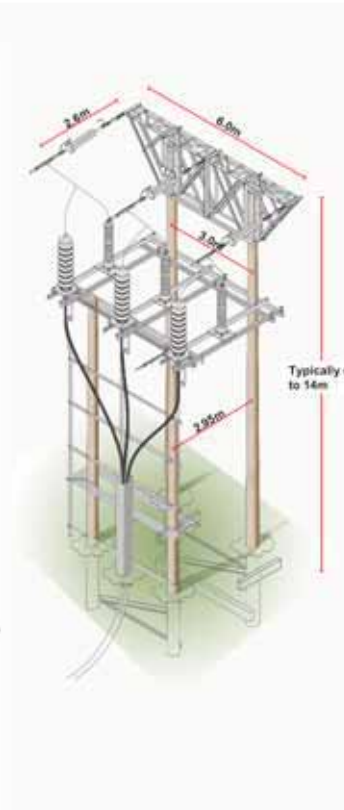
Legend



Straight line poles



20-30 degree angle poles



Terminal structure



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



Date: 17.08.09  
Revision: -  
Drawn by: AR  
Checked by: SI





Erection of Section Angle



Erecting the Failure Containment Structure



Terminal Structure

Legend



Notes

Figure 3  
Typical Heavy Duty Wood Pole  
Construction Images

Size: A3

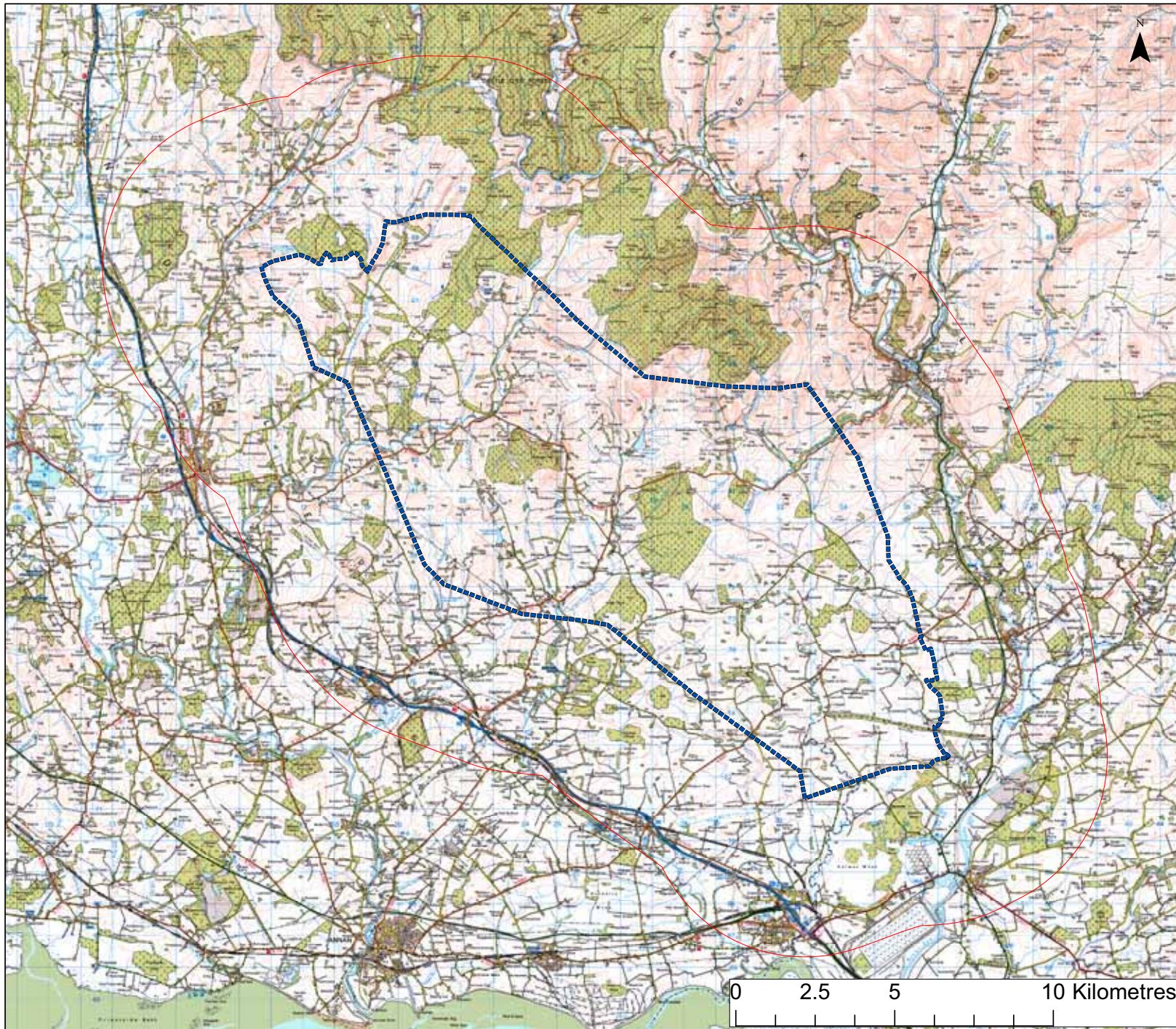
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Project: Gretna Substation to Ewe Hill  
and Newfield Windfarms



Date: 12.08.09  
Revision: -  
Drawn by: AR  
Checked by: SI





**Legend**

- - - - Study Area
- Buffer Area



**Notes**

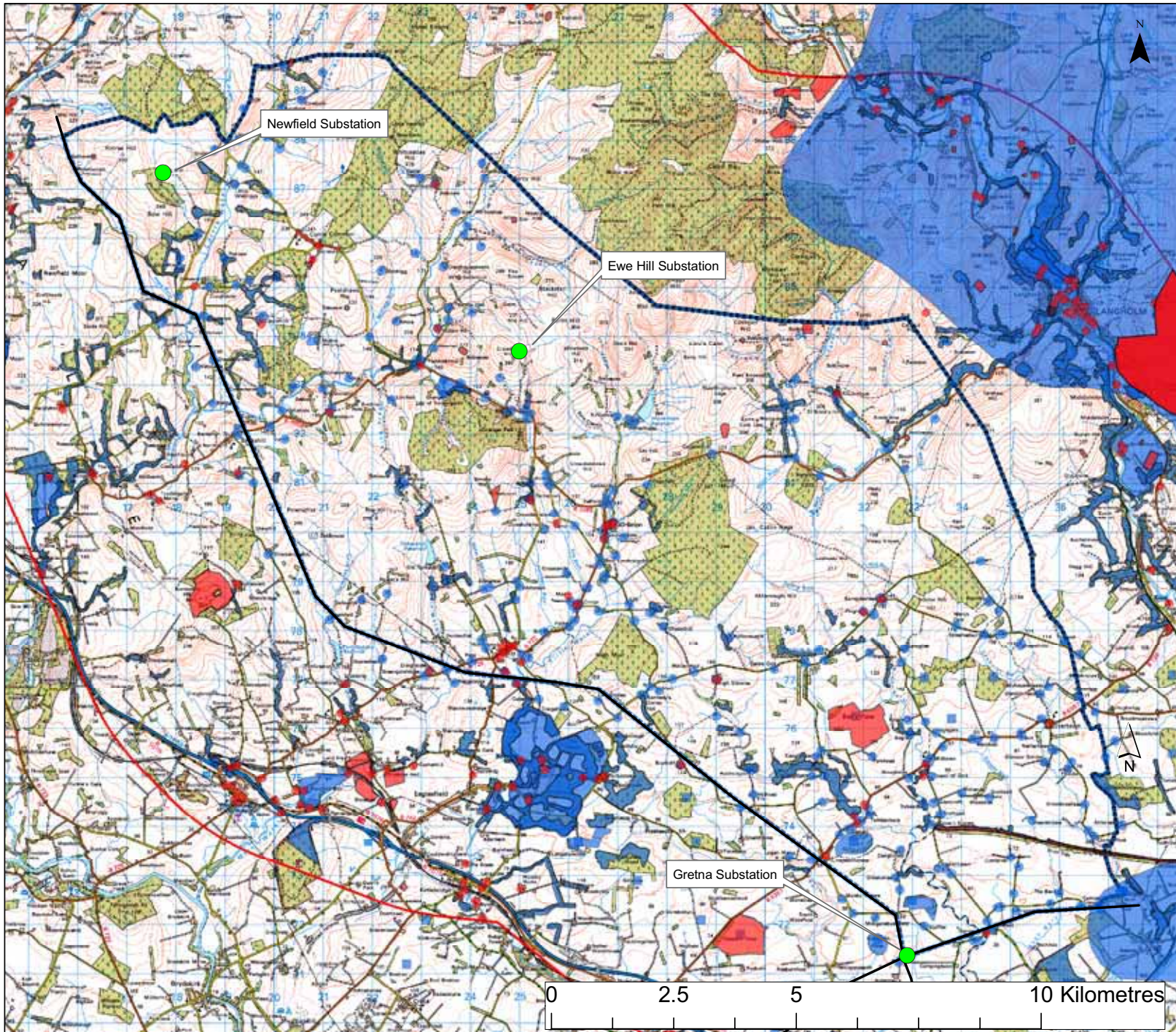
**Figure 4**  
Study Area and Buffer Area

Size: A3  
 Scale: Not to Scale  
 Project: Gretna Substation to Ewe Hill  
 and Newfield Windfarms



Date: 12.08.09  
 Revision: -  
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**Legend**

- - - - Study Area
- Buffer Area
- Substation Locations
- Highest Amenity Constraints
- High Amenity Constraints



**Notes**

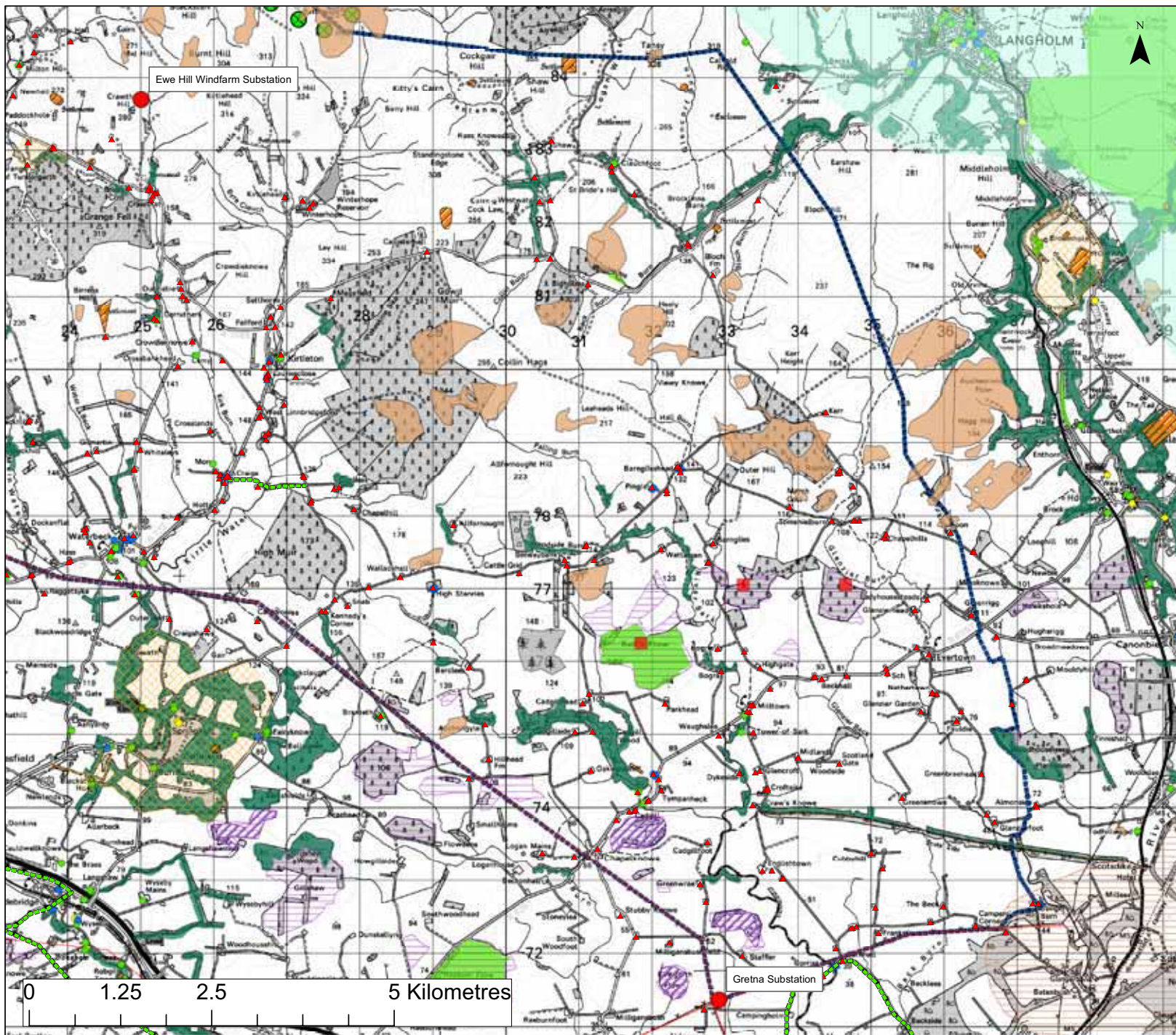
**Figure 5**  
Highest and High Amenity Constraints

Size: A3  
 Scale: Not to Scale  
 Project: Gretna Substation to Ewe Hill and Newfield Windfarms



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
  - Landscape of County Importance (Cumbria County Council)
  - ▲ Residential Property
  - - - - - Right of Way



**Notes**

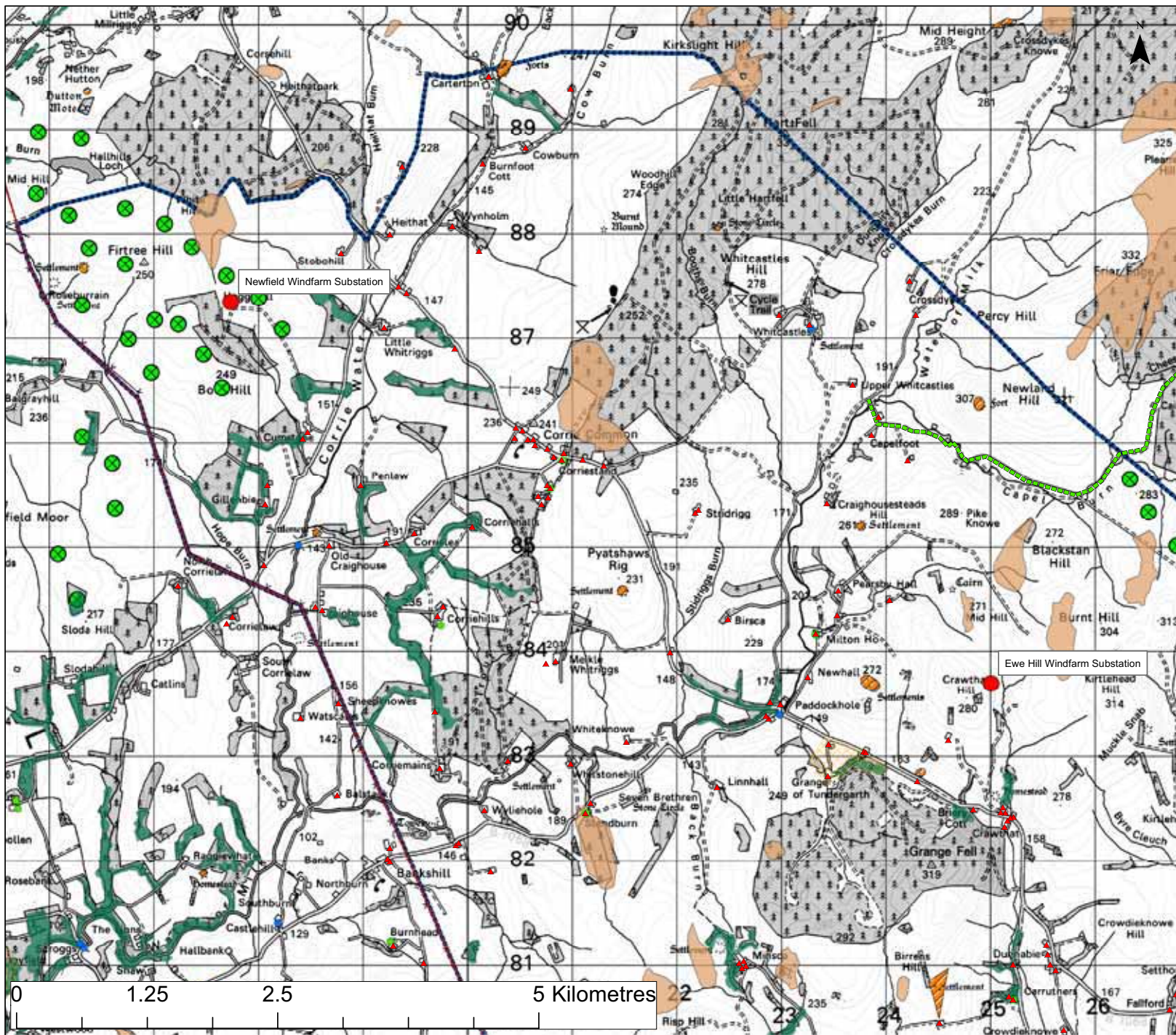
**Figure 6a**  
 Gretna to Ewe Hill - Constraints Map

Size: A3  
 Scale: Not to Scale  
 Project: Gretna Substation to Ewe Hill and Newfield Windfarms

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	Checked by: SI

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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

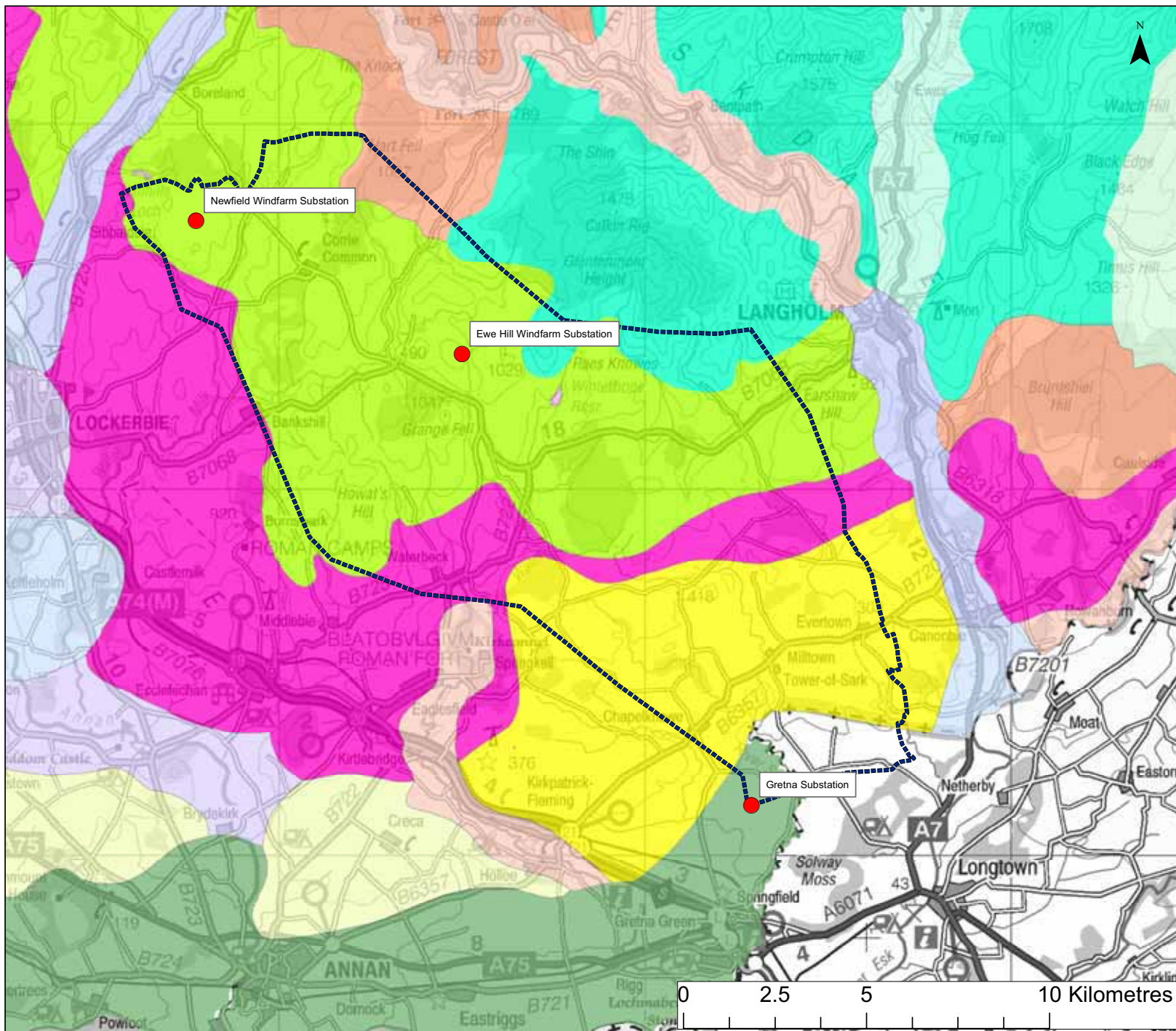
**GILLESPIES  
WSP**

**Notes**

**Figure 6b**  
**Ewe Hill to Newfield -**  
**Constraints Map**  
 Size: A3  
 Scale: Not to Scale  
 Project: Gretna Substation to Ewe Hill  
 and Newfield Windfarms

	Date: 12.08.09
	Revision: -
	Drawn by: AR
	Checked by: SI





**Legend**

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

**GILLESPIES  
WSP**

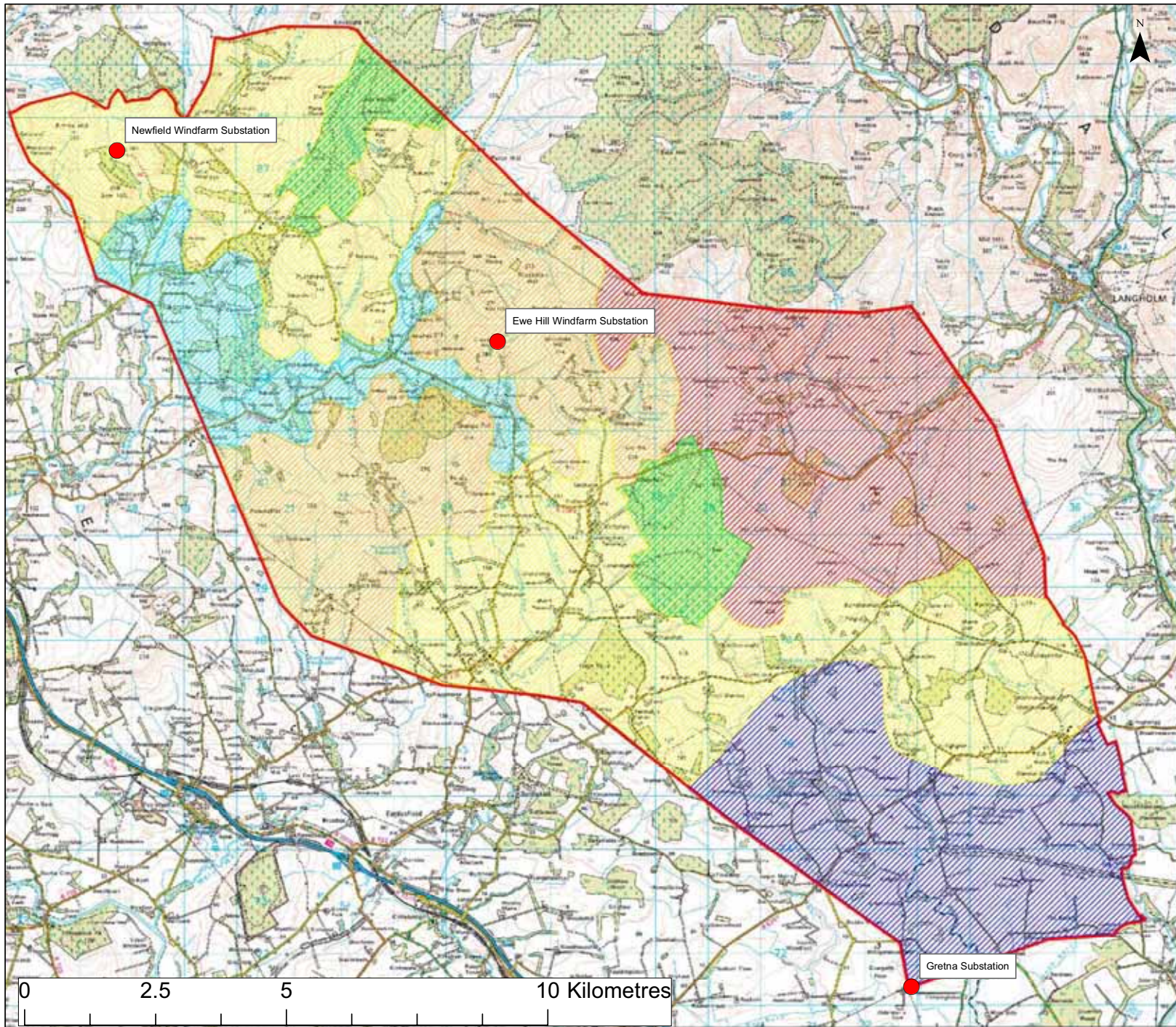
**Notes**

**Figure 7**  
**SNH Landscape Character Types**

Size: A3  
 Scale: Not to Scale  
 Project: Gretna Substation to Ewe Hill and Newfield Windfarms

	Date:	14.08.09
	Revision:	-
	Drawn by:	AR
	Checked by:	SI





**Legend**

- Substations
- Lowland Farmland
- Intimate River Corridor
- Transitional Farmland
- Upland Pasture
- Upland Heath
- Plantation Woodland



**Notes**

**Figure 8**  
Gillespies Landscape Character Types

Size: A3

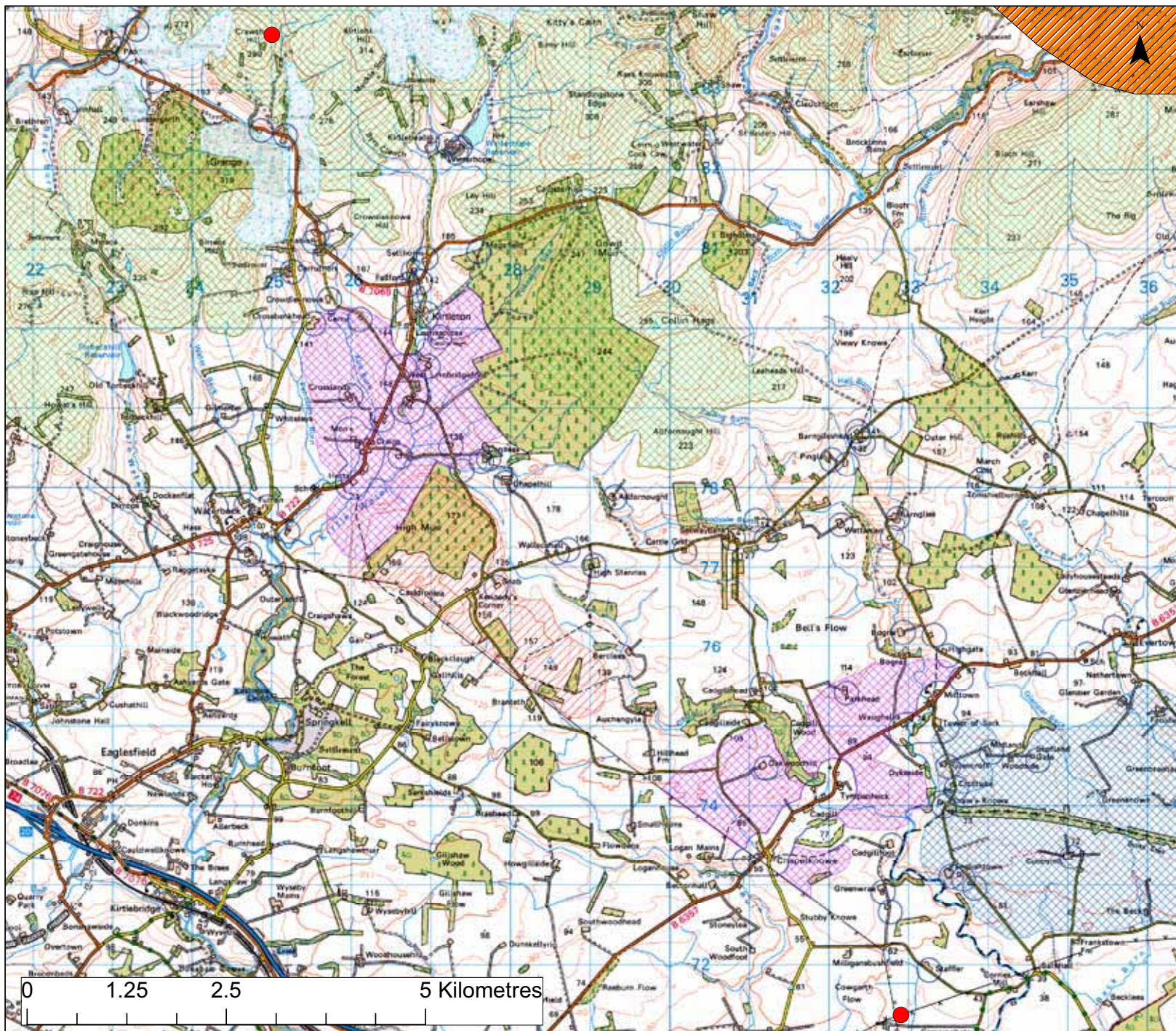
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Project: Gretna Substation to Ewe Hill and Newfield Windfarms



Date: 14.08.09  
Revision: -  
Drawn by: AR  
Checked by: SI





**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



**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

	Date:	14.08.09
	Revision:	-
	Drawn by:	AR
	Checked by:	SI







**Legend**

- Substations
- Residential receptor (150m buffer)
- Impact on views from settlements
- Impact on setting of historic features
- Varied topography and slopes
- 'Double climbing'
- Intimate landscape
- Regional Scenic Area



**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

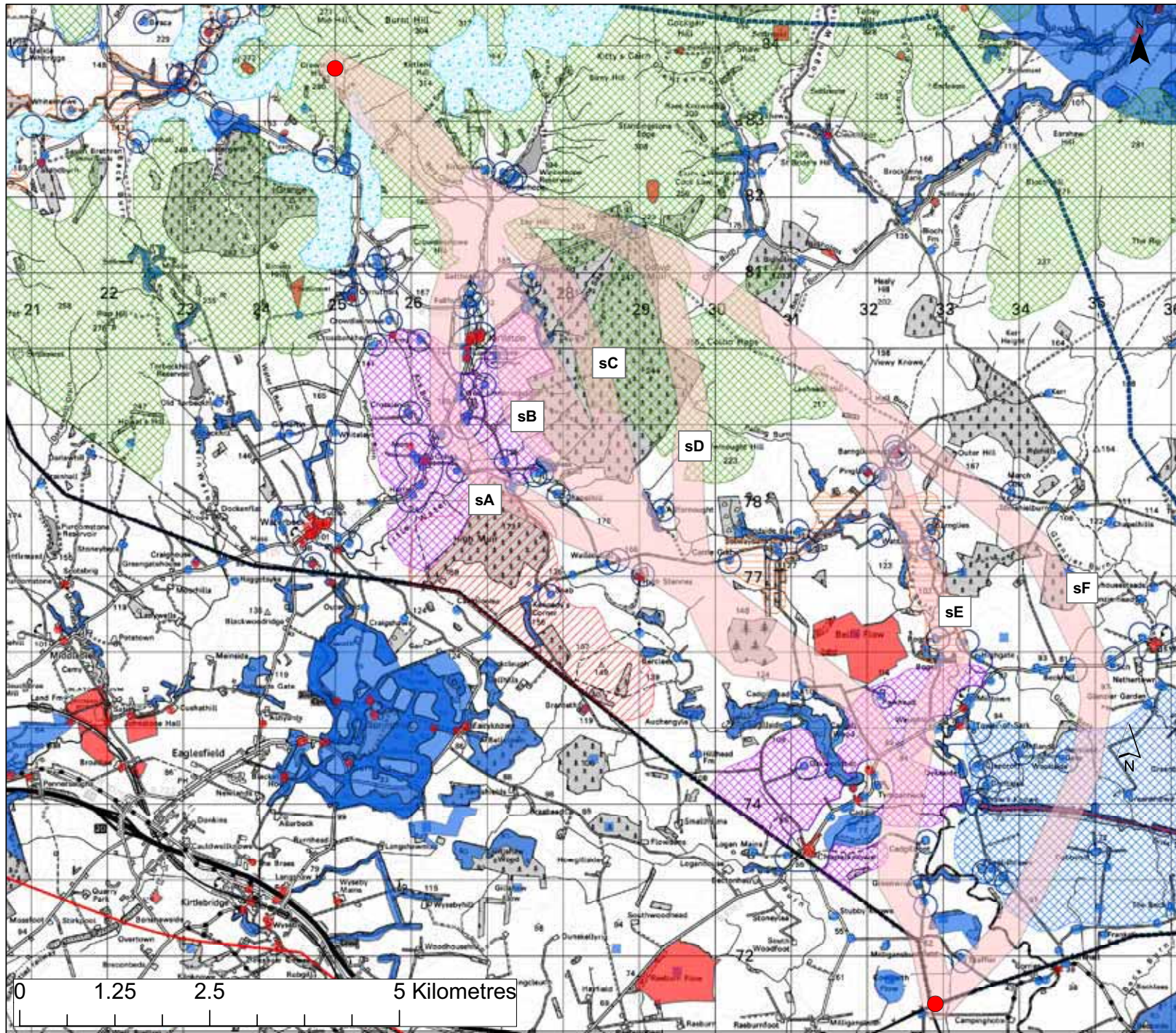


Date: 14.08.09  
Revision: -  
Drawn by: AR  
Checked by: SI



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**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'



**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



Date: 17.08.09  
Revision: -  
Drawn by: AR  
Checked by: SI





Section Location (scale 1:50,000 @ A3)

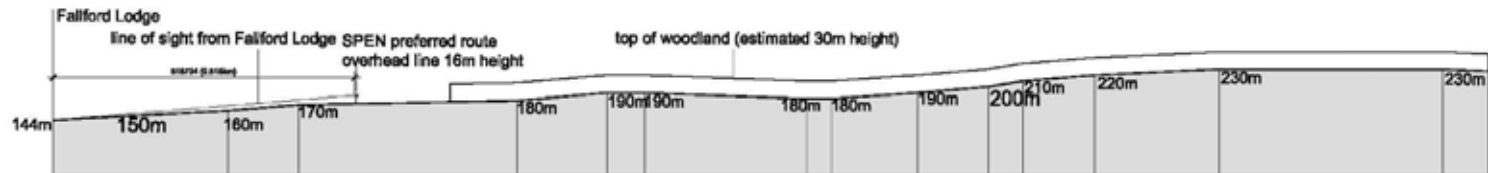


Existing View

**Legend**



**Notes**



**Section A-A**

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



Date: 12.08.09  
Revision: -  
Drawn by: AR  
Checked by: SI

**Legend**



Section Location (scale 1:50,000 @ A3)



Existing View



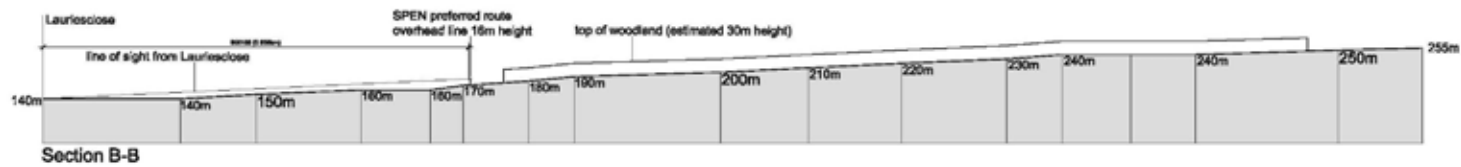
**Notes**

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



Date: 12.08.09  
Revision: -  
Drawn by: AR  
Checked by: SI



**Legend**



Section Location (scale 1:50,000 @ A3)



Existing View



Section C-C



**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



Date: 12.08.09  
Revision: -  
Drawn by: AR  
Checked by: SI

Legend



Section Location (scale 1:50,000 @ A3)



Existing View

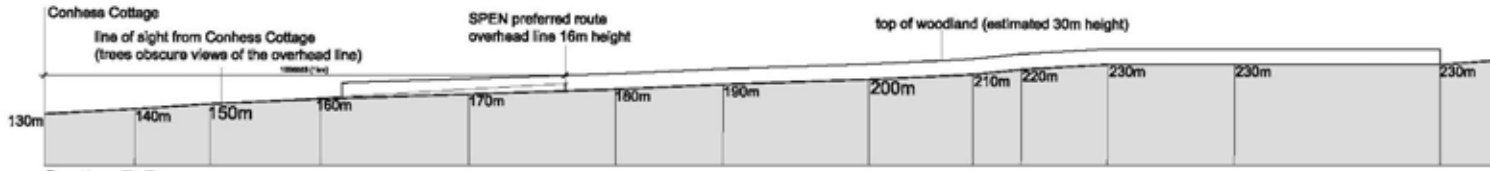


Notes

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

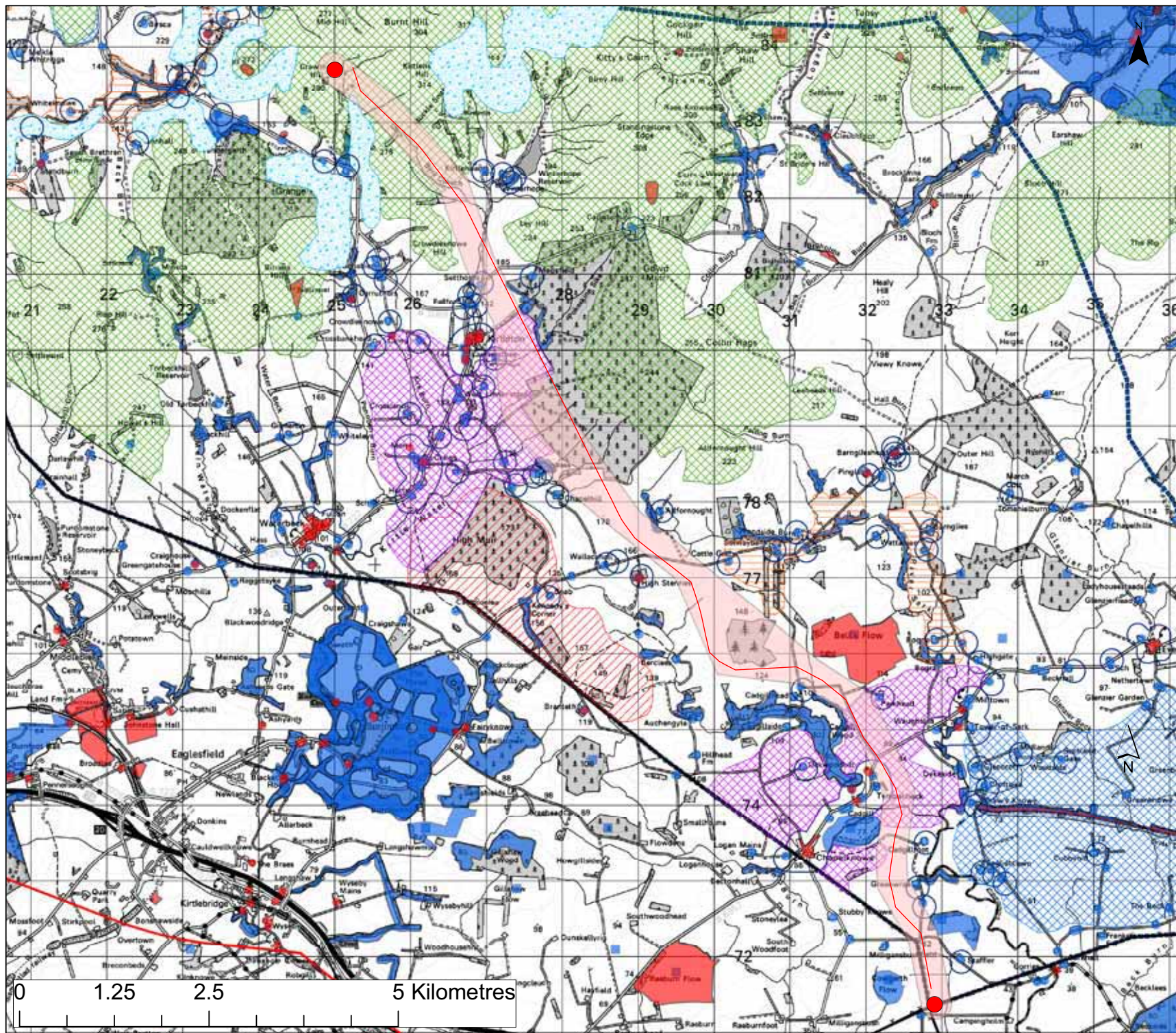


Date: 12.08.09  
 Revision: -  
 Drawn by: AR  
 Checked by: SI




Section D-D





### 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



### Notes

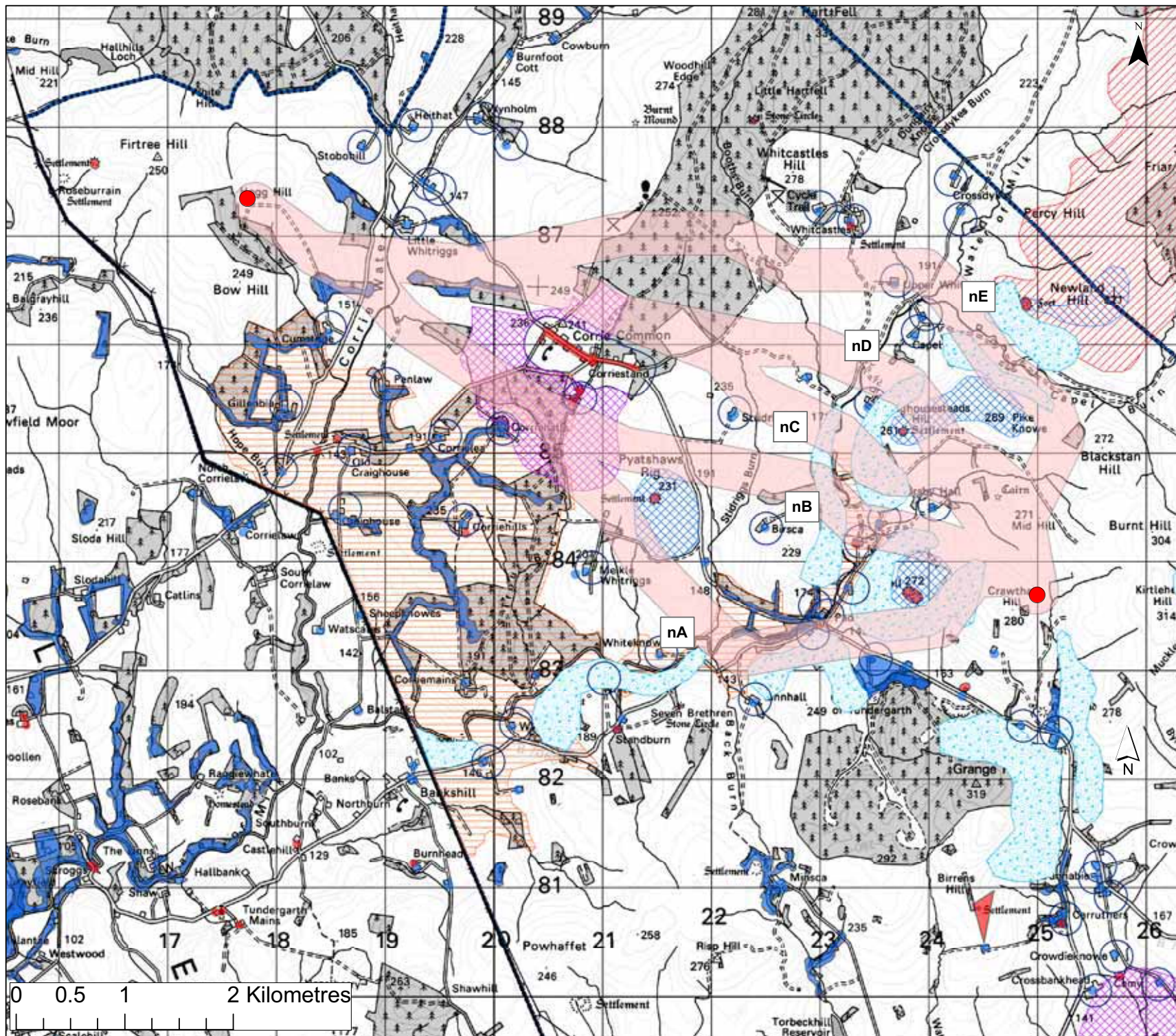
Ridge lines, summits and plateaus have not been annotated but have been considered, as read off the OS base mapping.

**Figure 12**  
**Gretna to Ewe Hill - Preferred Alignment**  
 Size: A3  
 Scale: Not to Scale  
 Project: Gretna Substation to Ewe Hill and Newfield Windfarms



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**

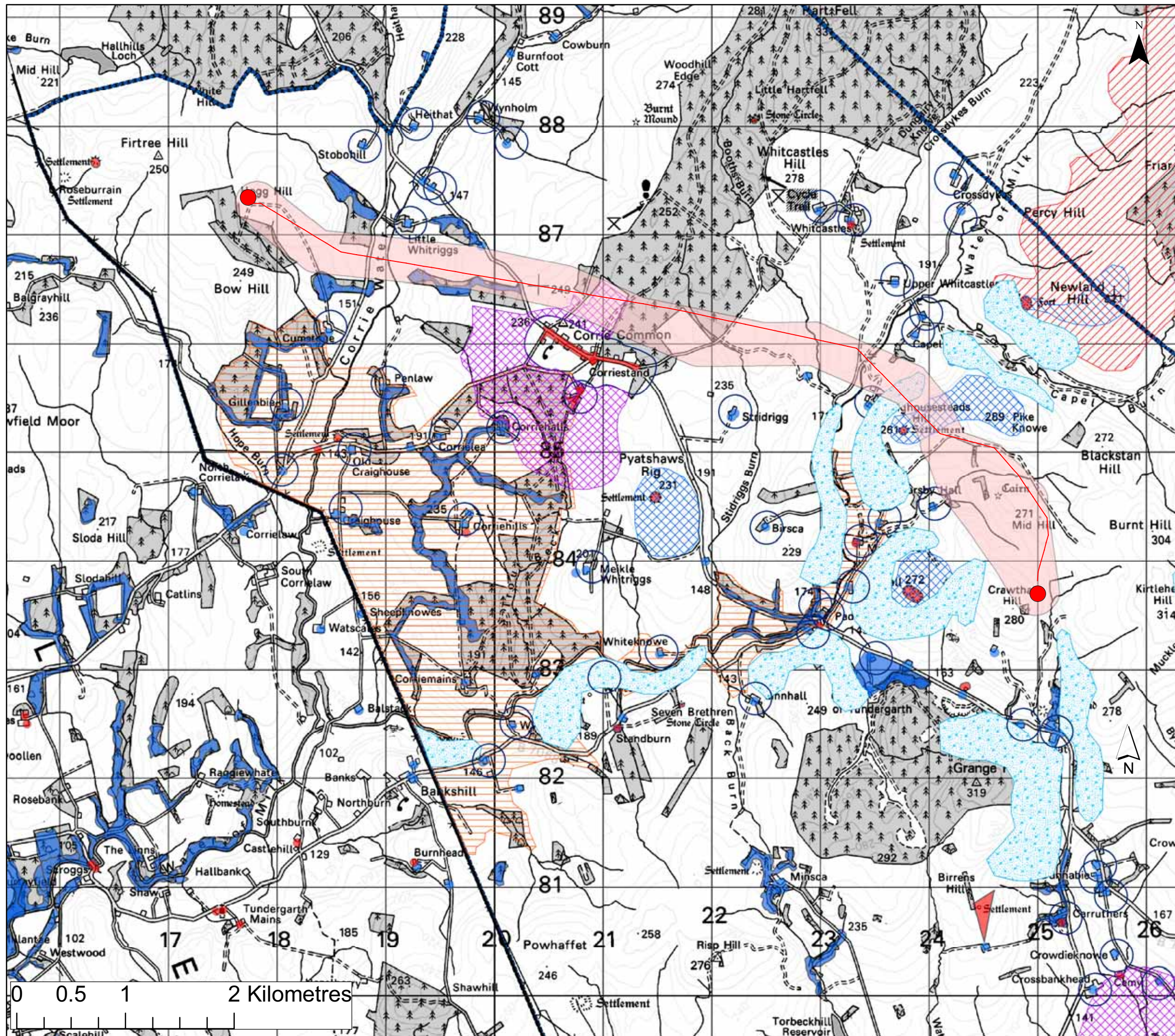
**Notes**  
Ridge lines, summits and plateaus have not been annotated but have been considered, as read off the OS base mapping.

**Figure 13**  
Ewe Hill to Newfield -  
Narrow Corridors  
Size: A3  
Scale: Not to Scale  
Project: Greta Substation to Ewe Hill  
and Newfield Windfarms

**SP TRANSMISSION**

Date:	17.08.09
Revision:	-
Drawn by:	AR
Checked by:	SI





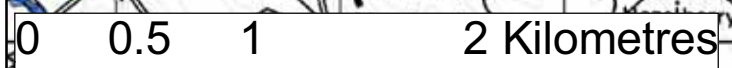
### Legend

- 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



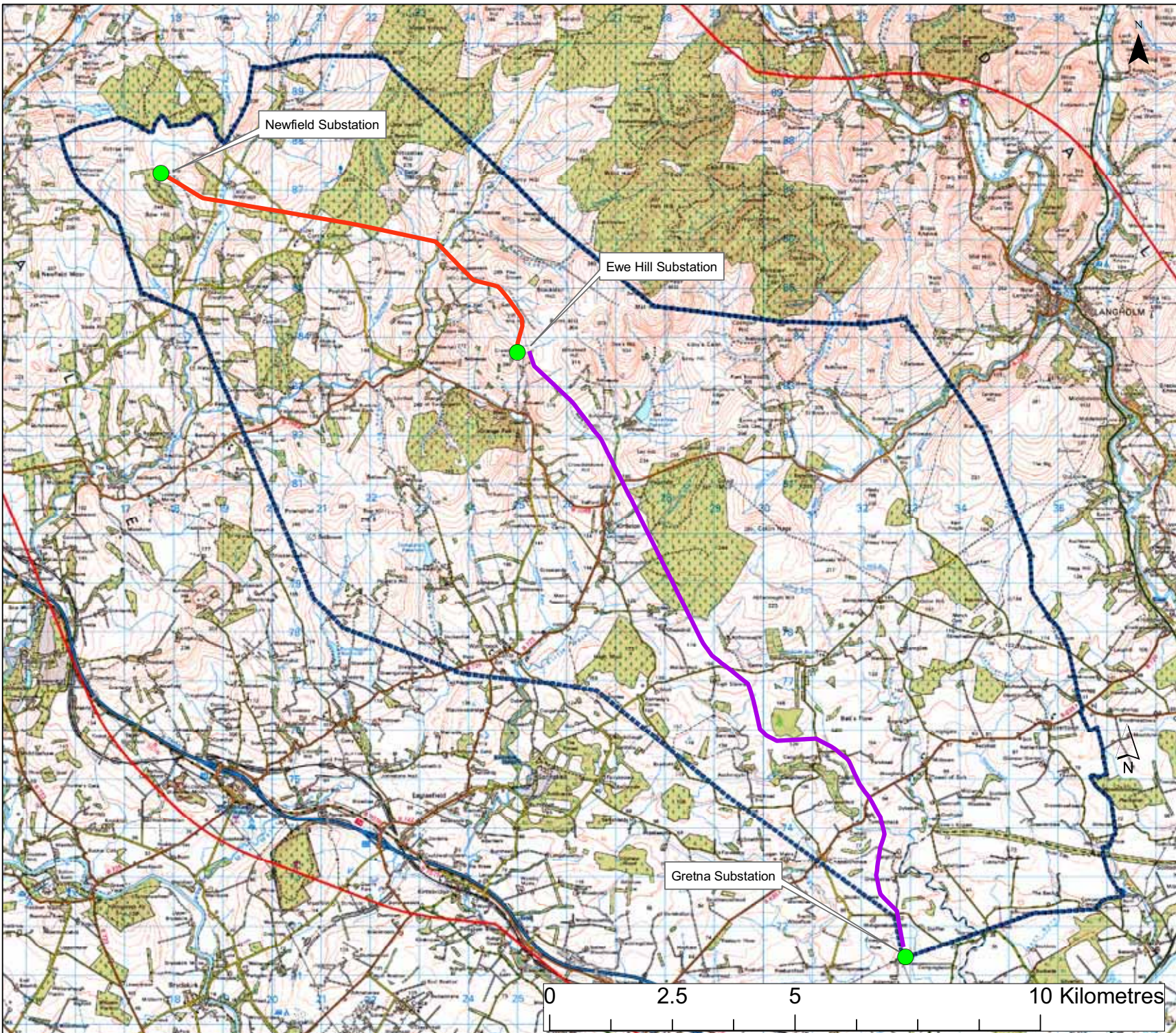
**Notes**  
 Ridge lines, summits and plateaus have not been annotated but have been considered, as read off the OS base mapping.

**Figure 14**  
 Ewe Hill to Newfield - Preferred Alignment  
 Size: A3  
 Scale: Not to Scale  
 Project: Gretna Substation to Ewe Hill and Newfield Windfarms



	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



**Notes**

Figure 15  
Preferred Alignments

Size: A3  
 Scale: Not to Scale  
 Project: Gretna Substation to Ewe Hill and Newfield Windfarms



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.





Ewe Hill and Newfield Project Manager  
Scottish Power Energy Networks  
New Alderston House  
Dove Wynd  
Strathclyde Business Park  
Bellshill  
ML4 3FF



## 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, 27 <sup>th</sup> November 2006, and email on 21 <sup>st</sup> 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, 28 <sup>th</sup> 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, 4 <sup>th</sup> 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, 21 <sup>st</sup> August 2006.	No comments made other than the information provided.	ARCGIS format shape files provided containing the following information: <ul style="list-style-type: none"> <li>• Broad Habitat Data</li> </ul>	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)			<ul style="list-style-type: none"> <li>• Local Wildlife Sites</li> <li>• Important Bird Areas</li> </ul> <p>Further information provided includes:</p> <ul style="list-style-type: none"> <li>• Georeferenced images of the NVC habitat data</li> <li>• Maps of Red Squirrel priority woodland</li> <li>• Maps of Lowland Raised Bog and Intermediate Bog sites</li> </ul> <p>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.</p>	
DGERC	Email response from Mark Pollitt, Manager, DGERC, 5 <sup>th</sup> 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, 6 <sup>th</sup> 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 25 <sup>th</sup> 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), 8 <sup>th</sup> September 2006.	<p>The letter details the fact that the Ewe Hill Wind Farm is a Section 36 application and is at an advanced stage. D&amp;G Council has considered the relevant consultation and has confirmed that it does not object to the proposal.</p> <p>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).</p>	<p>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.</p> <p>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.</p> <p>An annotated version of the plan has been provided showing the routes of the</p>	<p>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.</p> <p>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.</p>

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 28 <sup>th</sup> 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, 18 <sup>th</sup> May 2007	<p>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.</p> <p>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.</p>	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, 21 <sup>st</sup> 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.	<p>The comments concentrate on Historic Scotland's specific statutory remit for scheduled monuments, listed buildings, historic gardens and designed landscapes.</p> <p>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.</p> <p>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).</p> <p>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.</p> <p>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.</p>	<p>Two lists have been provided detailing the scheduled monuments and listed buildings. Map extracts showing the locations of these sites has been provided.</p> <p>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.</p> <p>Information on the location of all scheduled monuments, listed buildings and gardens and designed landscapes can be obtained from <a href="http://www.PASTMAP.org.uk">www.PASTMAP.org.uk</a></p>	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 9 <sup>th</sup> 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, 22 <sup>nd</sup> 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 21 <sup>st</sup> 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, 8 <sup>th</sup> 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	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, 20 <sup>th</sup> July 2007.	SEPA has no comments on the proposed routes for the OHLs. If the works involve any water crossings, it is recommended that: <ul style="list-style-type: none"> <li>• The works must comply with the Water Environment (Controlled Activities) (Scotland) Regulations 2005; and</li> <li>• The River Annan District Salmon Fishery Board should be consulted.</li> </ul> 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, 31 <sup>st</sup> 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, 1 <sup>st</sup> 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, 27 <sup>th</sup> 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, 11 <sup>th</sup> 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
		<p>Concern is expressed that the options for undergrounding or connection to the existing overhead line have not been considered.</p> <p>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.</p>		<p>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.</p> <p>Assessment of Landscape and Visual effects and Cumulative effects is presented in Chapters 6 and 16 of this RS respectively.</p>
SNH	Consultation Document issued. Email response from Barry Dunne, Area officer on 6 <sup>th</sup> 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 19 <sup>th</sup> 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 routing 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 28 <sup>th</sup> 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 19 <sup>th</sup> 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 routing 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

<b>Consultee Organisation</b>	<b>Type and Date of Consultation</b>	<b>Comments on Project and Effects</b>	<b>Information Provided</b>	<b>Consideration in this ES</b>
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 14 <sup>th</sup> 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 27 <sup>th</sup> 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

<b>Scientific Name</b>	<b>Common Name</b>
<i>Acer pseudoplatanus</i>	Sycamore
<i>Achillea millefolium</i>	Yarrow
<i>Achillea ptarmica</i>	Sneezewort
<i>Aegopodium podagraria</i>	Ground-elder
<i>Agrostis capillaris</i>	Common Bent
<i>Alchemilla vulgaris</i>	Lady's Mantle
<i>Alliaria petiolata</i>	Garlic Mustard
<i>Alnus glutinosa</i>	Alder
<i>Alopecurus pratensis</i>	Meadow Foxtail
<i>Andromeda polifolia</i>	Bog-rosemary
<i>Anemone nemorosa</i>	Wood Anemone
<i>Angelica sylvestris</i>	Wild Angelica
<i>Anthoxanthum odoratum</i>	Sweet Vernal Grass
<i>Anthriscus sylvestris</i>	Cow Parsley
<i>Arrhenatherum elatius</i>	False Oat-grass
<i>Artemisia vulgaris</i>	Mugwort
<i>Aulacomnium palustre</i>	Bog Groove-moss
<i>Bellis perennis</i>	Daisy
<i>Betula pendula</i>	Silver Birch
<i>Betula pubescens</i>	Downy Birch
<i>Botrychium lunaria</i>	Moonwort
<i>Briza media</i>	Quaking-grass
<i>Calluna vulgaris</i>	Heather
<i>Caltha palustris</i>	Marsh Marigold
<i>Calystegia sepium</i>	Hedge Bindweed
<i>Campanula rotundifolia</i>	Harebell
<i>Capsella bursa-pastoris</i>	Shepherd's-purse
<i>Cardamine pratensis</i>	Cuckooflower
<i>Carex binervis</i>	Green-ribbed Sedge
<i>Carex curta</i>	White Sedge
<i>Carex echinata</i>	Star Sedge
<i>Carex hirta</i>	Hairy Sedge
<i>Carex nigra</i>	Common Sedge
<i>Carex ovalis</i>	Oval Sedge
<i>Carex panicea</i>	Carnation Sedge
<i>Carex rostrata</i>	Bottle Sedge
<i>Carex viridula</i>	Yellow Sedge

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<b>Scientific Name</b>	<b>Common Name</b>
<i>Centaurea nigra</i>	Common Knapweed
<i>Cerastium fontanum</i>	Common Mouse-ear
<i>Chamerion angustifolium</i>	Rosebay Willowherb
<i>Chrysosplenium oppositifolium</i>	Opposite-leaved Golden-saxifrage
<i>Cirsium palustre</i>	Marsh Thistle
<i>Cirsium vulgare</i>	Spear Thistle
<i>Cladonia impexa</i>	Reindeer Moss
<i>Conopodium majus</i>	Pignut
<i>Corylus avellana</i>	Hazel
<i>Crataegus monogyna</i>	Hawthorn
<i>Cynosurus cristatus</i>	Crested Dog's-tail
<i>Dactylis glomerata</i>	Cock's-foot
<i>Dactylorhiza fuchsii</i>	Common Spotted Orchid
<i>Dactylorhiza maculata</i>	Heath Spotted Orchid
<i>Deschampsia cespitosa</i>	Tufted Hair-grass
<i>Deschampsia flexuosa</i>	Wavy Hair-grass
<i>Dicranum majus</i>	Greater Fork-moss
<i>Dicranum scoparium</i>	Broom Fork-moss
<i>Digitalis purpurea</i>	Foxglove
<i>Drosera rotundifolia</i>	Round-leaved Sundew
<i>Dryopteris dilatata</i>	Broad Buckler-fern
<i>Dryopteris filix-mas</i>	Common Male Fern
<i>Eleocharis palustris</i>	Common Spike-rush
<i>Elytrigia repens</i>	Common Couch
<i>Empetrum nigrum</i>	Crowberry
<i>Epilobium hirsutum</i>	Great Willowherb
<i>Epilobium montanum</i>	Broad-leaved Willowherb
<i>Epilobium parviflorum</i>	Hoary Willowherb
<i>Equisetum arvense</i>	Field Horsetail
<i>Equisetum fluviatile</i>	Water Horsetail
<i>Equisetum sylvaticum</i>	Wood Horsetail
<i>Erica tetralix</i>	Cross-leaved Heath
<i>Eriophorum angustifolium</i>	Common Cottongrass
<i>Eriophorum vaginatum</i>	Hare's-tail Cottongrass
<i>Euphrasia tetraquetra</i>	dicotyledon
<i>Fallopia japonica</i>	Japanese Knotweed
<i>Festuca ovina</i>	Sheep's Fescue
<i>Festuca pratensis</i>	Meadow Fescue
<i>Festuca rubra</i>	Red Fescue
<i>Filago vulgaris</i>	Common Cudweed
<i>Filipendula ulmaria</i>	Meadowsweet
<i>Fragaria vesca</i>	Wild Strawberry
<i>Fraxinus excelsior</i>	Ash

<b>Scientific Name</b>	<b>Common Name</b>
<i>Galium aparine</i>	Cleavers
<i>Galium palustre</i>	Common Marsh-bedstraw
<i>Galium saxatile</i>	Heath Bedstraw
<i>Galium uliginosum</i>	Fen Bedstraw
<i>Galium verum</i>	Lady's Bedstraw
<i>Geranium pratense</i>	Meadow Crane's-bill
<i>Geranium robertianum</i>	Herb-robert
<i>Geum rivale</i>	Water Avens
<i>Glechoma hederacea</i>	Ground-ivy
<i>Glyceria fluitans</i>	Floating Sweet-grass
<i>Hedera helix ssp. helix</i>	Common Ivy
<i>Heracleum sphondylium</i>	Hogweed
<i>Hieracium sabaudum</i>	composite
<i>Hippuris vulgaris</i>	Mare's-tail
<i>Holcus lanatus</i>	Yorkshire-fog
<i>Hyacinthoides non-scripta</i>	Bluebell
<i>Hydrocharis morsus-ranae</i>	Frogbit
<i>Hypericum maculatum ssp. maculatum</i>	St john's wort
<i>Hypnum cupressiforme</i>	Cypress-leaved Plait-moss
<i>Hypnum jutlandicum</i>	Heath Plait-moss
<i>Hypochaeris radicata</i>	Cat's-ear
<i>Ilex aquifolium</i>	Holly
<i>Impatiens glandulifera</i>	Himalayan Balsam
<i>Juncus acutiflorus</i>	Sharp-flowered Rush
<i>Juncus articulatus</i>	Jointed Rush
<i>Juncus bufonius</i>	Toad Rush
<i>Juncus conglomeratus</i>	Compact Rush
<i>Juncus effusus</i>	Soft Rush
<i>Juncus inflexus</i>	Hard Rush
<i>Juncus squarrosus</i>	Heath Rush
<i>Knautia arvensis</i>	Field Scabious
<i>Lapsana communis</i>	Nipplewort
<i>Larix decidua</i>	Larch
<i>Lathyrus pratensis</i>	Meadow Vetchling
<i>Lemna minor</i>	Common Duckweed
<i>Leucanthemum vulgare</i>	Oxeye Daisy
<i>Linaria vulgaris</i>	Common Toadflax
<i>Lolium perenne</i>	Perennial Rye-grass
<i>Lonicera periclymenum</i>	Honeysuckle
<i>Lotus corniculatus</i>	Common Bird's-foot Trefoil
<i>Lotus pedunculatus</i>	Greater Bird's-foot Trefoil
<i>Luzula campestris</i>	Field Wood-rush
<i>Luzula multiflora</i>	Heath Wood-rush

<b>Scientific Name</b>	<b>Common Name</b>
<i>Luzula pilosa</i>	Hairy Wood-rush
<i>Lychnis flos-cuculi</i>	Ragged Robin
<i>Matricaria discoidea</i>	Pineappleweed
<i>Mentha aquatica</i>	Water Mint
<i>Mercurialis perennis</i>	Dog's Mercury
<i>Molinia caerulea</i>	Purple Moor-grass
<i>Myosotis arvensis</i>	Field Forget-me-not
<i>Myosotis scorpioides</i>	Water Forget-me-not
<i>Nardus stricta</i>	Mat-grass
<i>Narthecium ossifragum</i>	Bog Asphodel
<i>Odontites verna</i>	Red Bartsia
<i>Ononis repens</i>	Common Restharrow
<i>Oxalis acetosella</i>	Wood-sorrel
<i>Pedicularis sylvatica</i>	Lousewort
<i>Persicaria maculosa</i>	Redshank
<i>Phleum pratense</i>	Timothy
<i>Picea sitchensis</i>	Sitka Spruce
<i>Pinus contorta</i>	Lodgepole Pine
<i>Pinus sylvestris</i>	Scots Pine
<i>Plagiothecium undulatum</i>	Waved Silk-moss
<i>Plantago lanceolata</i>	Ribwort Plantain
<i>Plantago major</i>	Greater Plantain
<i>Pleurozium schreberi</i>	Red-stemmed Feather-moss
<i>Poa annua</i>	Annual Meadow-grass
<i>Poa pratensis</i>	Smooth Meadow-grass
<i>Poa trivialis</i>	Rough Meadow-grass
<i>Polytrichum commune</i>	Common Haircap
<i>Polytrichum formosum</i>	Bank Haircap
<i>Potamogeton polygonifolius</i>	Bog Pondweed
<i>Potentilla anserina</i>	Silverweed
<i>Potentilla erecta</i>	Tormentil
<i>Potentilla palustris</i>	Marsh Cinquefoil
<i>Primula vulgaris</i>	Primrose
<i>Prunella vulgaris</i>	Selfheal
<i>Prunus avium</i>	Wild Cherry
<i>Pteridium aquilinum</i>	Bracken
<i>Quercus robur</i>	Pedunculate Oak
<i>Ranunculus acris</i>	Meadow Buttercup
<i>Ranunculus ficaria</i>	Lesser Celandine
<i>Ranunculus flammula</i>	Lesser Spearwort
<i>Ranunculus repens</i>	Creeping Buttercup
<i>Rhinanthus minor</i>	Yellow-rattle
<i>Rhynchospora alba</i>	White Beak-sedge

<b>Scientific Name</b>	<b>Common Name</b>
<i>Rhytidiadelphus loreus</i>	Little Shaggy-moss
<i>Rosa canina</i> agg.	Dog Roses
<i>Rubus fruticosus</i> agg.	Bramble
<i>Rubus idaeus</i>	Raspberry
<i>Rumex acetosa</i>	Common Sorrel
<i>Rumex acetosella</i>	Sheep's Sorrel [agg.]
<i>Rumex crispus</i>	Curled Dock
<i>Rumex obtusifolius</i>	Broad-leaved Dock
<i>Salix caprea</i>	Goat Willow
<i>Sambucus nigra</i>	Elder
<i>Scirpus cespitosum</i>	Deergrass
<i>Scrophularia nodosa</i>	Common Figwort
<i>Senecio jacobaea</i>	Common Ragwort
<i>Senecio vulgaris</i>	Groundsel
<i>Sonchus asper</i>	Prickly Sow-thistle
<i>Sonchus oleraceus</i>	Smooth Sow-thistle
<i>Sorbus aucuparia</i>	Rowan
<i>Sphagnum capillifolium</i>	Red Bog-moss
<i>Sphagnum compactum</i>	Compact Bog-moss
<i>Sphagnum cuspidatum</i>	Feathery Bog-moss
<i>Sphagnum fallax</i>	Flat-topped Bog-moss
<i>Sphagnum fimbriatum</i>	Fringed Bog-moss
<i>Sphagnum magellanicum</i>	Magellanic Bog-moss
<i>Sphagnum palustre</i>	Blunt-leaved Bog-moss
<i>Sphagnum papillosum</i>	Papillose Bog-moss
<i>Sphagnum quinquefarium</i>	Five-ranked Bog-moss
<i>Sphagnum squarrosum</i>	Spiky Bog-moss
<i>Sphagnum tenellum</i>	Soft Bog-moss
<i>Stachys palustris</i>	Marsh Woundwort
<i>Stachys sylvatica</i>	Hedge Woundwort
<i>Stellaria graminea</i>	Lesser Stitchwort
<i>Stellaria holostea</i>	Greater Stitchwort
<i>Stellaria media</i>	Common Chickweed
<i>Succisa pratensis</i>	Devil's-bit Scabious
<i>Taraxacum officinale</i> agg.	Dandelion
<i>Trifolium pratense</i>	Red Clover
<i>Trifolium repens</i>	White Clover
<i>Tussilago farfara</i>	Colt's-foot
<i>Typha latifolia</i>	Common Reedmace
<i>Ulex europaeus</i>	Gorse
<i>Urtica dioica</i>	Common Nettle
<i>Vaccinium myrtillus</i>	Blaeberry
<i>Vaccinium oxycoccos</i>	Cranberry

<b>Scientific Name</b>	<b>Common Name</b>
<i>Vaccinium uliginosum</i>	Bog Bilberry
<i>Vaccinium vitis-idaea</i>	Cowberry
<i>Valeriana officinalis</i>	Common Valerian
<i>Veronica beccabunga</i>	Brooklime
<i>Veronica chamaedrys</i>	Germander Speedwell
<i>Veronica officinalis</i>	Heath Speedwell
<i>Vicia hirsuta</i>	Hairy Tare
<i>Vicia sativa</i>	Common Vetch
<i>Viola canina</i>	Heath Dog-violet
<i>Viola palustris</i>	Marsh Violet
<i>Viola riviniana</i>	Common Dog-violet
<i>Viola tricolor</i>	Wild Pansy

Study Area 2. Ewe Hill – Newfield

<b>Scientific Name</b>	<b>Common Name</b>
<i>Acer pseudoplatanus</i>	Sycamore
<i>Achillea millefolium</i>	Yarrow
<i>Achillea ptarmica</i>	Sneezewort
<i>Aegopodium podagraria</i>	Ground-elder
<i>Agrostis capillaris</i>	Common Bent
<i>Alchemilla vulgaris</i>	Lady's Mantle
<i>Alliaria petiolata</i>	Garlic Mustard
<i>Alnus glutinosa</i>	Alder
<i>Alopecurus pratensis</i>	Meadow Foxtail
<i>Andromeda polifolia</i>	Bog-rosemary
<i>Anemone nemorosa</i>	Wood Anemone
<i>Angelica sylvestris</i>	Wild Angelica
<i>Anthoxanthum odoratum</i>	Sweet Vernal Grass
<i>Anthriscus sylvestris</i>	Cow Parsley
<i>Arrhenatherum elatius</i>	False Oat-grass
<i>Artemisia vulgaris</i>	Mugwort
<i>Aulacomnium palustre</i>	Bog Groove-moss
<i>Bellis perennis</i>	Daisy
<i>Betula pendula</i>	Silver Birch
<i>Betula pubescens</i>	Downy Birch
<i>Botrychium lunaria</i>	Moonwort
<i>Briza media</i>	Quaking-grass
<i>Calluna vulgaris</i>	Heather
<i>Caltha palustris</i>	Marsh Marigold
<i>Calystegia sepium</i>	Hedge Bindweed
<i>Campanula rotundifolia</i>	Harebell
<i>Capsella bursa-pastoris</i>	Shepherd's-purse
<i>Cardamine pratensis</i>	Cuckooflower

<b>Scientific Name</b>	<b>Common Name</b>
<i>Carex binervis</i>	Green-ribbed Sedge
<i>Carex echinata</i>	Star Sedge
<i>Carex hirta</i>	Hairy Sedge
<i>Carex nigra</i>	Common Sedge
<i>Carex ovalis</i>	Oval Sedge
<i>Carex panicea</i>	Carnation Sedge
<i>Carex rostrata</i>	Bottle Sedge
<i>Carex viridula</i>	Yellow Sedge
<i>Centaurea nigra</i>	Common Knapweed
<i>Cerastium fontanum</i>	Common Mouse-ear
<i>Chamerion angustifolium</i>	Rosebay Willowherb
<i>Chrysosplenium oppositifolium</i>	Opposite-leaved Golden-saxifrage
<i>Cirsium palustre</i>	Marsh Thistle
<i>Cirsium vulgare</i>	Spear Thistle
<i>Cladonia impexa</i>	Reindeer Moss
<i>Conopodium majus</i>	Pignut
<i>Corylus avellana</i>	Hazel
<i>Crataegus monogyna</i>	Hawthorn
<i>Cynosurus cristatus</i>	Crested Dog's-tail
<i>Dactylis glomerata</i>	Cock's-foot
<i>Dactylorhiza fuchsii</i>	Common Spotted Orchid
<i>Dactylorhiza maculata</i>	Heath Spotted Orchid
<i>Deschampsia cespitosa</i>	Tufted Hair-grass
<i>Deschampsia flexuosa</i>	Wavy Hair-grass
<i>Dicranum scoparium</i>	Broom Fork-moss
<i>Digitalis purpurea</i>	Foxglove
<i>Drosera rotundifolia</i>	Round-leaved Sundew
<i>Dryopteris dilatata</i>	Broad Buckler-fern
<i>Dryopteris filix-mas</i>	Common Male Fern
<i>Eleocharis palustris</i>	Common Spike-rush
<i>Elytrigia repens</i>	Common Couch
<i>Empetrum nigrum</i>	Crowberry
<i>Epilobium hirsutum</i>	Great Willowherb
<i>Epilobium montanum</i>	Broad-leaved Willowherb
<i>Epilobium parviflorum</i>	Hoary Willowherb
<i>Equisetum arvense</i>	Field Horsetail
<i>Equisetum fluviatile</i>	Water Horsetail
<i>Equisetum sylvaticum</i>	Wood Horsetail
<i>Erica tetralix</i>	Cross-leaved Heath
<i>Eriophorum angustifolium</i>	Common Cottongrass
<i>Eriophorum vaginatum</i>	Hare's-tail Cottongrass
<i>Euphrasia tetraquetra</i>	dicotyledon
<i>Fallopia japonica</i>	Japanese Knotweed

<b>Scientific Name</b>	<b>Common Name</b>
<i>Festuca ovina</i>	Sheep's Fescue
<i>Festuca pratensis</i>	Meadow Fescue
<i>Festuca rubra</i>	Red Fescue
<i>Filago vulgaris</i>	Common Cudweed
<i>Filipendula ulmaria</i>	Meadowsweet
<i>Fragaria vesca</i>	Wild Strawberry
<i>Fraxinus excelsior</i>	Ash
<i>Galium aparine</i>	Cleavers
<i>Galium palustre</i>	Common Marsh-bedstraw
<i>Galium saxatile</i>	Heath Bedstraw
<i>Galium uliginosum</i>	Fen Bedstraw
<i>Galium verum</i>	Lady's Bedstraw
<i>Geranium pratense</i>	Meadow Crane's-bill
<i>Geranium robertianum</i>	Herb-robert
<i>Geum rivale</i>	Water Avens
<i>Glechoma hederacea</i>	Ground-ivy
<i>Glyceria fluitans</i>	Floating Sweet-grass
<i>Hedera helix ssp. helix</i>	Common Ivy
<i>Heracleum sphondylium</i>	Hogweed
<i>Hieracium sabaudum</i>	composite
<i>Hippuris vulgaris</i>	Mare's-tail
<i>Holcus lanatus</i>	Yorkshire-fog
<i>Hyacinthoides non-scripta</i>	Bluebell
<i>Hydrocharis morsus-ranae</i>	Frogbit
<i>Hypericum maculatum ssp. maculatum</i>	St john's wort
<i>Hypnum jutlandicum</i>	Heath Plait-moss
<i>Hypochaeris radicata</i>	Cat's-ear
<i>Ilex aquifolium</i>	Holly
<i>Juncus acutiflorus</i>	Sharp-flowered Rush
<i>Juncus articulatus</i>	Jointed Rush
<i>Juncus bufonius</i>	Toad Rush
<i>Juncus conglomeratus</i>	Compact Rush
<i>Juncus effusus</i>	Soft Rush
<i>Juncus inflexus</i>	Hard Rush
<i>Juncus squarrosus</i>	Heath Rush
<i>Lapsana communis</i>	Nipplewort
<i>Larix decidua</i>	Larch
<i>Lathyrus pratensis</i>	Meadow Vetchling
<i>Lemna minor</i>	Common Duckweed
<i>Leucanthemum vulgare</i>	Oxeye Daisy
<i>Linaria vulgaris</i>	Common Toadflax
<i>Lolium perenne</i>	Perennial Rye-grass
<i>Lonicera periclymenum</i>	Honeysuckle



<b>Scientific Name</b>	<b>Common Name</b>
<i>Lotus corniculatus</i>	Common Bird's-foot Trefoil
<i>Lotus pedunculatus</i>	Greater Bird's-foot Trefoil
<i>Luzula campestris</i>	Field Wood-rush
<i>Luzula multiflora</i>	Heath Wood-rush
<i>Luzula pilosa</i>	Hairy Wood-rush
<i>Lychnis flos-cuculi</i>	Ragged Robin
<i>Matricaria discoidea</i>	Pineappleweed
<i>Mentha aquatica</i>	Water Mint
<i>Molinia caerulea</i>	Purple Moor-grass
<i>Myosotis arvensis</i>	Field Forget-me-not
<i>Myosotis scorpioides</i>	Water Forget-me-not
<i>Nardus stricta</i>	Mat-grass
<i>Narthecium ossifragum</i>	Bog Asphodel
<i>Oxalis acetosella</i>	Wood-sorrel
<i>Pedicularis sylvatica</i>	Lousewort
<i>Persicaria maculosa</i>	Redshank
<i>Phleum pratense</i>	Timothy
<i>Picea sitchensis</i>	Sitka Spruce
<i>Pinus sylvestris</i>	Scots Pine
<i>Plantago lanceolata</i>	Ribwort Plantain
<i>Plantago major</i>	Greater Plantain
<i>Pleurozium schreberi</i>	Red-stemmed Feather-moss
<i>Poa annua</i>	Annual Meadow-grass
<i>Poa pratensis</i>	Smooth Meadow-grass
<i>Poa trivialis</i>	Rough Meadow-grass
<i>Polytrichum commune</i>	Common Haircap
<i>Polytrichum formosum</i>	Bank Haircap
<i>Potamogeton polygonifolius</i>	Bog Pondweed
<i>Potentilla anserina</i>	Silverweed
<i>Potentilla erecta</i>	Tormentil
<i>Potentilla palustris</i>	Marsh Cinquefoil
<i>Primula vulgaris</i>	Primrose
<i>Prunella vulgaris</i>	Selfheal
<i>Pteridium aquilinum</i>	Bracken
<i>Quercus robur</i>	Pedunculate Oak
<i>Ranunculus acris</i>	Meadow Buttercup
<i>Ranunculus ficaria</i>	Lesser Celandine
<i>Ranunculus flammula</i>	Lesser Spearwort
<i>Ranunculus repens</i>	Creeping Buttercup
<i>Rhinanthus minor</i>	Yellow-rattle
<i>Rhynchospora alba</i>	White Beak-sedge
<i>Rosa canina</i> agg.	Dog Roses
<i>Rubus fruticosus</i> agg.	Bramble

<b>Scientific Name</b>	<b>Common Name</b>
<i>Rubus idaeus</i>	Raspberry
<i>Rumex acetosa</i>	Common Sorrel
<i>Rumex acetosella</i>	Sheep's Sorrel [agg.]
<i>Rumex crispus</i>	Curled Dock
<i>Rumex obtusifolius</i>	Broad-leaved Dock
<i>Salix caprea</i>	Goat Willow
<i>Sambucus nigra</i>	Elder
<i>Scirpus cespitosum</i>	Deergrass
<i>Scrophularia nodosa</i>	Common Figwort
<i>Senecio jacobaea</i>	Common Ragwort
<i>Senecio vulgaris</i>	Groundsel
<i>Sonchus asper</i>	Prickly Sow-thistle
<i>Sonchus oleraceus</i>	Smooth Sow-thistle
<i>Sorbus aucuparia</i>	Rowan
<i>Sphagnum capillifolium</i>	Red Bog-moss
<i>Sphagnum cuspidatum</i>	Feathery Bog-moss
<i>Sphagnum fallax</i>	Flat-topped Bog-moss
<i>Sphagnum palustre</i>	Blunt-leaved Bog-moss
<i>Sphagnum papillosum</i>	Papillose Bog-moss
<i>Stachys palustris</i>	Marsh Woundwort
<i>Stachys sylvatica</i>	Hedge Woundwort
<i>Stellaria graminea</i>	Lesser Stitchwort
<i>Stellaria holostea</i>	Greater Stitchwort
<i>Stellaria media</i>	Common Chickweed
<i>Succisa pratensis</i>	Devil's-bit Scabious
<i>Taraxacum officinale agg.</i>	Dandelion
<i>Trifolium pratense</i>	Red Clover
<i>Trifolium repens</i>	White Clover
<i>Tussilago farfara</i>	Colt's-foot
<i>Typha latifolia</i>	Common Reedmace
<i>Ulex europaeus</i>	Gorse
<i>Urtica dioica</i>	Common Nettle
<i>Vaccinium myrtillus</i>	Blaeberry
<i>Vaccinium oxycoccos</i>	Cranberry
<i>Vaccinium uliginosum</i>	Bog Bilberry
<i>Vaccinium vitis-idaea</i>	Cowberry
<i>Valeriana officinalis</i>	Common Valerian
<i>Veronica beccabunga</i>	Brooklime
<i>Veronica chamaedrys</i>	Germander Speedwell
<i>Veronica officinalis</i>	Heath Speedwell
<i>Vicia hirsuta</i>	Hairy Tare
<i>Vicia sativa</i>	Common Vetch
<i>Viola canina</i>	Heath Dog-violet

<b>Scientific Name</b>	<b>Common Name</b>
<i>Viola palustris</i>	Marsh Violet
<i>Viola riviniana</i>	Common Dog-violet
<i>Viola tricolor</i>	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**

<b>Domin</b>	<b>% Species cover</b>
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**

<b>Proposed OHL Route</b>	<b>Peatland</b>	<b>Grid Reference</b>
<i>Gretna - Ewe Hill</i>	<i>Cowgarth Flow</i>	NY 322 716
<i>Gretna – Ewe Hill</i>	<i>Greenwrae Flow</i>	NY 331 724
<i>Gretna – Ewe Hill</i>	<i>Cadgill Flow</i>	NY 318 736
<i>Gretna – Ewe Hill</i>	<i>Bells Flow</i>	NY 319 758
<i>Gretna – Ewe Hill (added 2009)</i>	<i>Berclees – Cadgillhead un-named mire</i>	NY 303 757
<i>Gretna – Ewe Hill</i>	<i>Solwaybank un-named intermediate/blanket Mire</i>	NY 300 766
<i>Gretna – Ewe Hill</i>	<i>Allfornaught South un-named Blanket Mire</i>	NY 290 773
<i>Gretna – Ewe Hill</i>	<i>Allfornaught North un-named Blanket Mire</i>	NY 286 777
<i>Ewe Hill - Newfield</i>	<i>Blackstan Moss</i>	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	<b>M18a - <i>Erica tetralix</i> - <i>Sphagnum papillosum</i> (Sub C:<i>Sphagnum magellanicum</i> - <i>Andromeda polifolia</i>) Raised Mire</b>	No Conservation Management	Pine and birch scrub encroachment	>1m
Cowgarth Flow		(W18 - <i>Pinus sylvestris</i> - <i>Hylocomium splendens</i> )	Plantation	Heavily modified with remnant understorey	
Cowgarth Flow	NY33128 72522	(M15d - <i>Scirpus cespitosus</i> - <i>Erica tetralix</i> (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	<b>M19a - <i>Calluna vulgaris</i> - <i>Eriophorum vaginatum</i> (Sub C:<i>Erica tetralix</i>) Blanket Mire</b>	No Conservation Management	Good but threatened by scrub encroachment	>1.5m
Greenwrae Flow		(W18b/c/d - <i>Pinus sylvestris</i> - <i>Hylocomium splendens</i> (Sub C's: <i>Vaccinium myrtillus</i> - <i>Vaccinium vitis-idaea</i> : <i>Luzula pilosa</i> : <i>Sphagnum capillifolium</i> )	Plantation		
Greenwrae Flow		(M17c <i>Scirpus cespitosus</i> - <i>Eriophorum vaginatum</i> blanket bog (Sub C: <i>Juncus squarrosus</i> - <i>Rhytidiadelphus loreus</i> )			<0.5m
Greenwrae Flow		(W4a - <i>Betula pubescens</i> - <i>Molinia caerulea</i> (Sub C: <i>Dryopteris dilatata</i> - <i>Rubus fruticosus</i> )		Drier areas	
Greenwrae Flow		(W4c - <i>Betula pubescens</i> - <i>Molinia caerulea</i> (Sub C: <i>Sphagnum</i> )		Wetter deeper peat areas	
Cadgill Flow	NY31856 73721	<b>M18 - <i>Erica tetralix</i> - <i>Sphagnum papillosum</i> (Sub C:<i>Empetrum nigrum</i> - <i>Cladonia</i>) Raised Mire</b>	No Conservation Management	Birch scrub encroachment - degrading due to drying out	>2m
		(W4a - <i>Betula pubescens</i> - <i>Molinia caerulea</i> (Sub C: <i>Dryopteris dilatata</i> - <i>Rubus fruticosus</i> )			
Bell's Flow	NY32003 75650	<b>M18a - <i>Erica tetralix</i> - <i>Sphagnum papillosum</i> (Sub C:<i>Sphagnum magellanicum</i> - <i>Andromeda polifolia</i>) Raised Mire</b>	Conservation Management	SSSI - good condition high water table	>2m
		(M20 - <i>Eriophorum vaginatum</i> blanket and raised mire)			

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Site	Grid Reference	NVC Code - Dominant code and (<5%)	Management	Habitat condition	Peat Depth
Berclees – Cadgillhead un- named mire	NY 303 757	<b>M19a - <i>Calluna vulgaris</i> - <i>Eriophorum vaginatum</i> (Sub C:<i>Erica tetralix</i>) Blanket Mire</b>	No Conservation Management. Some drainage and grazing to west.	Degraded due to over-dominance by <i>Molinia caerulea</i> and limited drainage impacts but still of value	>2m
		[M18 - <i>Erica tetralix</i> - <i>Sphagnum papillosum</i> (Sub C: <i>Empetrum nigrum</i> - <i>Cladonia</i> ) Raised Mire]			
Solwaybank Blanket Mire	NY30007 76734	<b>M17a -<i>Scirpus cespitosus</i> - <i>Eriophorum vaginatum</i> (Sub C:<i>Drosera rotundifolia</i> - <i>Sphagnum</i> spp.) Blanket Mire</b>	No Conservation Management. Historical grazing	Overgrazed and degraded but recovering, still very dry.	<2m
Solwaybank Blanket Mire		(M3 - <i>Eriophorum angustifolium</i> Bog Pool)			
		(M21 <i>Narthecium ossifragum</i> Valley Mire)			
Allfornaught Blanket Mire South	NY28895 77346	<b>M17a -<i>Scirpus cespitosus</i> - <i>Eriophorum vaginatum</i> (Sub C:<i>Drosera rotundifolia</i> - <i>Sphagnum</i> spp.) Blanket Mire</b>	No Conservation Management. Historical peat cutting	Grazed by horses. Variable condition due to drainage, grazing and historical cutting. Much currently being over-dominated by <i>Molinia</i> .	>2m
Allfornaught Blanket Mire South		(U6 - <i>Juncus squarrosus</i> - <i>Festuca ovina</i> Grassland)	Grazed margins		
Allfornaught Blanket Mire North	NY28598 77876	<b>M19a - <i>Calluna vulgaris</i> - <i>Eriophorum vaginatum</i> (Sub C:<i>Erica tetralix</i>) Blanket Mire</b>	Some drainage	Impacted by drainage and grazing.	>1m
Allfornaught Blanket Mire North		(U6 - <i>Juncus squarrosus</i> - <i>Festuca ovina</i> Grassland)	Grazed margins		
Blackstan Moss	NY2522854	<b>M20 - <i>Eriophorum vaginatum</i> blanket and raised mire</b>	No Conservation Management. Deep drainage	Recovering	>3m

Gretna Substation to Ewe Hill and Newfield Wind Farms 132kV  
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Site	Grid Reference	NVC Code - Dominant code and (<5%)	Management	Habitat condition	Peat Depth
			and historical grazing		
		(M3 - <i>Eriophorum angustifolium</i> 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
<b>Cowgarth Flow</b>	<b>M18a Raised Bog - Drained peat &gt;1m depth</b>		<b>M15d Wet Heath</b>		<b>Plantation W18 Woodland</b>	
	<i>Erica tetralix</i>	V 4-6	<i>Calluna vulgaris</i> (>0.3m)	V 6-8 (8-10)	<i>Pinus sylvestris</i>	
	<i>Eriophorum vaginatum</i>	IV 4-6	<i>Vaccinium myrtillus</i>	V 4-6	<i>Betula pendula</i>	
	<i>Vaccinium oxycoccus</i>	V 4	<i>Vaccinium oxycoccus</i>	V 3		
	<i>Empetrum nigrum</i>	IV 4-6 (3)	<i>Erica tetralix</i>	IV 4	<b>Understory</b>	
	<i>Sphagnum papillosum</i>	III 4	<i>Sphagnum capillifolium</i>	III 4(-5)	<i>Galium</i> sp	
	<i>Sphagnum palustre</i>	III 4	<i>Eriophorum vaginatum</i>	III 3	Various fems - including <i>Dryopteris</i> spp.	
	<i>Deschampsia flexuosa</i>	III 1-3	<i>Eriophorum angustifolium</i>	III 3 (II 2)	<i>Festuca ovina</i>	
	<i>Scirpus cespitosum</i>	III	<i>Deschampsia flexuosa</i>	III 1-3	<i>Anthoxanthum odoratum</i>	
	<i>Andromeda polifolia</i>	II 2	<i>Festuca ovina</i>	I	<i>Molinia caerulea</i>	
	<i>Sphagnum fallax</i> (in drainage ditches)	I 4-6	<i>Sphagnum fallax</i> (in drainage ditches)	I	<i>Digitalis purpurea</i>	
	<i>Narthecium ossifragum</i>	I	<i>Andromeda polifolia</i>	I 2	<i>Vaccinium myrtillus</i>	
	<i>Vaccinium uliginosum</i>	I	<i>Anthoxanthum odoratum</i>		<i>Sphagnum palustre</i>	
<b>Cowgarth Flow (cont.)</b>	<i>Cladonia impexa</i>		<i>Festuca ovina</i>		<i>Rubus fruticosus</i>	
			<i>Juncus squarrosus</i>		<i>Luzula campestris</i>	
			<i>Hypnum jutlandicum</i>		<i>Sphagnum squarrosum</i>	
			<i>Dicranium scoparium</i>		<i>Sphagnum fallax</i>	
					<i>Sphagnum palustre</i>	
					<i>Molinia caerulea</i>	
					<i>Calluna vulgaris</i>	

Gretna Substation to Ewe Hill and Newfield Wind Farms 132kV  
Overhead Transmission Line

Site	NVC Habitat Type	NVC Frequency & Domin	NVC Habitat Type	NVC Frequency & Domin	NVC Habitat Type	NVC Frequency & Domin
<b>Greenwrae Flow</b>	<b>M19a - Raised Bog - Drained/cut peat &gt;1.5m depth</b>		<b>Plantation - W18 Woodland</b>		<b>M17c - peat &lt;0.5m depth</b>	
	<i>Calluna vulgaris</i> (>0.35m)	V 6-8	<i>Pinus sylvestris</i> - plantation	V	<i>Calluna vulgaris</i> (>0.5m)	V 6-8
	<i>Eriophorum vaginatum</i>	V 4-6	<i>Betula pendula/pubescens</i> (scrub)	V	<i>Scirpus cespitosum</i>	V 4
	<i>Vaccinium oxycoccus</i>	V 3	<b>Understorey</b>		<i>Sphagnum capillifolium</i>	III 4
	<i>Erica tetralix</i>	IV 4	<i>Festuca ovina</i>	IV	<i>Sphagnum papillosum</i>	III 4
	<i>Vaccinium myrtillus</i>	III 3-4	<i>Anthoxanthum odoratum</i>	IV	<i>Eriophorum vaginatum</i>	III
<b>Greenwrae Flow (cont.)</b>	<b>M19a - Raised Bog - Drained/cut peat &gt;1.5m depth</b>		<b>Plantation - W18 Woodland: Understorey</b>		<b>M17c - peat &lt;0.5m depth</b>	
	<i>Empetrum nigrum</i>	III 1-3	<i>Vaccinium myrtillus</i> (W18b)	IV	<i>Eriophorum angustifolium</i>	III
	<i>Vaccinium ugilinosum</i>	III	<i>Galium sp</i>	III	<i>Molinia caerulea</i>	II
	<i>Sphagnum capillifolium</i> (noticeable loss of sphagna spp)	III	<i>Digitalis purpurea</i>	I	<i>Erica tetralix</i>	I
	<i>Nartheceium ossifragum</i>	III	<i>Eriophorum angustifolium</i>		<i>Andromeda polifolia</i>	I
	<i>Eriophorum angustifolium</i>	I	<i>Luzula pilosa</i> (W18c)		<i>Nardus stricta</i>	
	<i>Andromeda polifolia</i>	I 2	<i>Dicranium scoparium</i>		<i>Deschampsia flexuosa</i>	
	<i>Sphagnum fallax</i>		<i>Erica tetralix</i> (W18d)		<i>Anthoxanthum odoratum</i>	
	<b>Occasional Pleurocarpous mosses</b>		<i>Sphagnum capillifolium</i>		<i>Carex nigra</i>	
	<i>Hypnum jutlandicum</i>		<i>Sphagnum quinquefarium</i>		<b>Pleurocarpous mosses</b>	
	<i>Pleurozium schreberi</i>		<i>Vaccinium oxycoccus</i>		<i>Hypnum jutlandicum</i>	IV
	<i>Dicranium scoparium</i>		<i>Andromeda polifolia</i>		<i>Pleurozium schreberi</i>	IV
	<i>Polytrichum commune</i>				<i>Dicranium scoparium</i>	III

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Site	NVC Habitat Type	NVC Frequency & Domin	NVC Habitat Type	NVC Frequency & Domin	NVC Habitat Type	NVC Frequency & Domin
Greenwrae Flow (cont.)			<b>W4a (dryer)-W4c (wet) Scrub Woodland</b>	V	<i>Pleurocarpous mosses</i>	
			<i>Betula pendula/pubescens</i>	III	<i>Rhytidiadelphus loreus</i>	
			<i>Sphagnum squarrosum</i>		<i>Plagiothecium undulatum</i>	III
			<i>Sphagnum cuspidatum</i>	II	<i>Polytrichum commune</i>	
			<i>Sphagnum palustre &amp; fallax (W4c)</i>	III	<i>Cladonia impexa</i>	
			<i>Dryopteris dilatata (W4a)</i>		<i>Luzula multiflora</i>	
			<i>Rubus fruticosus (W4a)</i>		<i>Juncus squarrosus</i>	
			<i>Aulacomnium palustre</i>		<i>Deschampsia flexuosa</i>	
			<i>Polytrichum formosum</i>			
			<i>Juncus effusus</i>			
			<i>Molinia caerulea</i>			

Site	NVC Habitat Type	NVC Frequency & Domin	NVC Habitat Type	NVC Frequency & Domin	NVC Habitat Type	NVC Frequency & Domin
Cadgill Flow	<b>M18 Raised Mire but degraded by drainage. Peat &gt;2m depth, surrounded by birch scrub woodland (W4)</b>		<b>W4a (dryer)-W4c (wet) Scrub Woodland</b>			
	<i>Calluna vulgaris</i> (>0.3m)	V	<i>Betula pendula/pubescens</i>	V		
	<i>Erica tetralix</i>	V	<i>Eriophorum vaginatum</i>	IV		

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	<i>Eriophorum angustifolium</i>	IV	<i>Dryopteris dilatata</i> (W4a)	III		
			<i>Molinia caerulea</i>	III		
			<i>Sphagnum palustre</i> & <i>fallax</i>			
	<b>Occasional</b>		<b>W4c (wet) Scrub Woodland</b>			
	<i>Vaccinium myrtillus</i>	III	<i>Vaccinium myrtillus</i>			
	<i>Molinia caerulea</i>	III	<i>Polytrichum formosum</i>			
	<i>Eriophorum vaginatum</i>	II				
	<i>Nardus stricta</i>	II	<b>Occasional</b>			
	<i>Andromeda polifolia</i>	I 1-2	<i>Carex nigra</i>			
	<i>Narthecium ossifragum</i>	I	<i>Aulacomnium palustre</i>			
	<i>Empetrum nigrum</i>	I	<i>Calluna vulgaris</i>			
<b>Site</b>	<b>NVC Habitat Type</b>	<b>NVC Frequency &amp; Domin</b>	<b>NVC Habitat Type</b>	<b>NVC Frequency &amp; Domin</b>	<b>NVC Habitat Type</b>	<b>NVC Frequency &amp; Domin</b>
<b>Cadgill Flow (cont.)</b>	<b>Occasional</b>		<b>Occasional</b>			
	<i>Vaccinium uliginosum</i>	I	<i>Pleurozium schreberi</i>			
	<i>Cladonia impexa</i>	I	<i>Rubus fruticosus</i>			
	<i>Vaccinium oxycoccus</i>	I	<i>Dicranium majus</i>			
	<i>Sphagnum capillifolium</i>		<i>Festuca ovina</i>			
	<i>Sphagnum palustre</i>					
	<i>Cladonia impexa</i>					
	<i>Vaccinium uliginosum</i>					
	<b>Neutral Grassland/Marshy Grassland</b>					
	<i>Juncus effusus</i>					
	<i>Carex hirta</i>					
	<i>Carex binervis</i>					
	<i>Juncus inflexus</i>					
	<i>Dactylorhiza fuchsii</i>					



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Site	NVC Habitat Type	NVC Frequency & Domin	NVC Habitat Type	NVC Frequency & Domin	NVC Habitat Type	NVC Frequency & Domin
<b>Bell's Flow</b>	<b>M18a SSSI - (Peat &gt;2m depth)</b>		<b>M20</b>			
	<i>Calluna vulgaris</i> (>0.3m)	IV 6-8	<i>Eriophorum vaginatum</i>	IV 6-8		
	<i>Erica tetralix</i>	IV 6-8	<i>Erica tetralix</i>	IV 6-8		
	<i>Eriophorum vaginatum</i>	IV 6-8	<i>Sphagnum palustre</i>	III		
	<i>Sphagnum capillifolium</i>	III	<i>Sphagnum papillosum</i>	III		
	<i>Sphagnum cuspidatum</i>	III	<i>Sphagnum cuspidatum</i>	III		
	<i>Sphagnum papillosum</i>	III	<i>Vaccinium oxycoccus</i>	II		
	<i>Sphagnum palustre</i>	III	<i>Drosera rotundifolia</i>	II		
	<i>Sphagnum fallax</i>	II	<i>Sphagnum tenellum</i>	I		
	<i>Andromeda polifolia</i>	III 2-3	<i>Sphagnum magellanicum</i>	I		
	<i>Vaccinium oxycoccus</i>	II 2-3				
	<i>Narthecium ossifragum</i>	II				
	<i>Eriophorum angustifolium</i>	I				
	<i>Vaccinium myrtillus</i>	I				
	<i>Vaccinium ugilinosum</i>	I				
	<i>Sphagnum tenellum</i>	I				
Site	NVC Habitat Type	NVC Frequency & Domin	NVC Habitat Type	NVC Frequency & Domin	NVC Habitat Type	NVC Frequency & Domin
<b>Bell's Flow (cont.)</b>	<b>M18a SSSI - (Peat &gt;2m depth)</b>					
	<i>Sphagnum magellanicum</i>	I				
	<i>Scirpus cespitosum</i>					
	<b>Occasional</b>					
	<i>Carex nigra</i>					
	<i>Ranunculus flammula</i>					
	<i>Drosera rotundifolia</i>					

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Berclees – Cadgillhead Farms: un-named moss	M19a intermediate mire		M18 intermediate mire		W4a (dryer)-W4c (wet) Scrub Woodland	
	<i>Eriophorum vaginatum</i>	V 6-8	<i>Molinia caerulea</i>	V 4-8	<i>Betula pendula/pubescens</i>	IV
	<i>Molinia caerulea</i>	V 6-8	<i>Eriophorum vaginatum</i>	V 4-5	<i>Molinia caerulea</i>	IV
	<i>Erica tetralix</i>	V 1	<i>Erica tetralix</i>	V 1-2	<i>Sphagnum palustre &amp; fallax</i>	
	<i>Calluna vulgaris</i> (>0.3m)	IV 3	<i>Calluna vulgaris</i> (>0.3m)	IV 3	<i>Eriophorum vaginatum</i>	I
	<i>Sphagnum cuspidatum</i>	II 2	<i>Sphagnum cuspidatum</i>	II 2	<i>Polytrichum commune</i>	

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	
	<i>Narthecium ossifragum</i>	II 1-2	<i>Sphagnum fallax</i>	I 3	<i>Vaccinium myrtillus</i>	
	<i>Sphagnum fallax</i>	I 3	<i>Sphagnum papillosum</i>	I 2	<i>Potentilla erecta</i>	
	<i>Molinia caerulea</i>	I 3	<i>Sphagnum palustre</i>	I 2		
	<i>Sphagnum papillosum</i>	I 2	<i>Andromeda polifolia</i>	I 1-2		
	<i>Sphagnum palustre</i>	I 2	<i>Narthecium ossifragum</i>	I 1-2		
	<i>Andromeda polifolia</i>	I 1-2	<i>Juncus effusus</i>	I 1		
	<i>Cladonia impexa</i>	I 1-2	<i>Betula pendula</i>	Present		
	<i>Vaccinium oxycoccus</i>	I 1				
	<i>Eriophorum angustifolium</i>	I 1				
	<i>Vaccinium myrtillus</i>	I 1				
	<i>Scirpus cespitosum</i>	I 1				
	<i>Empetrum nigrum</i>	I 1				
	<i>Polytrichum commune</i>					
	<i>Dicranium scoparium</i>					

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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	
	<i>Eriophorum vaginatum</i> (tussocks)	IV 8	<i>Eriophorum angustifolium</i> dominated		<i>Eriophorum vaginatum</i> / <i>Scirpus cespitosum</i>	
	<i>Erica tetralix</i>	III	<i>Drosera rotundifolia</i>			
	<i>Scirpus cespitosum</i>	III	<i>Narthecium ossifragum</i>		<i>Eriophorum vaginatum</i> / <i>Erica tetralix</i>	
	<i>Vaccinium myrtillus</i>	I			<i>Eriophorum vaginatum</i> / <i>Sphagnum compactum</i>	
	<i>Vaccinium oxycoccus</i>	I				
	<i>Vaccinium ugilinosum</i>	I			<i>Eriophorum angustifolium</i> bog pools M2	
	<i>Andromeda polifolia</i>	I 1-2				
	<i>Sphagnum capillifolium</i>				<i>Narthecium ossifragum</i> valley mire M21	
	<i>Sphagnum palustre</i>					
	<i>Sphagnum cuspidatum</i>					
	<i>Sphagnum compactum</i>					
	<i>Sphagnum fallax</i>					
	<i>Molinia caerulea</i>					

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Site	NVC Habitat Type	NVC Frequency & Domin	NVC Habitat Type	NVC Frequency & Domin	NVC Habitat Type	NVC Frequency & Domin
<b>Solwaybank Mire (cont.)</b>	<b>M17a (peat &lt;2m depth)</b>					
	<i>Potentilla erecta</i>					
	<i>Calluna vulgaris (0.2m)</i>					
	<i>Empetrum nigrum</i>					
	<i>Cladonia impexa</i>					
	<i>Nartheccium ossifragum</i>					
<b>Allfomaught Intermediate Mire South</b>	<b>Low level (cutover)</b>		<b>M17 Middle level</b>		<b>M17 drained to acid grassland U4/5/6 Upper level</b>	
	<b>M17 various due to old peat cuts (&gt;2m peat depth)</b>					
	<i>Erica tetralix</i>	V 6-8	<i>Molinia caerulea</i>		<i>Molinia caerulea</i>	
	<i>Eriophorum vaginatum</i> (tussocks)	V 6-8	<i>Eriophorum vaginatum</i> (tussocks)		<i>Erica tetralix</i>	
	<i>Scirpus cespitosum</i>	V 4-6	<i>Sphagnum cuspidatum</i>		<i>Calluna vulgaris</i>	
	<i>Nartheccium ossifragum</i>	I	<i>Sphagnum palustre</i>		<i>Scirpus cespitosum</i>	
	<i>Sphagnum cuspidatum</i>	I	<i>Sphagnum papillosum</i>		<i>Potentilla erecta</i>	
	<i>Sphagnum palustre</i>	I			<i>Vaccinium myrtillus</i>	
	<i>Vaccinium oxycoccus</i>	I			<i>Vaccinium ugilinosum</i>	

Gretna Substation to Ewe Hill and Newfield Wind Farms 132kV  
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Site	NVC Habitat Type	NVC Frequency & Domin	NVC Habitat Type	NVC Frequency & Domin	NVC Habitat Type	NVC Frequency & Domin
Ailfomaught Intermediate Mire South (cont.)	M19a Peat >1m depth)		Acid grassland U6		M17 drained to acid grassland U4/5/6 Upper level	
	<i>Calluna vulgaris</i>	IV			<i>Luzula campestris</i>	
	<i>Vaccinium myrtillus</i>	V 6-8	<i>Deschampsia flexuosa</i>		<i>Luzula multiflora</i>	
	<i>Eriophorum vaginatum</i>	V 6-8	<i>Festuca ovina/rubra</i>		<i>Dactylorhiza maculata</i>	
	<i>Scirpus cespitosum</i>	IV 4	<i>Juncus squarrosus</i>		<i>Drosera rotundifolia</i>	
	<i>Erica tetralix</i>	IV 4	<i>Polytrichum commune</i>		<i>Narthecium ossifragum</i>	
	<i>Molinia caerulea</i>	IV 4	<i>Luzula campestris</i>		<i>Andromeda polifolia</i>	
	<i>Sphagnum capillifolium</i>	III	<i>Luzula multiflora</i>			
	<i>Sphagnum cuspidatum</i>	III	<i>Pedicularis sylvatica</i>			
	<i>Sphagnum papillosum</i>	III	<i>Dactylorhiza maculata</i>			
	<i>Sphagnum palustre</i>	III				
	<i>Sphagnum fallax</i> (ditches)					
	<b>Occasional</b>					
	<i>Vaccinium oxycoccus</i>	I				
	<i>Narthecium ossifragum</i>	I				
<i>Eriophorum angustifolium</i>	I					



Gretna Substation to Ewe Hill and Newfield Wind Farms 132kV  
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Site	NVC Habitat Type	NVC Frequency & Domin	NVC Habitat Type	NVC Frequency & Domin	NVC Habitat Type	NVC Frequency & Domin
<b>Blackstan Moss</b>	<b>M20 (peat &gt;3m depth)</b>		<b>M3 - Bog Pools</b>		<b>M20</b>	
	<i>Calluna vulgaris</i>	V 6-8	<i>Sphagnum cuspidatum</i>	IV 6	<i>Eriophorum vaginatum</i>	V 7-9
	<i>Vaccinium myrtillus</i>	IV 4	<i>Sphagnum palustre</i>	III	<i>Erica tetralix</i>	IV 5-7
	<i>Eriophorum vaginatum</i>	IV 4	<i>Sphagnum fallax</i>	III	<i>Sphagnum capillifolium</i>	III
	<i>Sphagnum capillifolium</i>	III	<i>Eriophorum angustifolium</i>	III	<i>Molinia caerulea</i>	III
	<i>Sphagnum papillosum</i>	III	<i>Vaccinium oxycoccus</i>	III	<i>Vaccinium oxycoccus</i>	I
	<i>Sphagnum palustre</i>	II	<i>Narthecium ossifragum</i>	III		
	<i>Dicranium scoparium</i>	II	<i>Drosera rotundifolia</i>	I	<b>M20 - with overdominance of <i>Molinia</i></b>	
	<i>Erica tetralix</i>	II			<i>Molinia caerulea</i>	
	<i>Eriophorum angustifolium</i>	I			<i>Eriophorum vaginatum</i>	
	<i>Molinia caerulea</i>	I			<i>Polytrichum commune</i>	
	<i>Polytrichum commune</i>	I			<i>Aulacomnium palustre</i>	
	<i>Cladonia impexa</i>	I			<i>Dicranium scoparium</i>	
	<i>Empetrum nigrum</i>	I			<i>Sphagnum papillosum</i>	
	<i>Aulacomnium palustre</i>	I			<i>Sphagnum palustre</i>	
	<i>Hypnum jutlandicum</i>	I			<i>Galium saxatile</i>	
	<i>Pleurozium schreberi</i>	I			<i>Potentilla erecta</i>	

**Appendix 2.** Species found on the peatlands and associated peripheral habitats

20 species of bryophyte and 39 species of vascular plant were recorded:

<b>Scientific Name</b>	<b>Common Name</b>
<i>Aulacomnium palustre</i>	Bog Groove-moss
<i>Cladonia impexa</i>	Reindeer Moss
<i>Dicranium majus</i>	Greater Fork-moss
<i>Dicranium scoparium</i>	Broom Fork-moss
<i>Hypnum jutlandicum</i>	Heath Feather-moss
<i>Plagiothecium undulatum</i>	Waved Silk-moss
<i>Pleurozium schreberi</i>	Red-stemmed Feather-moss
<i>Polytrichum commune</i>	Marsh Hair-moss
<i>Polytrichum formosum</i>	Wood Hair-moss
<i>Rhytidiadelphus loreus</i>	Little Shaggy-moss
<i>Sphagnum capillifolium</i>	Red Bog-moss
<i>Sphagnum compactum</i>	Compact Bog-moss
<i>Sphagnum cuspidatum</i>	Feathery Bog-moss
<i>Sphagnum fallax</i>	Flat-topped Bog-moss
<i>Sphagnum magellanicum</i>	Magellanic Bog-moss
<i>Sphagnum palustre</i>	Blunt-leaved Bog-moss
<i>Sphagnum papillosum</i>	Papillose Bog-moss
<i>Sphagnum quinquefarium</i>	Five-ranked Bog-moss
<i>Sphagnum squarrosum</i>	Spiky Bog-moss
<i>Sphagnum tenellum</i>	Soft Bog-moss
<i>Andromeda polifolia</i>	Bog Rosemary
<i>Anthoxanthum odoratum</i>	Sweet Vernal Grass
<i>Betula pendula</i>	Downy Birch
<i>Betula pubescens</i>	Silver Birch
<i>Calluna vulgaris</i>	Heather
<i>Carex binervis</i>	Green-ribbed Sedge
<i>Carex hirta</i>	Hairy Sedge
<i>Carex nigra</i>	Common Sedge
<i>Dactylorhiza fuchsia</i>	Common Spotted Orchid
<i>Dactylorhiza maculata</i>	Heath Spotted Orchid
<i>Deschampsia flexuosa</i>	Wavy Hair-grass
<i>Digitalis purpurea</i>	Foxglove
<i>Drosera rotundifolia</i>	Round-leaved Sundew
<i>Dryopteris dilatata</i>	Broad Buckler Fern
<i>Empetrum nigrum</i>	Crowberry
<i>Erica tetralix</i>	Cross-leaved Heath

<b>Scientific Name</b>	<b>Common Name</b>
<i>Eriophorum angustifolium</i>	Common Cotton-grass
<i>Eriophorum vaginatum</i>	Hare's-tail Cotton-grass
<i>Festuca ovina</i>	Sheep's Fescue
<i>Galium saxatile</i>	Heath Bedstraw
<i>Galium sp</i>	Marsh/Fen Bedstraw
<i>Juncus effuses</i>	Soft Rush
<i>Juncus inflexus</i>	Hard Rush
<i>Juncus squarrosus</i>	Heath Rush
<i>Luzula campestris</i>	Field Wood-rush
<i>Luzula multiflora</i>	Heath Wood-rush
<i>Luzula pilosa</i>	Hairy Wood-rush
<i>Molinia caerulea</i>	Purple Moor-grass
<i>Nardus stricta</i>	Mat Grass
<i>Narthecium ossifragum</i>	Bog Asphodel
<i>Pedicularis sylvatica</i>	Lousewort
<i>Pinus sylvestris</i>	Scots Pine
<i>Potentilla erecta</i>	Tormentil
<i>Ranunculus flammula</i>	Lesser Spearwort
<i>Rubus fruticosus</i>	Bramble
<i>Scirpus cespitosum</i>	Deergrass
<i>Vaccinium oxycoccus</i>	Cranberry
<i>Vaccinium ugilinosum</i>	Bog Bilberry
<i>Vaccinium myrtillus</i>	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



Gretna Substation to Ewe Hill and Newfield Wind Farms 132kV  
Overhead Transmission Line

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/Ancie nt 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						
<b>BF</b>							<b>BF</b>					
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
<b>CK</b>		<b>CK</b>		<b>CK</b>								
CT		CT	CT	CT	CT		CT	CT	CT	CT	CT	
<b>D.</b>				<b>D.</b>			<b>D.</b>	<b>D.</b>			<b>D.</b>	
<b>GC</b>				<b>GC</b>			<b>GC</b>		<b>GC</b>	<b>GC</b>	<b>GC</b>	
GO					GO			GO				
GR											GR	
GS	GS		GS									
GT			GT		GT	GT						
J.				J.			J.					
<b>K.</b>							<b>K.</b>					
<b>LI</b>				<b>LI</b>			<b>LI</b>					

Gretna Substation to Ewe Hill and Newfield Wind Farms 132kV  
Overhead Transmission Line

Study Area 1: Gretna - Ewe Hill Proposed OHL Route - continued												
	Greenwrae Flow Mire Woodland	Cadgill Flow Mire Woodland	Neds Beck Semi- natural/Ancie nt 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

Gretna Substation to Ewe Hill and Newfield Wind Farms 132kV  
Overhead Transmission Line

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.
<b>BF</b>													<b>BF</b>		<b>BF</b>	
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
<b>CK</b>	<b>CK</b>								<b>CK</b>							
CR									CR						<b>CK</b>	
CT		CT					CT		CT	CT		CT	CT	CT	CT	CT
<b>D.</b>														<b>D.</b>		
<b>GC</b>	<b>GC</b>			<b>GC</b>		<b>GC</b>	<b>GC</b>	<b>GC</b>	<b>GC</b>				<b>GC</b>	<b>GC</b>	<b>GC</b>	<b>GC</b>
GL									GL							
GO												GO	GO			
GR													GR			
GT												GT	GT			
H.													H.			



Gretna Substation to Ewe Hill and Newfield Wind Farms 132kV  
Overhead Transmission Line

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

Gretna Substation to Ewe Hill and Newfield Wind Farms 132kV  
Overhead Transmission Line

**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>B.</b>	Blackbird	<b>CD</b>	Collared Dove	<b>H.</b>	Grey Heron	<b>RT</b>	Redstart	<b>TO</b>	Tawny Owl
<b>BC</b>	Blackcap	<b>CR</b>	Crossbill	<b>J.</b>	Jay	<b>R.</b>	Robin	<b>TP</b>	Tree Pipit
<b>BT</b>	Blue Tit	<b>CK</b>	Cuckoo	<b>K.</b>	Kestrel	<b>RO</b>	Rook	<b>WC</b>	Whinchat
<b>BF</b>	Bullfinch	<b>D.</b>	Dunnock	<b>LR</b>	Lesser Redpoll	<b>SK</b>	Siskin	<b>WP</b>	Wood Pigeon
<b>BZ</b>	Buzzard	<b>GC</b>	Goldcrest	<b>LI</b>	Linnet	<b>S.</b>	Skylark	<b>WR</b>	Wren
<b>CG</b>	Canada Goose	<b>GL</b>	Grey Wagtail	<b>MG</b>	Magpie	<b>ST</b>	Song Thrush	<b>WW</b>	Willow Warbler
<b>C.</b>	Carrion Crow	<b>GO</b>	Goldfinch	<b>MP</b>	Meadow Pipit	<b>SH</b>	Sparrowhawk		
<b>CH</b>	Chaffinch	<b>GS</b>	Great Spotted Woodpecker	<b>M.</b>	Mistle Thrush	<b>SF</b>	Spotted Flycatcher		
<b>CC</b>	Chiffchaff	<b>GT</b>	Great Tit	<b>PH</b>	Pheasant	<b>SC</b>	Stonechat		
<b>CT</b>	Coal Tit	<b>GR</b>	Greenfinch	<b>RN</b>	Raven	<b>TC</b>	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>B.</b>	55	55	17	2	2	12	12	6	0	2
<b>BC</b>	4	1	4	0	3	0	0	0	0	0
<b>BF</b>	2	2	1	0	0	0	0	0	0	0
<b>BH</b>	0	0	0	0	0	10	10	10	10	10

Gretna Substation to Ewe Hill and Newfield Wind Farms 132kV  
Overhead Transmission Line

	Gretna - Ewe Hill						Ewe Hill - Newfield				
	Maximum Counts	April	May	June	July		Maximum Counts	April	May	June	July
<b>BO</b>	0	0	0	0	0		1	1	0	0	0
<b>BT</b>	9	9	8	1	0		1	1	0	0	0
<b>BZ</b>	4	4	4	4	0		4	4	0	1	3
<b>C.</b>	20	20	11	4	1		14	14	4	1	0
<b>CC</b>	1	0	0	0	1		4	0	1	2	4
<b>CD</b>	0	0	0	0	0		1	0	1	0	0
<b>CH</b>	135	135	64	48	34		61	43	35	34	61
<b>CK</b>	5	4	5	1	0		3	3	2	0	0
<b>CR</b>	3	0	2	3	0		3	2	1	0	3
<b>CS</b>	1	0	0	1	0		0	0	0	0	0
<b>CT</b>	29	29	3	5	5		16	16	5	1	5
<b>CU</b>	18	10	18	4	1		5	5	1	0	3
<b>D.</b>	12	12	2	2	0		8	8	4	0	1
<b>GC</b>	26	26	4	0	1		14	14	6	0	1
<b>GH</b>	5	4	5	0	5		2	2	0	0	1
<b>GL</b>	1	0	1	0	0		2	0	0	0	2
<b>GO</b>	10	10	4	3	3		2	2	0	0	2
<b>GR</b>	2	1	2	0	0		1	0	1	0	1
<b>GS</b>	2	1	2	0	0		1	1	0	0	0
<b>GT</b>	11	11	2	0	1		3	3	0	0	0
<b>GW</b>	0	0	0	0	0		1	0	0	0	1
<b>H.</b>	0	0	0	0	0		2	2	2	2	0
<b>HM</b>	2	0	2	0	0		3	3	1	1	2
<b>HS</b>	9	5	8	5	9		0	0	0	0	0
<b>J.</b>	1	1	1	0	0		2	0	2	0	1
<b>JD</b>	1	1	0	1	1		3	3	2	1	2

Gretna Substation to Ewe Hill and Newfield Wind Farms 132kV  
Overhead Transmission Line

	Gretna - Ewe Hill						Ewe Hill - Newfield				
	Maximum Counts	April	May	June	July		Maximum Counts	April	May	June	July
<b>K.</b>	0	0	0	0	0		1	0	0	0	1
<b>L.</b>	4	4	3	3	1		4	1	1	1	4
<b>LI</b>	3	3	2	0	0		0	0	0	0	0
<b>LR</b>	5	5	2	4	2		0	0	0	0	0
<b>LT</b>	3	3	0	0	0		0	0	0	0	0
<b>M.</b>	1	1	0	0	0		1	1	1	0	1
<b>MA</b>	2	0	2	0	0		0	0	0	0	0
<b>MG</b>	2	2	0	0	0		0	0	0	0	0
<b>MP</b>	83	60	83	56	44		73	52	73	45	71
<b>MS</b>	0	0	0	0	0		1	1	0	0	0
<b>OC</b>	3	1	3	0	1		3	1	1	1	3
<b>P.</b>	2	2	0	0	0		0	0	0	0	0
<b>PH</b>	1	1	0	0	0		0	0	0	0	0
<b>PW</b>	1	1	1	0	0		0	0	0	0	0
<b>R.</b>	55	55	14	32	6		26	26	16	4	15
<b>RB</b>	20	10	20	13	10		7	2	1	1	7
<b>RN</b>	1	1	0	1	0		0	0	0	0	0
<b>RO</b>	2	2	0	0	0		1	1	0	0	0
<b>RT</b>	3	3	0	2	0		0	0	0	0	0
<b>S.</b>	83	83	65	47	33		55	50	41	34	55
<b>SC</b>	5	3	5	2	2		3	2	3	0	1
<b>SD</b>	1	0	0	0	1		0	0	0	0	0
<b>SG</b>	3	3	2	0	0		1	1	1	0	0
<b>SH</b>	1	1	0	0	0		0	0	0	0	0
<b>SK</b>	1	1	1	0	0		2	2	0	0	0
<b>SL</b>	5	5	1	1	2		1	0	1	1	1

Gretna Substation to Ewe Hill and Newfield Wind Farms 132kV  
Overhead Transmission Line

	Gretna - Ewe Hill						Ewe Hill - Newfield				
	Maximum Counts	April	May	June	July		Maximum Counts	April	May	June	July
<b>SM</b>	40	40	40	40	40		0	0	0	0	0
<b>SN</b>	1	1	0	1	0		2	2	1	1	1
<b>ST</b>	16	16	3	3	0		10	10	5	0	1
<b>SW</b>	6	6	4	3	5		11	11	3	2	3
<b>TC</b>	0	0	0	0	0		2	0	0	1	2
<b>TS</b>	1	0	0	0	1		0	0	0	0	0
<b>W.</b>	1	0	1	0	0		1	1	1	0	0
<b>WH</b>	2	2	0	0	0		1	1	0	0	0
<b>WP</b>	9	9	3	2	0		12	12	7	0	4
<b>WR</b>	73	73	32	24	33		63	59	31	32	63
<b>WW</b>	122	122	35	38	23		73	73	24	19	30
<b>Y.</b>	5	5	3	3	0		0	0	0	0	0

Bird Species Codes follow British Trust for Ornithology Species Codes:

<b>B.</b>	Blackbird	<b>GT</b>	Great Tit	<b>RN</b>	Raven
<b>BC</b>	Blackcap	<b>GW</b>	Garden Warbler	<b>RO</b>	Rook
<b>BF</b>	Bullfinch	<b>H.</b>	Grey Heron	<b>RT</b>	Redstart
<b>BH</b>	Black-headed Gull	<b>HM</b>	House Martin	<b>S.</b>	Skylark
<b>BO</b>	Barn Owl	<b>HS</b>	House Sparrow	<b>SC</b>	Stonechat
<b>BT</b>	Blue Tit	<b>J.</b>	Jay	<b>SD</b>	Stock Dove
<b>BZ</b>	Buzzard	<b>JD</b>	Jackdaw	<b>SG</b>	Starling
<b>C.</b>	Carrion Crow	<b>K.</b>	Kestrel	<b>SH</b>	Sparrowhawk
<b>CC</b>	Chiffchaff	<b>L.</b>	Lapwing	<b>SK</b>	Siskin
<b>CD</b>	Collared Dove	<b>LI</b>	Linnet	<b>SL</b>	Swallow



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**Gretna Substation to Ewe Hill and Newfield Wind Farms 132kV  
Overhead Transmission Line**

<b>CH</b>	Chaffinch	<b>LR</b>	Lesser Redpoll	<b>SM</b>	Sand Martin
<b>CK</b>	Cuckoo	<b>LT</b>	Long-tailed Tit	<b>SN</b>	Snipe
<b>CR</b>	Crossbill	<b>M.</b>	Mistle Thrush	<b>ST</b>	Song Thrush
<b>CS</b>	Common Sandpiper	<b>MA</b>	Mallard	<b>SW</b>	Sedge Warbler
<b>CT</b>	Coal Tit	<b>MG</b>	Magpie	<b>TC</b>	Treecreeper
<b>CU</b>	Curlew	<b>MP</b>	Meadow Pipit	<b>TS</b>	Tree Sparrow
<b>D.</b>	Dunnock	<b>MS</b>	Mute Swan	<b>W.</b>	Wheatear
<b>GC</b>	Goldcrest	<b>OC</b>	Oystercatcher	<b>WH</b>	Whitethroat
<b>GH</b>	Grasshopper Warbler	<b>P.</b>	Grey Partridge	<b>WW</b>	Willow Warbler
<b>GL</b>	Grey Wagtail	<b>PH</b>	Pheasant	<b>WP</b>	Wood Pigeon
<b>GO</b>	Goldfinch	<b>PW</b>	Pied Wagtail	<b>WR</b>	Wren
<b>GR</b>	Greenfinch	<b>R.</b>	Robin	<b>Y.</b>	Yellowhammer
<b>GS</b>	Great Spotted Woodpecker	<b>RB</b>	Reed Bunting		

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# Appendix 11.1 Migration & Winter Period Vantage Point Survey Results



Gretna Substation to Ewe Hill and Newfield Wind Farms 132kV  
Overhead Transmission Line

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



Gretna Substation to Ewe Hill and Newfield Wind Farms 132kV  
Overhead Transmission Line

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	

Gretna Substation to Ewe Hill and Newfield Wind Farms 132kV  
Overhead Transmission Line

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
								8	10	W	5-6	>2	cross PR & Landed in stubble to west
11/11/2008	Stubby	0930	1130	PG	1050	100	1						
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	
								2	8	NW	4	>2	cross PR & Landed beside 400
15/11/2008	Stubby	1345	1545	PG	1535	80	68						
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	

Gretna Substation to Ewe Hill and Newfield Wind Farms 132kV  
Overhead Transmission Line

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	

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Gretna Substation to Ewe Hill and Newfield Wind Farms 132kV  
Overhead Transmission Line

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	

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## Appendix 8.1 Designated & Historic Sites

### *Gretna Substation to Ewe Hill Substation*

#### Designated Sites

WSP Ref <sup>1</sup>	Ref	Name	Period	Description	Potential impact summary <sup>2</sup>
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.

<sup>1</sup> WSP reference relates to the archaeological figure labels

<sup>2</sup> 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**

<b>WSP Ref</b>	<b>Ref</b>	<b>Name</b>	<b>Description</b>	<b>Potential impact summary</b>
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	Greenwich / Greenwrae	Tower house, A map of 1590 places the tower of 'Greenwich' 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.

<b>WSP Ref</b>	<b>Ref</b>	<b>Name</b>	<b>Description</b>	<b>Potential impact summary</b>
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

<b>WSP Ref</b>	<b>Ref</b>	<b>Site Name</b>	<b>Date</b>	<b>Description</b>	<b>Potential impact summary</b>
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 century 3-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

<b>WSP Ref</b>	<b>Ref</b>	<b>Site Name</b>	<b>Description</b>	<b>Potential impact summary</b>
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

<b>WSP Ref</b>	<b>Ref</b>	<b>Site Name</b>	<b>Description</b>	<b>Potential impact summary</b>
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.

<b>WSP Ref</b>	<b>Ref</b>	<b>Site Name</b>	<b>Description</b>	<b>Potential impact summary</b>
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*

<b>Grouse Shooting</b>
<b>Driven Shooting</b>
<b>Rough Shooting</b>
<b>Deer Stalking</b>
<b>Fishing</b>

*Figure 2 VII LABOUR*

Please list number of employees all labour (family and employed) including Casual Labour and Contractors.

	<b>Number</b>	<b>Roles and responsibilities</b>
<b>Full time</b>		
<b>Part-time/casual</b>		
<b>Contractors</b>		

## 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.

<b>Type of Drainage</b>
<b>Location/Depth</b>

## 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.

<b>Type of Supply (Mains or Private)</b>
<b>Location of water pipes, boreholes, springs and wells</b>

---

## 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<sub>1</sub>*

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<sub>2</sub>*

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<sub>1</sub>*

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<sub>2</sub>*

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<sub>1</sub>*

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<sub>2</sub>*

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<sub>3</sub>*

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.

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*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

Gretna Substation to Ewe Hill and Newfield Wind Farms 132kV  
Overhead Transmission Line

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

Gretna Substation to Ewe Hill and Newfield Wind Farms 132kV  
Overhead Transmission Line

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 shooting 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 and Newfield Wind Farms 132kV  
Overhead Transmission Line**

<b>Gretna Substation to Ewe Hill Substation – Effect on Agricultural Activities</b>							
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 <sub>2</sub> ). 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. 185m <sup>2</sup> )		Medium	Moderate		Minor
Staffler Farm	C	665m of overhead transmission line traverses agricultural land (Land Class 4 <sub>1</sub> , 4 <sub>2</sub> , 5 <sub>2</sub> ). 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. 70m <sup>2</sup> ).		Medium	Moderate		Minor
Greenwrae Farm	C	1035m of overhead transmission line traverses agricultural land (Land Class 3 <sub>2</sub> , 4 <sub>1</sub> , 4 <sub>2</sub> ). Estimated 11 poles (8 intermediate; 3 section/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. 260m <sup>2</sup> ).		Medium	Moderate/major		Minor/moderate
Cadgillfoot Farm	C	827m of overhead transmission line traverses agricultural land (Land Class 4 <sub>1</sub> , 5 <sub>2</sub> , 6 <sub>2</sub> ). 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. 190m <sup>2</sup> ).		Medium	Moderate/major		Minor/moderate
Tympanheck Farm	C	1054 m of overhead transmission line traverses agricultural land (Land Class 3 <sub>2</sub> , 4 <sub>1</sub> ). Estimated 12 poles (10 intermediates; 1	Medium	Medium	Moderate	LU1, LU2, LU3, LU4, LU5, LU6,	Minor

**Gretna Substation to Ewe Hill and Newfield Wind Farms 132kV  
Overhead Transmission Line**

<b>Gretna Substation to Ewe Hill Substation – Effect on Agricultural Activities</b>							
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 <sub>1</sub> , 5 <sub>2</sub> , 6 <sub>2</sub> ). 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 <sub>2</sub> , 5 <sub>2</sub> , 5 <sub>3</sub> ). 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 <sub>2</sub> , 5 <sub>3</sub> ). 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 <sub>3</sub> , 6 <sub>3</sub> ). 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 and Newfield Wind Farms 132kV  
Overhead Transmission Line

<b>Gretna Substation to Ewe Hill Substation – Effect on Agricultural Activities</b>							
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 <sub>1</sub> , 5 <sub>3</sub> , 6 <sub>3</sub> ). 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 <sub>1</sub> ). 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 <sub>2</sub> , 5 <sub>3</sub> ). 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 and Newfield Wind Farms 132kV  
Overhead Transmission Line**

<b>Gretna Substation to Ewe Hill Substation – Effect on Agricultural Activities</b>							
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 <sub>3</sub> ). . 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 <sub>2</sub> , 5 <sub>3</sub> ). 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 <sub>2</sub> ) . 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 and Newfield Wind Farms 132kV  
Overhead Transmission Line

<b>Gretna Substation to Ewe Hill Substation – Effect on Sporting Activities</b>							
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
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
Alderwell Forest and Conhess Forest	C	No sporting activity					
	O	No sporting activity					





Gretna Substation to Ewe Hill and Newfield Wind Farms 132kV  
Overhead Transmission Line

<b>Ewe Hill Substation to Newfiled Substation – Effect on Agricultural Activities</b>							
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 <sub>3</sub> ). 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. 185m <sup>2</sup> ).		Medium	Moderate		Minor
Pearsby Hall Farm	C	1966m of overhead transmission line traverses agricultural land (Land Class 5 <sub>3</sub> & 5 <sub>2</sub> ). 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. 730m <sup>2</sup> ).		Medium	Moderate		Minor
Craighousesteads Farm	C	775m of overhead transmission line traverses agricultural land (Land Class 5 <sub>2</sub> ). 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. 270m <sup>2</sup> ).		Medium	Moderate		Minor
Whitcastles Farm (Castle Milk & Corrie Estates)	C	1410m of overhead transmission line traverses agricultural land (Land Class 5 <sub>2</sub> ). 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

**Gretna Substation to Ewe Hill and Newfield Wind Farms 132kV  
Overhead Transmission Line**

<b>Ewe Hill Substation to Newfiled Substation – Effect on Agricultural Activities</b>							
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. 460m <sup>2</sup> ).		Medium	Moderate		Minor
Castlemilk and Corrie Estates	C	517m of overhead transmission line traverses agricultural land (Land Class 5 <sub>2</sub> ). Estimated 6 poles (6 intermediate).	n/a				
	O						
Whitehill Farm	C	923m of overhead transmission line traverses agricultural land (Land Class 5 <sub>2</sub> ). 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. 170m <sup>2</sup> ).		Medium	Moderate		Minor
Moss Plantation	C	80 m of overhead transmission line traverses agricultural land (Land Class 5 <sub>2</sub> ). 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 <sub>2</sub> ). 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. 400m <sup>2</sup> ).		Medium	Moderate		Minor
Cumstone Farm	C	1426m of overhead transmission line traverses agricultural land (Land Class 5 <sub>1</sub> , 5 <sub>3</sub> , 4 <sub>2</sub> ). 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

Gretna Substation to Ewe Hill and Newfield Wind Farms 132kV  
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<b>Ewe Hill Substation to Newfiled Substation – Effect on Agricultural Activities</b>							
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. 625m <sup>2</sup> ).		Medium	Moderate		Minor

Gretna Substation to Ewe Hill and Newfield Wind Farms 132kV  
Overhead Transmission Line

<b>Ewe Hill Substation to Newfiled Substation – Effect on Sporting Activities</b>							
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





Gretna Substation to Ewe Hill and Newfield Wind Farms 132kV  
Overhead Transmission Line

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.

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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: <ul style="list-style-type: none"> <li>• Avoidance of work in lambing parks during lambing time (March to May);</li> <li>• Avoidance of works in dedicated calving fields during calving time; and</li> <li>• Avoidance of work where muirburn planned (1<sup>st</sup> October to 15<sup>th</sup> April or 30<sup>th</sup> April over 450m).</li> </ul>
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: <ul style="list-style-type: none"> <li>• Timing of construction works to prevent sowing operations; and</li> <li>• Timing of construction to prevent harvest operations.</li> </ul>
LU22	Reduction	By programming of construction in consultation with the land owner/occupier, disruption to shooting based sporting

Gretna Substation to Ewe Hill and Newfield Wind Farms 132kV  
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Mitigation Item Number	Mitigation objective	Mitigation Measure
		<p>activity would be minimised as far as is practically possible, through:</p> <ul style="list-style-type: none"> <li>• 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: <ul style="list-style-type: none"> <li>• Grouse                    Aug 12th to Dec 12<sup>th</sup>;</li> <li>• Common Snipe        Aug 12th to Jan 31<sup>st</sup>;</li> <li>• Partridge                Sep 1st to Jan 31<sup>st</sup>;</li> <li>• Woodcock                Oct 1st to Jan 31<sup>st</sup>;</li> <li>• Pheasant                Oct 1st to Feb 1<sup>st</sup>.</li> </ul> </li> </ul>
LU23	Prevent and Reduction	<p>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:</p> <ul style="list-style-type: none"> <li>• Roe Bucks                April 1st to Oct 20<sup>th</sup>;</li> <li>• Red Stags                July 1st to Oct 20<sup>th</sup>;</li> <li>• Sika Stags                July 1st to Oct 20<sup>th</sup>;</li> <li>• Fallow Bucks            Aug 1st to April 30<sup>th</sup>;</li> <li>• Red Hinds                Oct 21st to Feb 15<sup>th</sup>;</li> <li>• Fallow Does             Oct 21st to Feb 15<sup>th</sup>;</li> <li>• Sika Hinds                Oct 21st to Feb 15<sup>th</sup>;</li> <li>• Roe Does                 Oct 21st to Mar 31<sup>st</sup>;</li> </ul>
LU24	Prevent and Reduction	<p>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:</p> <ul style="list-style-type: none"> <li>• Brown Trout             Mar 15<sup>th</sup> to Oct 6<sup>th</sup></li> <li>• Salmon (Spey)           Feb 11<sup>th</sup> to Sep 30<sup>th</sup></li> <li>• Salmon (Beauly)        Feb 11<sup>th</sup> to Oct 15<sup>th</sup></li> </ul>
LU25	Offset	<p>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.</p>



## 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.

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**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.

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## **Gretna – Ewehill Site Assessment Report**

### 1. Gretna – Ewehill Section

#### *Woodland Site 006*

Location	Cadgillhead wood.
Context	<p>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.</p> <p>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.</p> <p>The line then passes over some hedgerow mature broadleaf trees which will require to be reduced in height adjacent to the minor public road.</p> <p>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.</p> <p>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.</p> <p>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.</p>
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	<p>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.</p> <p>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.</p>
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

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*Woodland Site 005*

Location	Forest area of Corrie Common village.
Context	<p>Line enters commercial conifer woodland north east of Corrie Common. This woodland is part of the Castlemilk and Corrie Estate.</p> <p>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.</p> <p>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.</p>
Proposed Works	<p>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.</p> <p>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.</p>
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.

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## Appendix 12.2 Glossary of Forestry Terms

<b>Ancient Woodland AWI</b>	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.
<b>Long-established Woodland of Semi-Natural Origin</b>	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.
<b>Long-Established Woodland of Plantation Origin</b>	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.
<b>Other Woods on "Roy" Woodland Sites</b>	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 extent of semi-natural and plantation woodland.
<b>Other Woodland</b>	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 extent of semi-natural and plantation woodland.
<b>Recent plantations</b>	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.
<b>Brashing</b>	Cutting away the dead side branches from young conifers, to a height of about 6ft, to aid fire protection or provide easier access.
<b>Broad-leaved tree</b>	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.
<b>Canopy</b>	Collectively, the mass of branches and foliage formed by the crowns of trees.

<b>Clear Felling</b>	Complete removal of the whole tree crop at one time.
<b>Compartment</b>	A distinct sub-division of the woodland suitable as a basis for long term management and record keeping.
<b>Conifer</b>	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.
<b>Coppice</b>	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.
<b>Critical height</b>	The tree height at which windthrow is likely to start.
<b>Crown</b>	The canopy of the branches of the tree.
<b>EIA</b>	Environmental Impact Assessment.
<b>Forest</b>	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).
<b>Forest Gales</b>	Forestry Commission's method of assessing the probability of average trees within a forest stand being damaged by wind.
<b>Forestry Commission (Scotland)</b>	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.
<b>Holford Rules</b>	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.
<b>Natural regeneration</b>	The re-growth of a forest crop from self-sown seed, without artificial planting or sowing.
<b>Pollard</b>	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.
<b>Premature felling</b>	The felling of trees prior to them attaining full mature status.
<b>Rack</b>	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.
<b>Ride</b>	Broad track running through a wood; a ride has a natural surface, whereas a road is metalled and made up.
<b>Rotation</b>	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.
<b>Semi-natural Ancient Woodland SNAWI</b>	Ancient and Semi-natural Woodlands are defined as those known to be continuously present since 1600 AD (1750 AD in Scotland)
<b>Severance felling</b>	A felling design or practice not following normal forestry practice.
<b>Shelterbelt</b>	Woodland, normally a long narrow strip, designed primarily for agricultural

	shelter. May also perform a visual screening or sporting function
<b>Silviculture</b>	The growing and tending of trees in woodlands, plantations or natural forests.
<b>Stand</b>	A defined area of woodland, usually of similar size, species and age.
<b>Sterilisation</b>	The imposition of a non forestry management regime on an area. No woodland can be established in this area.
<b>Thicket stage</b>	A stage in the growth of a plantation or natural regeneration during which the lower branches of the growing trees meet and interlace.
<b>Thinning</b>	Removing selected stems from a crop of trees, so as it give the remaining stems more growing space; a tree so removed.
<b>Topping</b>	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.
<b>Windblow</b>	Uprooting of trees by the wind, or a tree so uprooted.
<b>Wind-break</b>	Breakage of tree stems by the wind, or a tree so broken.
<b>Windfirm</b>	Considered unlikely to suffer the effects of windthrow
<b>Windthrow</b>	Uprooting of trees by the wind, or a tree so uprooted.
<b>Windthrow risk</b>	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 31<sup>st</sup> August and 3<sup>rd</sup> 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 25<sup>th</sup> 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 25<sup>th</sup> 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
<b>Total Site Movements (HGV's)</b>	<b>1848</b>	<b>1848</b>	<b>1374</b>				<b>6818</b>

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						
<b>Total Movements to/from Site (HGV's)</b>	<b>152</b>	<b>8</b>	<b>256</b>	<b>122</b>	<b>10</b>	<b>18</b>	<b>566</b>
Site personnel to/from Site (1.3 per car)	643	643	846	677	508	372	3689
<b>Total Vehicle Movements to/from Site per Month</b>	<b>795</b>	<b>651</b>	<b>1102</b>	<b>799</b>	<b>518</b>	<b>390</b>	<b>4255</b>
<b>Average Daily Car Movements</b>	<b>29.2</b>	<b>29.2</b>	<b>38.5</b>	<b>30.8</b>	<b>23.1</b>	<b>16.9</b>	
<b>Average Daily HGV's Movements</b>	<b>6.9</b>	<b>0.4</b>	<b>11.6</b>	<b>5.5</b>	<b>0.5</b>	<b>0.8</b>	
<b>Average Daily Movements</b>	<b>36.1</b>	<b>29.6</b>	<b>50.1</b>	<b>36.3</b>	<b>23.5</b>	<b>17.7</b>	
<b>Percentage Change in Total Daily Car Flow (%)</b>	<b>10.8</b>	<b>10.8</b>	<b>14.2</b>	<b>11.4</b>	<b>8.5</b>	<b>6.3</b>	
<b>Percentage Change in Total Daily HGV Flow (%)</b>	<b>10.2</b>	<b>0.5</b>	<b>17.1</b>	<b>8.2</b>	<b>0.7</b>	<b>1.2</b>	
<b>Percentage Change in Total Daily Traffic Flow (%)</b>	<b>10.7</b>	<b>8.8</b>	<b>14.8</b>	<b>10.7</b>	<b>7.0</b>	<b>5.2</b>	

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	<b>Above threshold</b> (Months 1, 3, and 4)
	Cars	Below threshold Not significant	<b>Above threshold</b> (Months 1 - 4)
	HGV	Below threshold Not significant	<b>Above threshold</b> (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
<b>Construction Effects</b>		
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.
<b>Operational Effects</b>		
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.
<b>Decommissioning Effects</b>		
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.	
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## 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 Interpreting 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.

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## 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).

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## 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

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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<sub>AE</sub> (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<sub>w</sub>**

Sound power measured on a decibel scale, relative to a reference value of  $10^{-12}$  W.

### **SPECIFIC NOISE LEVEL, L<sub>Aeq,Tr</sub>**

The noise of the particular source under investigation.

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