



S.P. Transmission & Distribution

Erskine Substation to Devol Moor Substation

132kV OVERHEAD LINE



Public Consultation Document

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PREFACE

Proposals

SP Transmission (SPT) has an overhead line (OHL) proposal in the Greenock and Erskine areas. This is an upgrade and replacement of an existing 132kV overhead single circuit line between the existing Erskine and Devol Moor substations. It is proposed to upgrade this line to 132kV double circuit in order to provide security of supply to the existing developed areas of Greenock, Erskine and Paisley.

SPEN also intends to connect the proposed Waterhead Moor windfarm to the existing Devol Moor Substation via a new 132kV double circuit OHL. This connection cannot be undertaken without the Erskine to Devol Moor connection as set out above.

Consultation Document

This document has been prepared in order to inform those who have an active interest in the selection of the preferred route for the OHL. Following the consultation phase, SPT will make an informed decision and found upon a proposed route for the OHL proposal.

Preferred Route Option

After having consulted with a wide range of consultees and other interested parties in order to identify key constraints in the study area, SPT has identified a preferred route for the Erskine-Devol Moor OHL proposal. 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 route seeks to minimise the environmental impact on a range of physical, environmental and socio-economic considerations (including landscape and visual, woodland, flora and fauna, agriculture, people, settlements, properties and historical features) whilst remaining economically and technically viable.

Consent Procedure

SPEN intends to prepare and submit an application for the OHL route to the Scottish Ministers under Section 37 of the Electricity Act 1989. This application will be accompanied by an Environmental Statement.

Consultation

Copies of the Consultation Document have been sent to a number of key consultees who include Renfrewshire Council, Inverclyde Council, Scottish Natural Heritage and Historic Scotland. A public exhibition, where copies of this document will be available for public review and details of the project will be on display, will be held in Kilmacolm Community Centre on the 8th and 10th of October 2007 and Bishopton Scout Hall on the 9th and 11th of October between 1300hrs and 1900hrs.

1.0 INTRODUCTION

1.1 Background

SP Transmission Ltd (SPT), are responsible for the transmission network from the English/Scottish border to just north of Stirling, an area of some 23,000 square kilometres. As the licence holder, SPT is required under the Electricity Act 1989 *“to develop and maintain an efficient, co-ordinated and economical system of electricity transmission”*. SP EnergyNetworks (SPEN) develop, operate and maintain the transmission system on behalf of SPT.

SPT has a new overhead line (OHL) proposal in the area surrounding Erskine and Port Glasgow. The proposal involves the upgrade and replacement of a single circuit 132kV OHL between the existing substations at Erskine and Devol Moor. This OHL is now coming towards the end of its operational life and so it is proposed to replace and upgrade it to a double circuit 132kV OHL in order to provide security of supply to the surrounding developed areas. Upon completion of this new line, the existing 132kV OHL will be removed.

A routeing study has been prepared which considers the connection. For consistency, the corridor options and preferred route have been described in this report from east to west.

This Consultation Document reports on a detailed assessment of the constraints, route options and selection of a preferred route for the proposed 132kV OHL. The location and context of the existing substations and existing 132kV OHL to be removed is shown in Figure 1.

The process of route selection and environmental assessment of the OHL proposal will follow four phases:

- Phase A: Routeing Study and Consultation Document
- Phase B: Scoping Document
- Phase C: Environmental Assessment and Environmental Statement
- Phase D: Mitigation Measures

This report concludes Phase A of the process. Following Phase A, a Section 37 application with an Environmental Statement is proposed.

The routeing study considers the background landscape and environmental planning constraints information for the route before considering routeing options, a preferred route corridor and preferred alignment. For the purposes of a legible and consistent narrative throughout the report the route options are described from east to west, ie. From Erskine to Devol Moor.

1.2 Purpose of Consultation Document

The Consultation Document has been prepared in order to set out the steps taken in identifying the preferred route of the 132kV OHL.

Its purpose is to allow statutory and other interested parties the opportunity to comment on the preferred route and any other matters in order to inform the selection of a proposed route. Comments will also inform the preparation of an Environmental Statements for the line, which will accompany the application for consent to construct and operate the line.

SPEN will hold public exhibitions in Kilmacolm and Bishopton, where the background, methodology and evaluation of the preferred option 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 <mailto:devolmoor.projectmanager@sppowersystems.com>.

1.3 Scope

The Consultation Document is divided into six sections as follows:

Section 2	Description of the project and summary of Government policy
Section 3	Methodology used in the route appraisal and selection process
Section 4	Description of baseline landscape, physical and environmental features within the study area and the technical, environmental and landscape constraints that these represent with regard to the identification and evaluation of route corridor options
Section 5	Description and appraisal of corridor options, the selection of a preferred corridor and preferred route alignment for the Erskine to Devol Moor line.
Section 6	Outline of the steps that will be taken following completion of the consultation exercise regarding the preferred route alignment

1.4 Statutory Consent Procedures

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.

An application 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 OHL is defined by the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 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 is likely to have significant effects on the environment, and on this basis SPT proposes to submit an Environmental Statement with the application for consent. In accordance with regulation 3(2), this intention to submit an Environmental Statement confirms the development as an EIA development.

2.0 PROJECT DESCRIPTION

2.1 The Need Case

Due to system security issues with the existing transmission system in the Inverclyde and Renfrewshire areas, there is a need for SP Transmission (SPT) to reinforce the 132kV electrical network in this area. In the event of a sustained fault on the 400/275kV network in the area, a significant load would require to be placed on the existing single circuit 132kV OHL from the existing Erskine and Devol Moor substations. This line is in poor condition and so requires to be upgraded and replaced in order to provide security of supply to the surrounding areas in the event of a sustained fault on the transmission network.

Therefore, in order to resolve the security of supply issues in the area it is proposed to replace the existing single circuit Devol Moor - Erskine 132kV OHL with a double circuit 132kV overhead steel tower line. On commissioning of the new double circuit line, the existing single circuit will be removed.

2.2 The Project

Ironside Farrar (together with subconsultants Central Environmental Surveys, Headland Archaeology and Envision 3D) were commissioned by SPT in June 2006 to undertake an options appraisal exercise for the proposed 132kV OHL in the Erskine, Port Glasgow and Greenock area. This involves the replacement and upgrade of the existing OHL between Erskine and Devol Moor substations.

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. The preferred route corridor has been considered, based on a balanced assessment of a range of factors to have the least overall impact on the natural and built environment.

2.3 SPT Transmission System

SP Transmission Ltd (SPT) is responsible for the transmission network from the English/Scottish border to just north of Stirling, an area of some 23,000 square kilometres. SPT is required under the Electricity Act 1989 *“to develop and maintain an efficient, co-ordinated and economical system of electricity transmission”*.

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 judgement involved in weighing the issues results in a route, which, on balance, best meets the stated 'routeing objective'. That routeing commitment requires to reflect the licence holder's statutory duties. This is discussed in further detail in Section 3.2

2.4 Design, Construction and Maintenance

2.4.1 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 tower.

The majority of electricity transmission line towers in the UK are lattice steel structures supporting three conductors or conductor bundles from horizontal crossarms on both sides of the tower (see Figure 2). Additionally there is an earth conductor suspended between tower peaks to provide lightning protection. This includes fibre optic cores for communication purposes.

The proposed design for both connections is the L4 steel lattice tower, refer to Figure 2 for details. The nominal height of the towers is likely to be in the range 26m, with a maximum in exceptional circumstances of 44m. 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 a detailed line survey but will be in the range of 280m, with a maximum of 380m. The towers are manufactured from galvanised steel and are grey in colour. Tower steelwork is painted at intervals throughout their life to afford continued protection against corrosion.

There are basically two types of tower, a 'line' tower and an 'angle' tower, refer to Figure 2. The angle tower as its name suggests is used where the line changes direction

The conductors are attached to the crossarms at line towers via insulator strings which hang vertically below the crossarms. At angle towers the conductors are again attached to the crossarms via insulators but in this case the insulators are in line with the conductors. Insulators are typically coloured porcelain, polymeric or clear glass.

Conductors for transmission lines are typically manufactured from aluminium.

Site surveys will be carried out at proposed tower positions in order to examine the subsoil conditions in order that the tower foundations, can be designed.

2.4.2 Construction

Line construction typically follows a standard sequence of events which are:

- Prepare access
- Install tower foundations
- Erect towers
- String conductors
- Reinstate tower sites and remove temporary accesses

It is preferred to have vehicular access to every tower site for foundation excavation, concrete delivery and a crane to erect towers. Additionally, the conductors are winched to/pulled from section towers thus access to these towers is required for conductor drums and large winches. The access arrangements to angle towers are greater than for line towers.

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

Tower foundations are typically 3-4m 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 concrete has been poured and set the excavation is back-filled using the original material in layers. Surplus material is removed from site.

Around two weeks after the foundations have been cast tower erection can commence. Tower steelwork can be delivered to site either as individual steel members or prefabricated panels, dependent on the method of erection for the tower.

Once a number of sections of towers are erected, conductor stringing can commence, installing conductors from section tower to section tower via the line towers. Conductor drums are set up at one end of the section with a winch at the other end and the conductors pulled from one end to the other utilising a winch bond.

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 and ground disturbance during construction of the new line will be reinstated. Refer to Figure 3 for images of an L4 steel lattice tower under construction.

2.4.3 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. There is therefore a preference that any crushed stone access tracks built to section towers are left in situ for future use; this will be dependent on agreement with individual landowners and having regard to the views of other interested parties. Insulators and conductors are normally replaced after about 40 years and towers painted every 15-20 years.

3.0 STUDY APPROACH AND METHODOLOGY

3.1 Introduction

The following routeing study and assessment is based on information that has been accumulated during the initial desk based assessment and from route assessment through field visits. The data used to inform routeing includes national, regional and local environmental planning designations and potential physical and landscape constraints. This was analysed in the context of the key project requirements:

- SPT project design requirements
- Scottish Power Transmission (2002) Overhead Transmission Lines – Routeing and Environmental Assessment
- The Holford Rules: Guidelines for the Routeing of New High Voltage Transmission Lines with NGC 1992 and SHETL 2003 notes (see Appendix 1)
- Section 9 of the Electricity Act 1989

3.2 SPT Routeing Commitments and Objectives

3.2.1 SPT's Routeing Commitment:

In developing and maintaining an efficient and coordinated technically and economically viable transmission system in accordance with the license agreement, SP Transmission Ltd 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 within it"

3.3 Defining the Study Area

The first stage in the routeing assessment was to establish a study area which defined an area of feasible routeing options and an area of search for potential environmental and technical constraints. Figure 4 shows a study area and wider buffer zone:

- The study area has been defined by the key geographical, environmental and technical constraints beyond which it would not be feasible or economic to route the line
- The wider buffer area of 5km around the outside of the study area represents the potential area in which there could be indirect impacts on

important designated areas, landscapes and views from settlements. Factors located in this area may influence the route corridor options

3.4 Data Collection

3.4.1 Information Sources

Following identification of the study area a process of collecting baseline environmental and geographical information and collating a baseline database of potential constraints was initiated. This process involved desk study, consultation and fieldwork in which information from the following was collected and collated:

- Responses from a wide range of statutory and non-statutory consultees following circulation of an initial consultation letter and direct contacts
- Local and structure plans including information sent by Councils consulted
- Sites and monuments records
- Historic Scotland spatial data website
- Ordnance Survey digital mapping
- SNH Landscape character assessments
- Site survey photos, notes etc
- Meetings with key consultees

3.4.2 Constraints Hierarchy

The analysis of constraints is critical to the selection of route corridors, route options and the preferred route alignment. The constraints include a wide variety of information relating to environmental designations and land use, with differing levels importance. For the purposes of this study the constraints have been divided into three categories of importance, relating to the potential level of physical or environmental constraint that they could place on the routeing of the line. A hierarchical approach allows the assessment to focus on the constraints most likely to be of importance in routeing the OHLs.

Category 1 Constraints	National importance/ significant physical and/or environmental constraint
Category 2 Constraints	Regional importance/ potentially significant physical and/or environmental constraint
Category 3 Constraints	Local importance/ minor physical and/or environmental constraint

In the context of the Holford Rules the Rule 1 areas of 'Highest Amenity Value' are equivalent to the Category 1 constraints, whereas the Rule 2 areas of 'High Amenity Value' would generally be considered equivalent to Category 2 or 3. As with previous routeing studies we have considered

population centres and residential properties to be a significant constraint, with settlements and groups of five or more properties in Category 1 and smaller groups or individual properties in Category 2.

It should be noted that, although they are potentially significant environmental planning designations or physical impediments, not all of the items listed in Category 1 would constrain route options. Although of significant importance, they may be of limited extent and easily crossed by the OHL without significant impact. However, some constraints may have sensitive settings beyond their physical boundaries or combine with other physical constraints or designated areas to create a more significant obstruction to routeing.

In addition to environmental and technical constraints attention has also been paid to the potential landscape and visual constraints presented by topography, trees, waterbodies and other features. The Holford rules 3 to 7 (see Appendix 1) relate to minimisation of landscape and visual impacts and have been applied to route corridor selection and particularly to identification of the preferred route alignment. In particular the routeing has been influenced by the desirability of minimising skyline routes and changes in direction with heavy angle towers.

3.5 Presentation of Information

The information has been recorded in GIS format on an Ordnance Survey 1:25,000 digital base. It is available as a single database and is presented on maps in this report. Physical constraints clearly shown on the OS base mapping, such as settlements, waterbodies and roads have not been digitally mapped but are visible on the map base and clearly identified in the assessment process. The maps are as follows:

Study Area (shown as one map covering the whole study area)	
Figure 4	The study area and buffer zone
Figure 5	Landscape Context - SNH Landscape Character Areas (<i>in relation to the study area and buffer zone</i>)
Figure 6	Local Landscape Character Areas (<i>in relation to study area</i>)
Detailed Constraints and Route Selection (shown as 2 maps at 1:25,000)	
Figure 7a&b	Overall constraints – <i>allowing areas with no or few constraints to be identified</i>
Figure 8a&b	Route Corridor Options and Overall Constraints – <i>showing potential route corridors and the constraints affecting them</i>
Figure 9a&b	Preferred Route Corridor and Alignment and Key Constraints – <i>showing preferred route corridor with fewest constraints and preferred alignment within the corridor</i>
Figure 10a&b	Preferred Route Alignment and Local Landscape Character Areas - <i>showing preferred route corridor and alignment against landscape constraints</i>

3.6 Limitations and Routeing Options

This assessment has identified a series of key landscape, environmental, land use and technical constraints that have restricted route corridor options and influenced the final choice of preferred route alignment. These include:

- designated areas of national and international importance for nature conservation and cultural heritage;
- the presence of another OHL to the south and the 132kV OHL to be replaced;
- the Inner Firth of Clyde to the north;
- built up areas and concentrations of dwellings;
- the Royal Ordnance Factory at Bishopton;
- escarpments, hills and ridges
- reservoirs and woodlands.

The physical and technical constraints and concentration of designated areas has simplified the routeing process by limiting the areas in which route corridors can be located without potentially significant environmental effects or land use issues. However this has meant that, in some locations, landscape fit and the potential for visibility has not been the primary determining factor in route selection.

4.0 BASELINE INFORMATION

4.1 Introduction

This section of the report describes the main constraints identified during the study. As described in Section 3 the baseline data collection and analysis has built up a picture of the key areas of environmental, landscape and technical constraint. In addition to defining the study area this has allowed the identification of corridors of least constraint within the study area, through which transmission lines could be routed with the least potential for environmental impact.

4.2 The Study Area

4.2.1 Extents of Study Area

The potential area for routeing lies between two key corridors of constraint:

- the Inner Firth of Clyde and Port Glasgow to the north; and
- the existing Inverkip to Neilston 400kV OHL to the south.

These are physical and technical barriers that would be difficult, expensive and unnecessary for the proposed overhead line to cross and they provide the basis for a routeing study area defined in Figure 4.

The study area covers the area between Erskine Substation and Devol Moor substation:

From east to west, the northern boundary is initially defined by the town of Erskine together with parkland and an industrial area to the north. It then follows the Inner Firth of Clyde shore between Erskine and Langbank. At Langbank it turns inland to avoid the settlement and continues to the southern edge of Port Glasgow, south of the Finlaystone Estate. From Port Glasgow it heads south, keeping south of the escarpment of Devol Moor and Harelaw Reservoir just north of Devol Moor substation. From here it turns south, following the Auchenfoil Road to Devol Moor substation.

The southern boundary has been drawn from Erskine Substation to include the Bishopton Royal Ordnance Factory Site, the southern boundary of which coincides with the route of the Inverkip-Neilston 400kV interconnector. The study area boundary then continues to follow the interconnector northwest, north of Kilmacolm. It then turns WSW, south of Devol Moor to meet the 400kV OHL branch on the edge of Strathgryfe and head NNW to Devol Moor substation.

Figure 4 also shows a buffer area lying up to 5km beyond the potential routeing corridor in which there is the potential for receptors to experience indirect impacts such as visual impacts. This buffer area extends east into the fringes of Glasgow and envelopes the Inner Firth of Clyde to the coast of West Dumbartonshire. The western edge includes Greenock and the edge of

Renfrew Heights. To the south it includes more of Renfrew Heights, Bridge of Weir and the northern part of Paisley.

4.2.2 Landscape and Topography

There are four main landscapes in the core study area: South of the Firth of Clyde between Erskine and Greenock there is a narrow coastal strip defined by a raised beach and steep escarpment. This area has a significant proportion of built up land including settlements and transport corridors.

Inland is broadly divided into two topographic and landscape types. Most of the area between Erskine and Devol Moor comprises a landscape of varying topography all under 200m. There are a number of steep rocky hills of modest elevation surrounded by more gently rolling topography with minor valleys, supporting mainly improved pasture, woodland and small scale forestry. One main valley, Strathgryfe separates this area. There are a number of settlements including Bishopton and Kilmacolm in the lower areas.

South of Bishopton and Erskine the elevation lowers to below 25m AOD and the topography becomes flat or gently undulating, forming a flood plain around the River Gryfe. This area is farmed, with blocks of woodland but also occupied by the Royal Ordnance Factory south of Bishopton.

West of Kilmacolm and the upper reaches of Strathgryfe, the land increases in elevation: mostly above 150m and up to nearly 450m, becoming larger scale with rolling topography and upland pasture, moorland and forestry land uses predominating. A series of larger reservoirs lie in the middle of this area and there are no settlements.

4.3 Landscape Character

4.3.1 Regional Character Types

The landscape character of the study area is covered by SNH's Glasgow and the Clyde Valley Landscape Character Assessment.

The area falls into four broad landscape character types, broadly based on the topographic areas described above. These are shown in Figure 5. There are further Landscape Character Areas within the 5km buffer area but these play only a peripheral role in the landscape character of the study area.

Raised Beach

The coastal strip is Type 1: Raised Beach. This is characterised by the following:

- steep scarp, representing the former cliffline, and narrow platform, representing the former beach, with estuarine mudflats along the inner part of the Firth of Clyde
- 'hanging' broadleaf woodland on many of the steeper slopes

-
- coastal settlements
 - defensive sites, castles, historic houses and designed landscapes
 - dominance of horizontal landscape elements
 - prominent area with extensive views

Planning and management guidelines state that particular care is required in the siting of vertical features such as pylons and that visual impacts can be reduced by siting them in locations where they are generally viewed against a background rather than against the sky. It is recommended that areas downslope or further inland are considered.

Alluvial Plain

The flatter area around the River Gryfe, to the south of Bishopton and Erskine is Type 2: Alluvial Plain, characterised as follows:

- distinctive low-lying landform
- generally open character though woodland blocks and remnant field boundary trees create containment in some areas
- lush pastures, arable fields and a number of surviving mosses
- significant urban influences in some areas, resulting from urban expansion, transport infrastructure and activities such as waste disposal

No guidelines in relation to pylons are given but it is stated that planning and management guidelines should aim to reinforce the area's rural character and pursue strategies to reduce the visual influence of existing urban developments.

Rugged Upland Farmland

The area between Bishopton and Kilmacolm, including Strathgryfe is Type 6: Rugged Upland Farmland. Key characteristics include:

- rugged landform comprising rocky bluffs and shallow troughs
- dominance of pastoral farming
- tree cover often emphasising landform, for example concentrated on bluffs and outcrops

It is noted that there is a concentration of tall structures such as masts and pylons and that, particularly when situated near the northern edge of the area, they have a significant adverse impact on landscape character. It is stated that they should generally be discouraged, except where there are opportunities to provide a degree of backclothing.

Rugged Moorland Hills

The higher area to the west is Type 20: Rugged Moorland Hills. Key characteristics include:

- distinctive upland character created by the combination of elevation, exposure, rugged landform, moorland vegetation and the predominant lack of modern development
- a sense of apparent naturalness and remoteness which contrasts strongly with the farmed and developed lowland areas
- presence of archaeological sites on hilltops and sides

The landscape is considered sensitive to the development of tall structures (such as pylons) on hilltops and along the crests of scarps as they would be potentially obtrusive and visible from surrounding landscapes. Local areas with landform enclosure may be capable of reducing visual impacts and may, therefore, be less sensitive.

Other Areas

There are further Landscape Character Areas within the 5km buffer area but these play only a peripheral role in the landscape character of the study area:

- The River Clyde is defined as Type 9: Green Corridor, referring mainly to its banks. Despite being shown as extending to Port Glasgow the description of the area starts from the Erskine Bridge eastwards. The shorelines of the Clyde are therefore defined by the Raised Beach LCA. The Green Corridor type is also represented along the White and Black Cart Waters east of Erskine and River Leven and Duntocher Burn in West Dunbartonshire
- Type 19, Moorland Hills and Ridges are represented in West Dunbartonshire, across the Clyde Estuary.

4.3.2 Local Landscape Character Areas

The regional landscape assessments by SNH provide a very broad picture of the study area and surroundings. In order to allow a finer grained approach to route corridor selection, the landscape of the study area has been assessed in more detail. This involves further subdivision into local landscape character types and areas characterised by topography, vegetation and land use, such as localised hill and valley forms, agricultural practices and areas of woodland.

The local landscape character areas (LLCAs) are at a scale that allows the identification of areas of greatest and least landscape constraint to the routing of transmission lines. The LLCAs are described in Table 4.1 below and their extents within the study area boundaries are shown in Figure 6.

Table 4.1. Local Landscape Character Types and Areas

CHARACTER TYPE AND LOCATIONS	KEY FEATURES
Escarpment Erskine Park to Port Glasgow	The predominantly steep north facing slope above the Inner Firth of Clyde. A varied small to medium scale landscape of pasture, broadleaved woodland and occasional parkland set between areas of settlement. Climbed by steeply ascending roads cutting diagonally across the slope. Extensive views northwards across the Inner Firth of Clyde.
Raised Beach Erskine Park to Langbank	The flat and undulating pastureland forming the coastal strip along the Inner Firth of Clyde. Predominantly improved pasture divided into fields by post and wire fences. Traversed by main transport corridors including the M8 and railway. Views southwards cut off and dominated by escarpment and woodlands.
Rolling Pastureland Extensive throughout much of study area between Erskine and Port Glasgow above the Firth of Clyde escarpment.	Small to medium scale, rolling and undulating improved and semi-improved pasture. Predominantly enclosed by hedges, fences and walls with occasional trees, copses and shelterbelts with a high proportion of broadleaved trees. Frequent farms, isolated houses and small settlements connected by a network of narrow, winding roads and lanes. Traversed by electricity transmission lines. Occasional small scale waterbodies and rapidly flowing minor watercourses. Views vary from highly enclosed to extensive from tops of ridges. A complex, semi-enclosed and often intimate landscape in which the prominence of tall objects would depend on the local topography.
Rocky Hills and Ridges Isolated summits and ridges between Bishopton and Port Glasgow	Small to medium scale hills and ridges set in a predominantly pastoral landscape where they define lower lying pastureland and shallow valleys. Steep sided in places with rocky outcrops. Predominantly rough grazing in large enclosures. Areas of bracken. Lower summits crowned with mature mixed or broadleaved woodland. Occasional masts and pylons. Extensive views.
Pastoral Valleys Dargavel Glen, Finlaystone Glen, Strathgryfe	Areas of rolling and upland pastureland which are sufficiently topographically defined by surrounding ridges and/ or by watercourses to be considered as valleys. Views enclosed to the sides but often lengthy along and beyond the valley. Often crossed or traversed by electricity pylons although these are often viewed against a background of slopes and/ or woodland and trees.
Lowland Arable Farmland Gryfe floodplain south of Bishopton ROF and Erskine	Flat or gently undulating predominantly arable farmland with large rectilinear fields separated by fences and drainage ditches. Straight roads and tracks. Occasional farm buildings. An open, flat landscape with long distance views to higher ground. Vertical elements are prominent
Improved Upland Pasture Mainly in west of study area including the area around Devol Moor and the head of Strahgryfe	Medium scale undulating or rolling improved and semi-improved pasture. Predominantly enclosed by fences and drystone walls. Open and exposed with few trees and occasional shelterbelts or small plantations, mainly coniferous. Isolated farms, occasional roads and tracks. A simple, open landscape with wide views where tall or large scale objects are easily visible.

CHARACTER TYPE AND LOCATIONS	KEY FEATURES
Forestry Surroundings of Bishopton ROF	Extensive areas of commercial forestry plantation set out in geometric blocks, generally located in upland areas. Dominated by even age stands of coniferous trees of varying maturity. Serviced by a network of tracks. No habitation.
Moorland Devol Moor	Undulating and rolling, predominantly unimproved, upland used for rough grazing. Occasional watercourses. Few enclosures, roads or tracks and little habitation. A simple, open landscape with wide views where tall or large scale objects are easily visible.
Settlement and Industry Bishopton and ROF	No character assessment made as these are areas through which the line cannot be routed.

4.3.3 Landscape Fit and Topographic Constraints

There are few areas of very steep topography in the study area that might prove to be a technical constraint to construction. The main topographic constraints relate to areas of locally high ground and coastal escarpments on which the OHL may appear prominent, and areas of exposed high ground to which difficulties of access and adverse weather conditions may apply as well as landscape impacts in a relatively open environment.

Valleys present an opportunity to route lines in a less prominent location and against a backdrop but can be adversely affected when crossed at an obtuse angle or are at an intimate scale such that the line would be a dominant feature.

Between Erskine and Devol Moor the main constraints relate to the steep escarpment above the Firth of Clyde and steep hilltops to the south of here, including Barmore Hill, Barscube Hill, Knockmountain and Craigmarloch. Shallow valleys lie around the Dargavel Burn, Finlaystone Burn and rising up to Devol Moor above West Kilbride farm.

Devol Moor rises gently up to over 200m AOD south of Port Glasgow. West of Devol Moor there are extensive areas of rolling upland hills broken into two masses by Strathgryfe and the Gryfe Reservoirs and Loch Thom. Strathgryfe forms a significant broad, open, valley between Kilmacolm and the reservoirs.

4.3.4 Reservoirs

There are three small reservoirs between Erskine and Devol Moor. The Whitemoss Dam north of Formakin lies just south of the existing 132kV OHL. Auchindores and Leperstone lie inbetween Kilmacolm and Port Glasgow. The latter reservoirs present a significant obstacle in combination with other factors: they lie across the route and are separated by a narrow isthmus already crossed by the existing 132kV OHL to be replaced, with the 400kV OHL immediately to the south of Leperstone.

4.4 Environmental Designations and Land Use Constraints

4.4.1 Introduction

As explained in Section 3 the data on environmental designations and land use collected during this study has been sieved into three categories based on importance and potential significance as a physical and/ or planning constraint. The detailed list of constraints and constraining properties are given in Table 4.2 below. The category 1 designations together with settlements should generally be considered equivalent to Holford's areas of 'Highest Amenity Value' although some land use features are also included due to the significance of the constraint that they represent. Category 2 together with isolated residential properties are generally equivalent to 'High Amenity Value'. The distribution of the constraints throughout the study area is shown in Figures 7a&b.

It should be noted that the location of the substations and the existing 400kV and 132kV OHLs are also a significant constraint on routeing, largely defining the study area. However as they are considered to be technical constraints they are not included with the environmental and land use constraints in Table 4.2.

Table 4.2: Potential Routeing Constraints

CONSTRAINT	CONSTRAINING FACTORS/ COMMENTS
Category 1: National/ International	
Settlements (5nr properties or more).	Often extensive area. Physical routeing constraints, visual impacts, perceived health concerns. 150m clearance zone considered desirable.
Special Protection Areas/ Ramsar Sites	Impacts on protected species, bird flight impacts, extensive area
SSSIs	Effects on habitats, wildlife or designated features
Scheduled Ancient Monuments and Sites of Schedulable Quality	Damage to cultural heritage, impacts on setting
Historic Scotland Sites	Damage to cultural heritage, impacts on setting
Conservation Areas	Settlement. Physical routeing constraints, damage to cultural heritage, impacts on setting
Category A Listed Buildings	Damage to cultural heritage, impacts on setting
Historic Garden/ Designed Landscape (Inventory listed)	Damage to cultural heritage, impacts on setting, often extensive area
Bishopton Royal Ordnance Factory (ROF)	Exclusive land use, extensive area
Proposed Bishopton Development Site	Future residential land use, uncertainty over future development pattern, extensive area
MOD land	Land use restrictions

CONSTRAINT	CONSTRAINING FACTORS/ COMMENTS
Category 2: Regional/ Moderate	
Residential Properties (Fewer than 5nr.)	Physical routeing constraints, visual impacts, perceived health concerns. 150m clearance zone considered desirable.
Clyde Muirshiel Regional Park	Extensive area, landscape/ visual and recreational concerns
Ancient and Semi-Natural Woodlands	Tree loss, severance of habitat
Country Parks	Extensive area, landscape and recreational issues
Golf Courses	Extensive area, land use
Cultural Heritage Sites	Sites and Monuments Records. Potential cultural heritage impacts.
Category B Listed Buildings	Cultural Heritage Impacts, impacts on setting.
Historic Gardens and Designed Landscapes (Non-inventory)	Damage to cultural heritage, impacts on setting, often extensive area.
Category 3: Local/ Minor	
Tree Preservation Orders	Loss of trees/ woodland
SWT sites	Wildlife and habitat impacts
Forestry Commission Land	Extensive areas but scope for routeing
Category C Listed Building	Cultural heritage impacts
Sites of Importance for Nature Conservation (S.I.N.C sites)	Wildlife and habitat impact

The following paragraphs detail the key issues in the study area relating to the above constraints.

4.4.2 Landscape Designations

There are no national or regional landscape designations based primarily on landscape quality within the study area. However the Clyde Muirshiel Regional Park covers most of the study area west of Devol Moor substation, and is an area valued for both its recreational and landscape value. The need to enter this area would be unlikely.

There are two significant Designed Landscapes between Erskine and Devol Moor, at Finlayston and Formakin. These are discussed below under cultural heritage.

4.4.3 Nature Conservation Designations

There are significant areas with nature conservation designations throughout the study area. Special Protection Areas are of international importance: the

Inner Firth of Clyde SPA lies immediately to the north of the Devol Moor to Erskine study area and the Renfrewshire Heights pSPA covers much of the Clyde Muirshiel area west of Devol Moor. There is also an SPA around the Black Cart Water to the east of Erskine with the potential for indirect effects on designated interests.

In addition to this there are SSSIs between Erskine and Devol Moor, at Formakin and Dargavel Burn, both currently crossed by the existing line. There are also numerous woodlands identified by Local Authority inventories as being of Ancient origin and/or Semi-Natural origin, at least 3 of which are currently crossed by the existing 132kV OHL.

There are a number of local authority SINC sites covering a significant proportion of the study area east of Devol Moor. The existing OHL between Erskine and Devol Moor crosses six of these.

4.4.4 Archaeology and Cultural Heritage

Between Erskine and Devol Moor there are significant numbers of Scheduled Ancient Monuments, sites of Schedulable Quality and Listed Buildings as well as two Inventory-listed Designed Landscapes: Formakin and Finlayston. In places, together with dwellings and woodlands these represent significant areas of potential constraint. The existing 132kV OHL to be replaced currently passes across Whitemoss Roman Fort SAM, west of Ingliston House, and through the western edge of Formakin Designed Landscape.

4.4.5 Existing Transmission Lines and Other Infrastructure

The presence of the existing 132kV OHL from Erskine to Devol Moor (to be removed upon completion of the proposed new line) and the 400kV Inverkip to Neilston OHL in the study area are potential technical constraints on both of the proposed OHLs.

The existing Erskine to Devol Moor 132kV OHL will be operational during construction of the new OHL. If the final proposed route requires to cross or closely parallel this existing line then a temporary outage will be required during construction. Whilst this is not an absolute constraint, it is desirable to minimise the number of crossings or areas of close proximity as the existing system could only sustain an outage for a limited time.

Crossing the 400kV OHL to the south would require under grounding of the proposed 132kV OHL and require cable sealing end towers (larger and more visually prominent structures) on either side of the 400kV OHL.

Roads and Other Infrastructure

The study area is mainly traversed by minor roads or lightly trafficked A roads. However, in the north and east there is a major transport corridor including the M8, A8 and an electrified railway line passing through the area around Erskine and Bishopston and along the raised beach coastline to Port Glasgow.

A gas pipeline passes south of Greenock and Port Glasgow, past Devol Moor Substation and south of Kilmacolm.

4.4.6 Settlements and Dwellings

Settlements, dwellings and some places of education and work represent significant constraints to routeing due to visual impacts and perceived adverse impacts on visual amenity. SPT have adopted a rule of thumb in which 150m of clearance from properties is a trigger for further consideration of impacts where possible. Nevertheless in particular circumstances it cannot be guaranteed that this clearance would not be breached.

There are several larger settlements within and close to the study area between Erskine and Devol Moor. Most notably the small town of Bishopton lies immediately west of the Erskine substation and much of the coastal area is built up with the settlements of Langbank and Port Glasgow, defining the northern boundary of the study area. To the south of the existing transmission lines lies the town of Kilmacolm. Inbetween the towns and scattered throughout most of the study area there are farms, single dwellings and small clusters of dwellings, becoming much more scattered in the west.

West of Devol Moor there are no significant settlements and only a few scattered farms and dwellings at the upper end of Strathgryfe.

4.4.7 Planning and Land Use

The Royal Ordnance Factory occupies an extensive area south and west of Bishopton. This area is currently surrounded by high security fencing. The northern section of this site is designated for redevelopment as housing, with an access road joining the A8 northwest of the town. Currently we are advised by BAE systems that it would not be possible to route the line through the existing ROF site. Furthermore, plans for the redevelopment area are at an early stage and unlikely to be resolved in the time frame of the line replacement project.

4.4.8 Recreation and Tourism

In the Erskine and Devol Moor study area there are a number of potential visitor locations and recreational facilities. This includes the previously mentioned Formakin and Finlaystone Estates, the latter being a country park. In addition there are three golf courses: at Erskine; Gleddoch House Hotel near Langbank and Auchinleck at Port Glasgow. The latter course, on Devol Moor, is crossed by the existing 132kV OHL. A course is also under construction at Mar Hall Hotel, north of Bishopton.

The Clyde Muirshiel Regional Park is a key regional resource for informal recreation and covers much of the area west of Devol Moor substation.

4.4.9 Forestry and Agriculture

With the exception of the extensively planted surroundings of the Royal Ordnance Factory there are no substantial areas of forestry between Erskine and Devol Moor, although there are many scattered blocks and strips of plantation and woodland, some of which are on the Ancient and Semi-Natural Woodland Inventory. However an extensive area around Knockmountain Farm, north of Kilmacolm, is designated as Forestry Commission land in which there are plans to plant extensive areas of native woodland of high amenity and recreational value. This is crossed by the existing 132kV OHL that is to be replaced.

There is extensive pastoral farming throughout most of the study area. The majority in the east is on enclosed, improved pasture with rough grazing restricted to a few hilltops and on Devol Moor. To the west the majority of grazing is open, unimproved moorland with improved pasture concentrated around the head of Strathgryfe.

5.0 ROUTEING STUDY

5.1 Introduction

The objective of this stage of the assessment was to identify areas in which there are fewer of the highest level constraints. This has facilitated the determination of a number of potential route corridors to be assessed in more detail before selecting a preferred route corridor and then a preferred alignment to be developed and assessed in detail.

5.2 Corridor Options

A series of potential route corridors were identified. These are a nominal 400m wide and are considered wide enough to accommodate a transmission line and allow for deviations to avoid localised constraints.

The Holford Rules form the accepted guidance for the routeing of OHLs in the UK and these formed the starting point for the development of route corridor options. This was carried out by identifying broad areas of least environmental, physical and technical constraint in combination with considering the principles of good route design:

- avoiding sharp changes of direction where possible
- considering topography, particularly visual effects, associated with hills, ridges and skylines
- following open valleys where possible
- avoiding other transmission lines (where possible)
- avoiding recreational and residential land

This has allowed the establishment of corridors that balance good routeing principles and reduced potential for environmental impacts. The corridors do not completely avoid constraints due to the concentration and extent of environmentally sensitive locations. Furthermore some physically possible but potentially constrained routes were included to test the overall suitability of the more obvious options. Ongoing consultations revealed further information during the assessment process and this is discussed below.

Three main corridor options were identified between Erskine and Devol Moor substations: Northern, Central and Southern, together with potential sub-options and crossovers between the principal lines. They are shown in Figures 8a and b.

5.3 Route Corridor Assessment

5.3.1 Northern Corridor

The northern route leaves Erskine substation to pass north of Bishopton broadly east of the existing line over undulating improved pasture south of an industrial area. At this stage two closely aligned options are available:

- Bishopton: the more westerly option is shorter, passing NNW and turning W towards the M8 at North Polton through a belt of inventory woodland and past an archaeological site of schedulable quality
- Erskine: the corridor heads NNE to the east of Drumcross farm and then NW to Erskine Farm, thus avoiding the woodland and archaeological site but close to a prominent B-listed monument and a number of listed properties, including Mar Hall Hotel. It then heads W along the southern edge of Erskine golf course towards the M8.

West of the M8 two options are available:

- Escarpment: the corridor closely follows the existing 132kV OHL, crossing the railway at Bishopton Tunnels and rising up the escarpment on an WSW alignment, passing a number of properties and towards Ingliston House. It crosses the existing OHL at the Old Greenock Road and turns WNW near Whitemoss Dam towards the lodge at the entrance to Drums, crossing the existing OHL again but going south of the Whitemoss Roman Fort SAM.
- Coastal: the corridor deviates NW from the existing 132kV OHL, following the relatively flat land between the motorway and railway. It crosses the railway east of the M8/A8 junction as roads, woodland and settlements constrain further coastal routeing, and rises SW diagonally up the escarpment slope towards the Lodge at Drums.

West of Drums Lodge there are again two options:

- Escarpment: the corridor passes WNW, crossing and re-crossing the Old Greenock Road and passing between it and the upper edge of Langbank through small steep fields, passing west and back over Old Greenock Road at Undercraig.
- Inland: the corridor heads SW on rising ground towards Barscube Hill across small fields between small plantations, along the southern edge of the golf course at Gleddoch House Hotel and then turning sharply to the NW towards Undercraig, following a line between the ridge of Barscube Hill and the golf course

West of Undercraig is a single corridor which follows a westerly route over undulating farmland, passing north of Auchendores Reservoir and south of the Bardrainey suburb of Port Glasgow. It crosses the Auchenbothie Road and crosses south of the existing line to rise up onto Devol Moor, following a course 200-300m south of the existing 132kV OHL to arrive at Devol Moor substation after crossing the southern end of Port Glasgow golf course.

5.3.2 Central Corridor

This corridor follows the same initial routes north of Bishopton as the northern route. After crossing the M8 motorway and railway it then heads sharply SSW over the undulating farmland between ROF Bishopton and the Formakin Estate. The corridor bends south of Formakin and then heads WNW crossing Barochan Road and climbs steeply up Barmore Hill, just south of the hilltop woodland. At this point it is joined by an alternative corridor connected to the northern corridor, passing SSW-NNE over rolling pastureland between Formakin Estate to the east and Drums to the west.

Heading west of Barmore Hill at Park Erskine the corridor passes across rolling pastureland between plantations and south of Barscube. It then follows a WNW line across undulating improved pasture on the northern side of Dargavel Glen paralleling the existing 132kV and 400kV OHL routes along this shallow valley before passing north of Knockmountain Farm at its head and downhill to the isthmus between the two reservoirs west of Finlaystone Road.

West of the reservoirs the corridor splits into northern or southern alternatives around Craigmarnoch Hill:

- The northern route heads north between Cloak and Auchendores Reservoir then west around the hill before returning SW to West Kilbride.
- The southern route heads SW towards Craigmarnoch, crossing the existing 132kV OHL before turning WNW to West Kilbride.

Past West Kilbride the route continues WNW, heading uphill onto Devol Moor via a shallow fold in the topography, where it joins the northern corridor.

5.3.3 Southern Corridor

The southern corridor goes south of Bishopton. Initially crossing the M8 west of Erskine substation it then heads SSW across undulating farmland, across the A8 and the railway and into the Royal Ordnance Factory site, skirting the southern edge of the proposed development area, where two options are possible:

- Northern: the corridor turns WNW through the ROF, continuing to skirt the proposed development area, until it joins the central corridor at Nether Mill just south of Formakin. It then heads WSW on steadily rising improved pastureland to Towncroft.
- Southern: the corridor continues W across the ROF, passing a sand and gravel pit to the west and then to the north side of Barochan Hill, before turning NW and passing across rolling pasture and woodland to Towncroft.

West of Towncroft the corridor turns WNW to Haddockston, following the gap between the two existing OHLs (400kV and 132kV) along the southern side of Dargavel Glen. There are also potential links to the central corridor between Nether Mill and Towncroft and between Barscube and Mid Glen. The route

passes south of Knockmountain where it merges with the central corridor to descend to the two reservoirs.

Further west the route follows the same corridor options to Devol Moor substation as the northern and central corridors.

5.4 Route Corridor Appraisal

West of the Erskine substation the primary routeing consideration is whether to pass north or south of Bishopton. Further consultation with BAE Systems concerning the ROF site to the south and west of Bishopton has indicated that routeing through the site would be constrained due to development proposals. There are also considerable uncertainties concerning the Bishopton development site within the timescale of this project. Furthermore, routeing along its perimeter would be considered undesirable and likely to be resisted. As routeing round the southern end of the ROF site would involve a considerable diversion and two crossings of the 400kV OHL it is concluded that only the north and central routes, passing north of Bishopton and the ROF, are feasible.

North of Erskine substation the principal constraints include an ancient woodland and schedulable monument site, a number of residential properties and hotel (some buildings listed), a B-listed monument and Erskine golf course. Analysis of the two sub-options indicates that the optimum would be a combination of the two: initially passing east and north of Drumcross and then cutting south of the monument, residential properties, hotel and golf course on the alignment closer to Bishopton.

West of Bishopton a number of high category constraints limit the routeing options to three:

- The northern route sub-options bypass a high concentration of designated and developed sites including the Whitemoss Roman Fort SAM, Cora Campus and an area of Ancient Woodland:
 - the coastal option avoids all the designated areas but is close to the Firth of Clyde SPA and then has to cross the electrified railway on a slope.
 - the escarpment option passes close to the Roman fort but misses it, crossing the existing 132kV OHL route south and west of the fort.
- The third option is the central route which passes between the ROF/ Bishopton development site and the Formakin Designed Landscape.

Due to the uncertainties associated with the ROF development site the central route is no longer considered feasible. Of the northern corridors the escarpment option is considered preferable due to its remoteness from the SPA and the fact that it does not have to cross the railway.

West of Formakin the two principal options are the northern corridor and central corridor.

- The northern corridor splits to pass either side of the Gleddoch House Hotel and Golf Course:
 - the escarpment corridor passes close to the southern edge of Langbank; and
 - the inland corridor rises onto the shoulder of Barscube Hill and around the southern edge of the golf course.

West of the golf course there are no designated areas or landuse issues as the corridor passes north of Auchendores Reservoir.

- The central corridor is joined via a route passing between areas of woodland and forestry before following the existing lines passing west along Dargavel Glen, north of the SSSI.

Along the glen a fourth option presents itself in the form of the southern route, passing between the existing 132kV and 400kV OHLs and south of the SSSI.

Of the available options the central and southern corridors are considered preferable to the northern as they avoid population centres and recreational interests as well as the potential for skylining. Furthermore they are located in a landscape already affected by overhead transmission lines whereas the northern corridor has no existing lines. The central corridor, however, passes fewer properties than the southern.

The central and southern corridors merge at the isthmus between Auchendores and Leperstone Reservoirs. West of here there are two options:

- The northern option passes the B-listed residential property at Cloak, a further property and a hilltop settlement site of schedulable quality, before passing between the heavily designated Craigmarloch Hill and the suburbs of Port Glasgow.
- The southern option passes an occupied prefabricated building on the reservoir shore, then between two properties on the A761 and then south of Craigmarloch Hill.

The southern is considered preferable as it avoids affecting the setting of two cultural heritage sites and avoids moving the line closer to a centre of population.

West of Craigmarloch Hill the corridor passes south of the existing 132kV OHL on a route to Devol Moor substation that avoids the skyline currently occupied by the existing line but crosses Port Glasgow Golf course in a different location to the existing line

The preferred route corridor is shown in Figures 9a and b and 10a and b. In summary the preferred corridor has been chosen on the following basis:

- Avoidance of existing ROF and proposed development land
- Avoiding highest amenity sites represented by statutory and local plan designations including Inner Firth of Clyde SPA, Whitemoss Roman Fort

and Craigmearloch Hill SAMs, Formakin Designed Landscape and SSSI, Dargavel Burn SSSI

- Avoiding Ancient/ Semi-natural Woodland at Drumcross, Formakin and Craigmearloch Hill
- Avoiding centres of population at Erskine, Langbank and Auchinleck
- Avoiding close proximity to residential properties around Erskine, Langbank and Gleddoch House Hotel
- Avoiding paralleling or crossing skyline ridges at Barscube Hill
- Locating in an area already affected by overhead transmission lines, including the existing line to be replaced
- Avoiding the setting of high amenity cultural heritage sites such as the monument at Erskine farm and listed house at Cloak

5.5 Preferred Route Alignment Criteria

Following identification of the preferred route corridor between Erskine and Devol Moor a preferred route alignment was defined. The criteria used to define the alignment were primarily based on Holford Rules 3 to 7 and localised landform and topography within the preferred corridor:

- Minimising the number of changes in direction to reduce the number of angle towers required (these are more complex and heavier than straight line towers and considered to be more visually intrusive)
- Avoiding sharp changes in direction that require the heaviest angle towers
- Using detailed routeing to avoid woodlands, trees, higher topography and other landscape features where possible
- Using detailed routeing to avoid encroaching on residential properties where possible

5.6 Preferred Route Alignment

The preferred route alignment has been refined from the preferred corridor to achieve a number of environmental objectives as well as improvements from the existing 132kV OHL it is to replace. It is illustrated in Figures 9a and b and 10a and b. Photographs 1-11 illustrate key locations.

- Removing the line completely from designated areas including Whitemoss Roman Fort SAM, Formakin Designed Landscape and SSSI and Dargavel Burn SSSI
- Avoiding visual impacts by routeing as far away as possible from residential properties (eg. Drumcross, North Glen, Cloak)
- Following the lowest practicable topographic line, including avoiding hill summits and exposed/ skyline ridges and keeping to the line of shallow

valleys or topographic depressions such as Dargavel Glen and on Devol Moor

- Avoiding the loss of mature woodland and trees wherever possible but using them as a screen and backdrop (eg East of the M8, Barbeg Hill, Park Erskine and Dargavel Burn.
- Minimising the number of changes in direction and therefore the number of angle towers, except where this conflicts with higher level routing objectives
- Avoiding crossovers with the existing 132kV OHL to be removed except where this enables a significant environmental objective to be achieved (eg. avoiding Whitemoss Roman Fort SAM and the skyline ridge of Devol Moor)

By comparison with the existing 132kV OHL the preferred route alignment represents an improvement in environmental performance:

- Four designated areas of the highest amenity are no longer directly affected (one SAM, two SSSIs, and an inventory-listed designed landscape)
- The line is moved further from the northern and eastern edge of Bishopton and southern edge of Port Glasgow.

6.0 THE NEXT STEPS

6.1. Selection of the Proposed Route

At the conclusion of the consultation process, a proposed route 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 the route corridor;
- having regard to all other matters that SPT consider to be relevant

6.2 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 Statements 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. The scoping report will reference this Consultation Document.

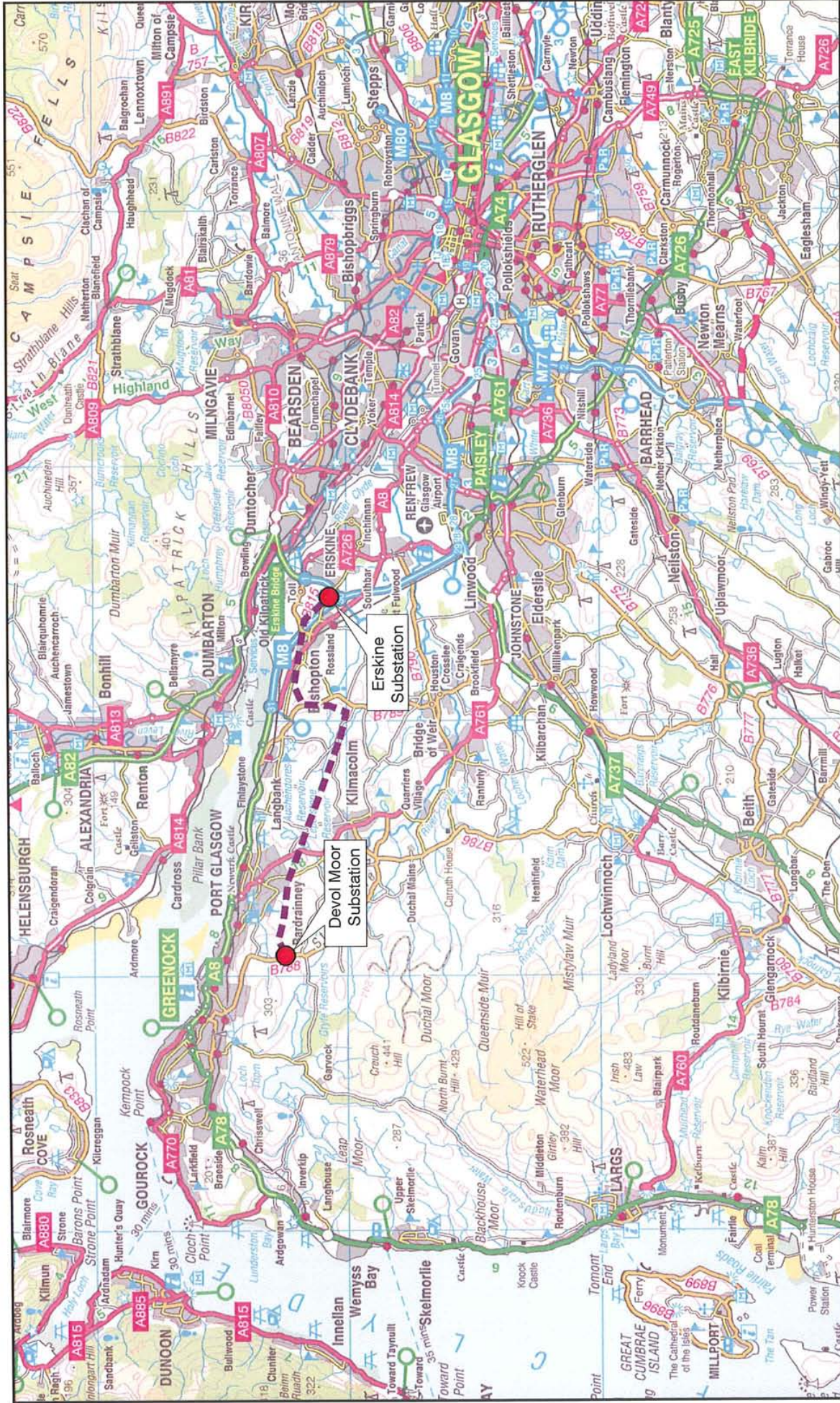
6.3 Detailed Studies

Further detailed studies including technical studies will be undertaken for the preparation of the Section 37 application. The Environmental Statement will provide a detailed visual and environmental assessment of the proposed routes and will include any appropriate mitigation measures. Computer aided techniques will be used to assist the evaluation of the visual effects of the proposed route.

6.4 Environmental Statement

The Environmental Statement will assess the environmental impacts of the proposed route, which will be developed from the preferred route 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 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 any appropriate mitigation measures.



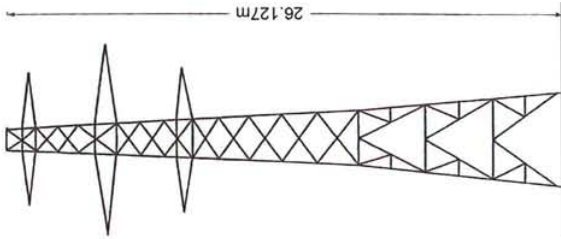
Ironside Farrar Ltd

Erskine to Devo Moor Overhead Line Route

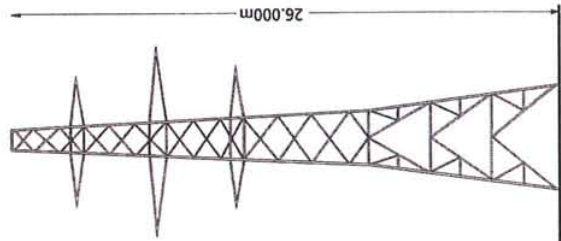
-  Existing Substations
-  Existing 132kv OHL from Erskine to Devo Moor

Figure 1 Location & Context

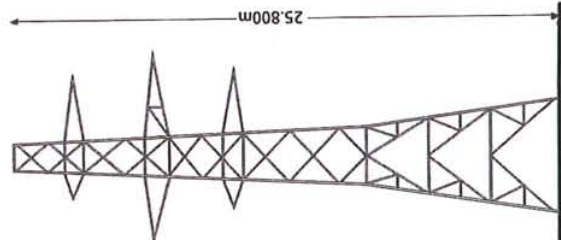
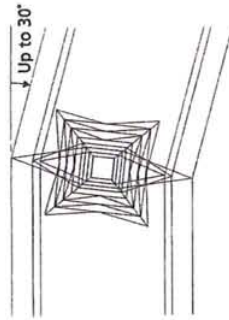
0 1.0 2.0 4 km



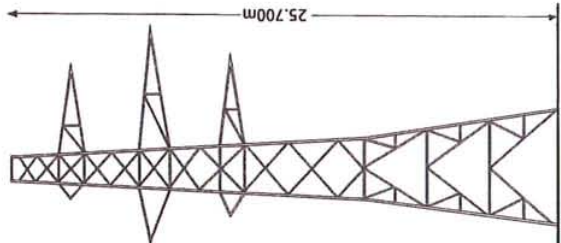
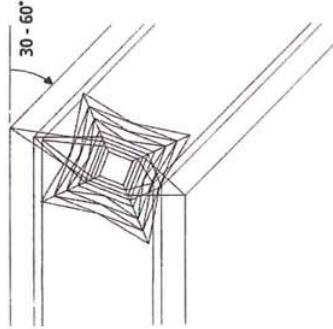
Line Tower



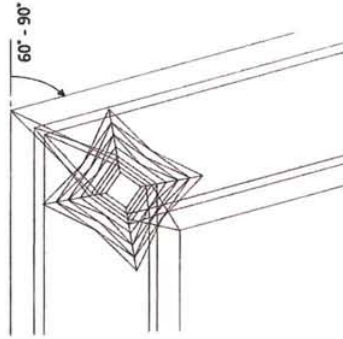
30° Angle Tower



60° Angle Tower



90° Angle Tower





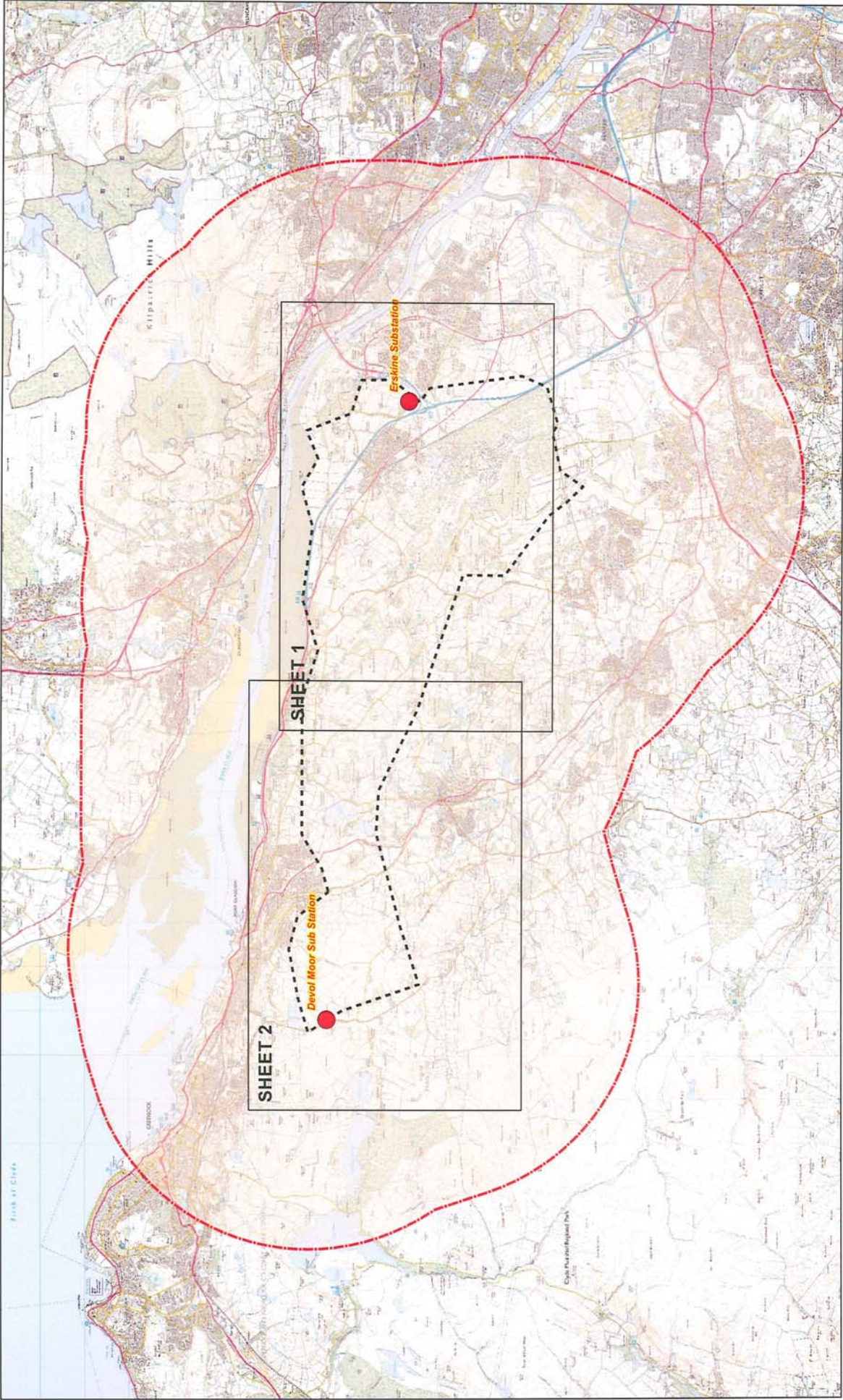
Ironside Farrar Ltd

Erskine to Devol Moor Overhead Line Route

Figure 3
Typical L4 Tower
Construction Stages

Aug 2007

6847_Fig 3



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Erskine to Devol Moor Overhead Line Route





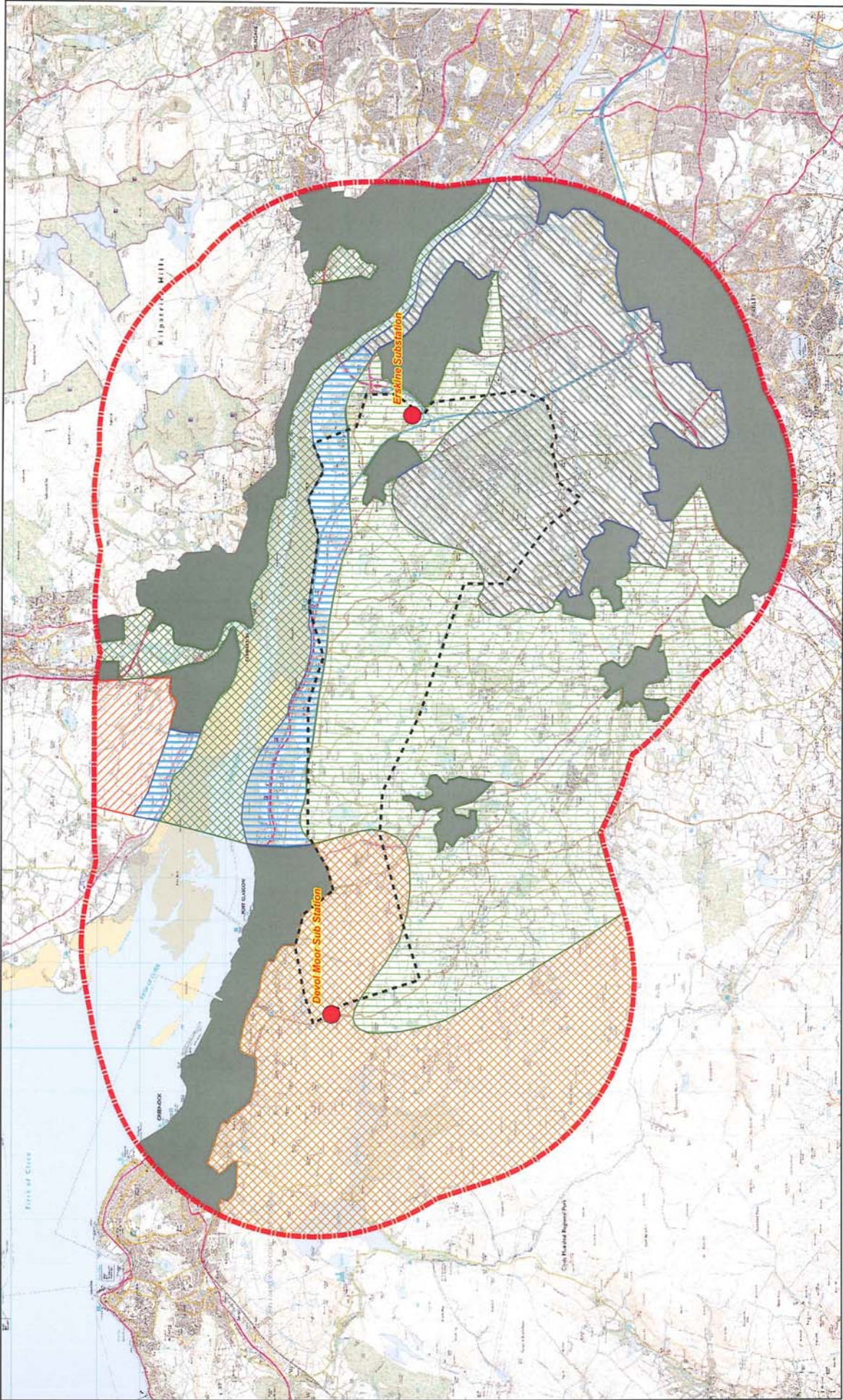
-  5km Buffer to Study Area
-  Study Area Corridor
-  Existing Electricity Substation
-  Detailed Study Area Sheet Locations (See Figures 7 - 10)

Figure 4
Study Area
& 5km Buffer

0 0.5 1 2 3 4 km



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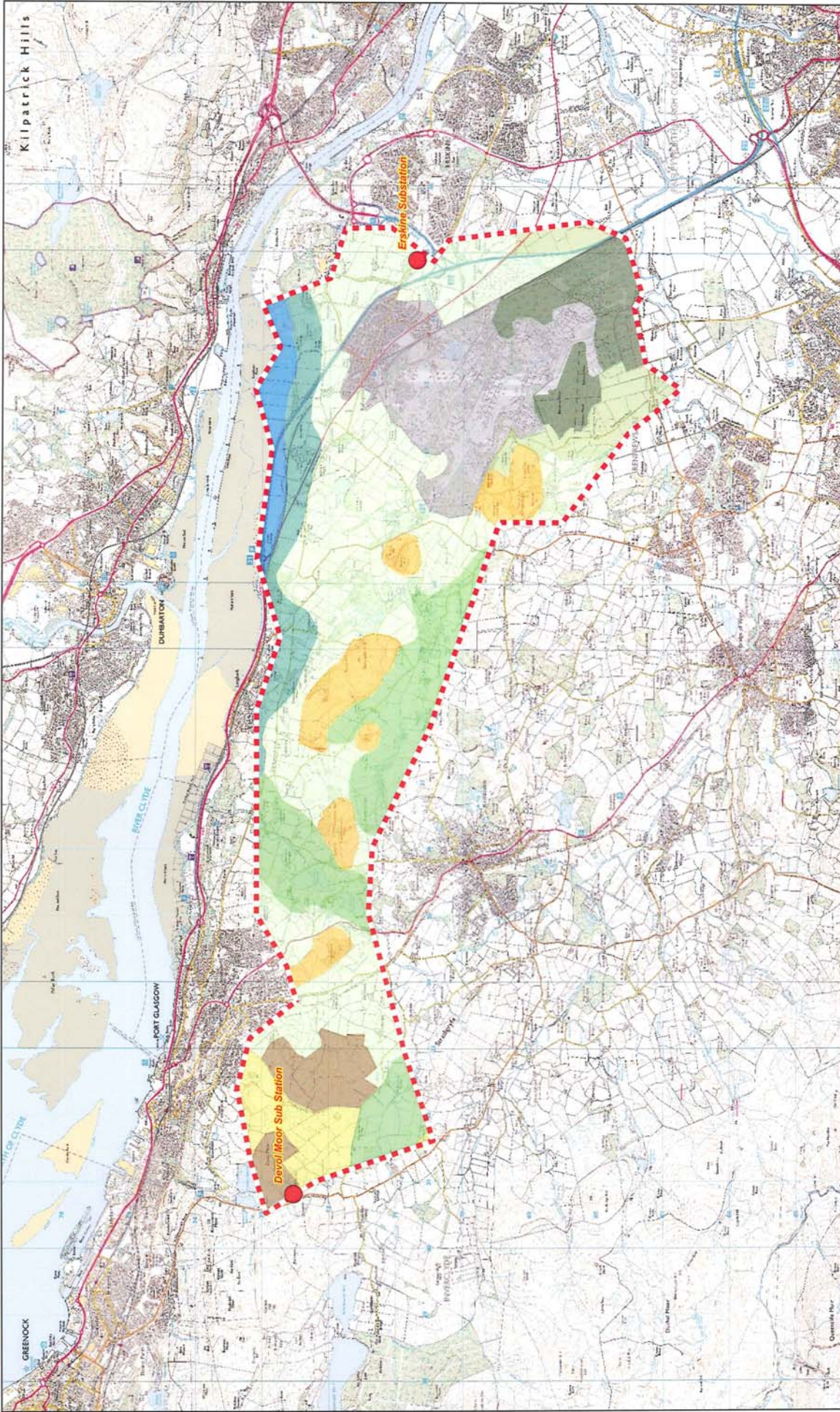
Erskine to Devol Moor Overhead Line Route

- General**
- Existing Electricity Substation
 - Study Area Corridor
 - 5km Buffer to Study Area
 - Urban Areas

- Glasgow & The Clyde Valley Landscape Character Areas**
- Raised Beach
 - Flood Plain
 - Green Corridor
 - Moorland Hills & Ridges
 - Rugged Upland Farmland
 - Rugged Moorland Hills

Figure 5
Landscape Context
SNH Character Areas





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Erskine to Devol Moor Overhead Line Route

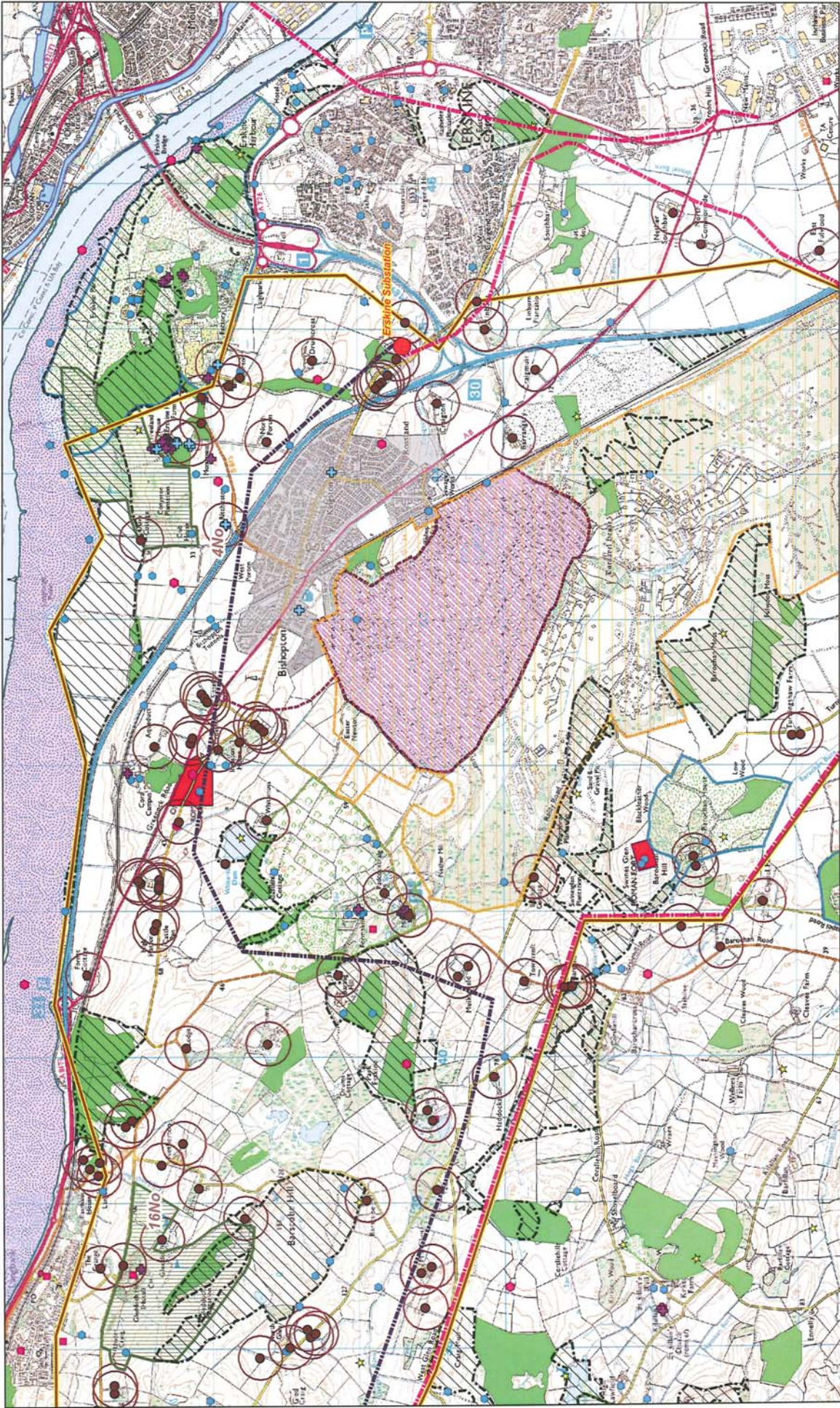
Figure 6
Local Landscape Character Areas

- General**
- - - Study Area Corridor
 - Existing Electricity Substation

- Local Landscape Character Types & Areas**
- Escarpment
 - Pastoral Valleys
 - Raised Beach
 - Lowland Arable Farmland
 - Rolling Pastureland
 - Improved Upland Pasture
 - Rocky Hills & Ridges
 - Forestry
 - Moorland
 - Settlement and Industry

Sept 2007

6847_Fig6



Erskine to Devo Moor Overhead Line Route

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Cat 1: National/Significant Constraints

- SPA
- Ramsar Site
- Scheduled Ancient Monuments
- Site of Scheduled Quality
- Historic Scotland Sites
- Conservation Areas

Cat 1: National/Significant Constraints

- Category A Listed Building
- Historic Gardens & Designed Landscape
- Bishops Cleeve
- Proposed Bishopston Development Area & Road
- M.O.D Brantford Moor (NW) & (SE)
- Gas Transmission Pipe

Cat 2: Regional/Moderate Constraints

- Residential Properties and 150m Offset
- Clyde Muirshiel Regional Park
- Ancient Woodlands
- Country Parks
- Golf Courses
- Historic Gardens & Designed Landscapes
- Linear Cultural Heritage Site
- Other Cultural Heritage Sites
- Category B Listed Building

Cat 3: Local/Minor Constraints

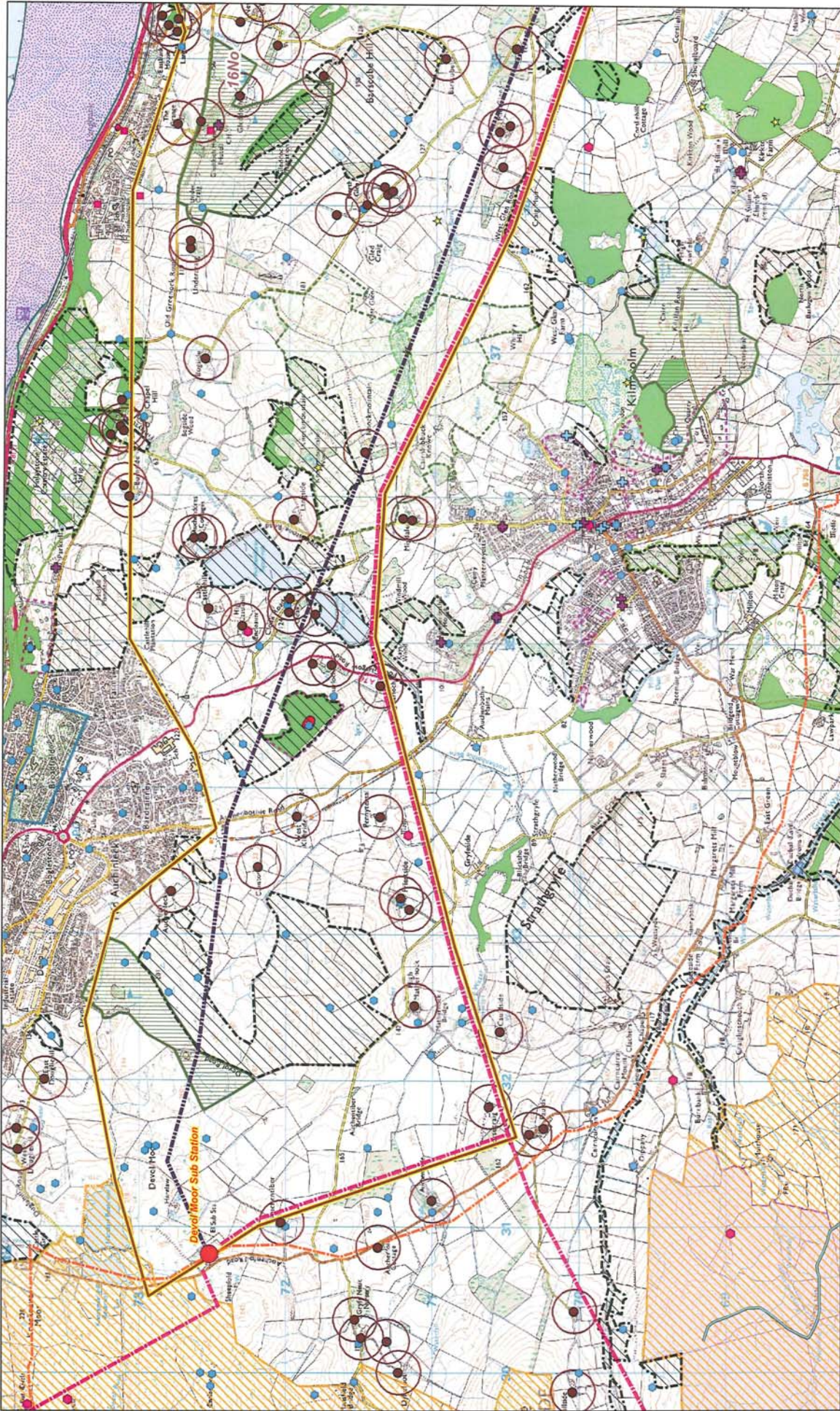
- Tree Preservation Orders
- SWT Muds Sites
- Site of Interest for Nature Conservation
- Forestry Commission Land
- Category C(S) Listed Buildings

Existing & Proposed Infrastructure

- Existing Electricity Substation
- Existing 400kv Electricity Services
- Existing 132kv Electricity Services
- General
- Study Area Corridor

Figure 7a
Overall Constraints
Sheet 1

Sept 2007 6547_ Fig7a_Sht1



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Cat 1: National/Significant Constraints

- SPA
- Ramsar Site
- SSSIs
- Scheduled Ancient Monuments
- Site of Schedule Quality
- Historic Scotland Sites
- Conservation Areas

Cat 1: National/Significant Constraints

- Category A Listed Building
- Historic Gardens & Designed Landscape
- Inventory Listed
- Historic Park
- Proposed Fisheries Development Area & Road
- M.O.D Breached Moor (NW) & (SE)
- Gas Transmission Pipe

Cat 2: Regional/Moderate Constraints

- Residential Properties and 150m Offset
- Clyde Muirshiel Regional Park
- Ancient Woodlands
- Country Parks
- Golf Courses
- Historic Sites & Designed Landscapes
- Linear Cultural Heritage Site
- Other Cultural Heritage Sites
- Category B Listed Building

Cat 3: Local/Minor Constraints

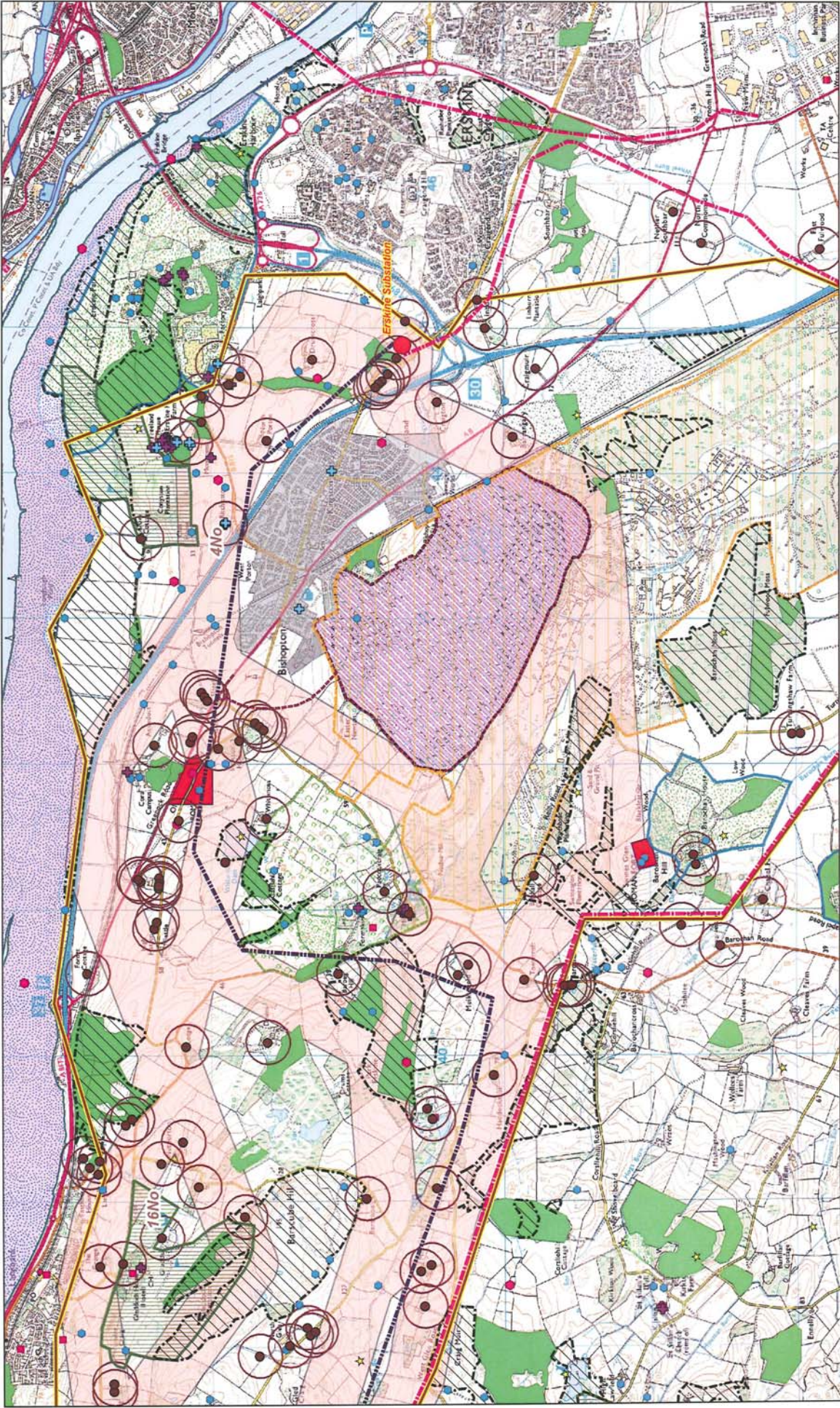
- Tree Preservation Orders
- SVT Wildlife Sites
- Provisional Survey or Proposed
- Site of Interest for Nature Conservation
- Forestry Commission Land
- Category C(D) Listed Buildings
- Other Cultural Heritage Sites

Existing & Proposed Infrastructure

- Existing Electricity Substation
- Existing 400kV Electricity Services
- Existing 132kV Electricity Services
- General
- Study Area Corridor

Figure 7b
Overall
Constraints
Sheet 2

6847_Fig7b_Sht2
 Sept 2007



Erskine to Devol Moor Overhead Line Route

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Cat 1: National/Significant Constraints

- SPA
- Hamar Site
- Historic Gardens & Designed Landscape
- Bishopston RCF
- SSSFs
- Scheduled Ancient Monuments
- Site of Scheduled Quality
- Historic Scotland Sites
- Conservation Areas

Cat 1: National/Significant Constraints

- Category A Listed Building
- Historic Gardens & Designed Landscape
- Bishopston RCF
- Proposed Bishopston Development Area & Road
- M.O.D Brearhead Moor (NM) & (SE)
- Gas Transmission Pipe

Cat 2: Regional/Moderate Constraints

- Residential Properties and 150m Offset
- Cycle Muralist Regional Park
- Ancient Woodlands
- Country Parks
- Golf Courses
- Historic Gaps & Designed Landscapes
- Linear Cultural Heritage Site
- Other Cultural Heritage Sites
- Category B Listed Building

Cat 3: Local/Minor Constraints

- Tree Preservation Orders
- NAT/Media Site
- Government Licensed Approval
- Site of Interest for Nature Conservation
- Forestry Commission Land
- Category (CIS) Listed Buildings

Existing & Proposed Infrastructure

- Existing Electricity Substation
- Existing 400kv Electricity Services
- Existing 132kv Electricity Services

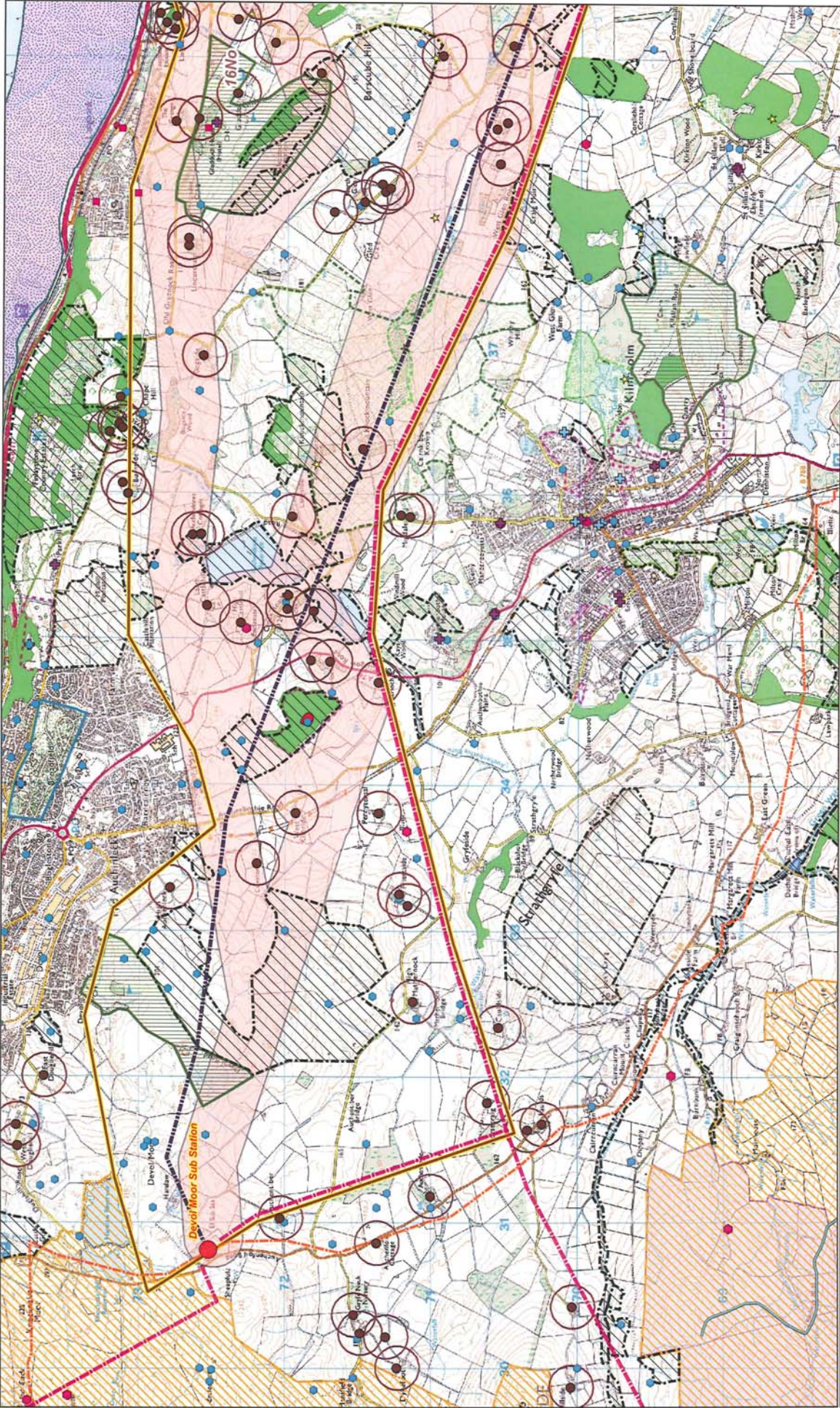
General

- Study Area Corridor
- Route Options Corridors

0 125 250 500 750 1,000 m

Figure 8a
Route Corridor
Options Overall
Constraints
Sheet 1

Sept 2007 6647 - Fig8b_Sht2



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Cat 1: National/Significant Constraints

- SPA
- Remain Site
- SSSIs
- Scheduled Ancient Monuments
- Site of Scheduled Quality
- Historic Scotland Sites
- Conservation Areas

Cat 1: National/Significant Constraints

- Category A Listed Building
- Historic Gardens & Designed Landscape
- Inventory Listed
- Historic ROP
- Proposed Bathing Development Area & Road
- M.O.D Basehead Moor (NW) & (SE)
- Gas Transmission Pipe

Cat 2: Regional/Moderate Constraints

- Residential Properties and 150m Offset
- Clyde Muirhall Regional Park
- Ancient Woodlands
- Country Parks
- Golf Courses
- Historic Cores & Designed Landscapes
- Linear Cultural Heritage Site
- Other Cultural Heritage Sites
- Category B Listed Building

Cat 3: Local/Minor Constraints

- Tree Preservation Orders
- STW Mounds
- Private Reserves or Approved Sites for Nature Conservation
- Forestry Commission Land
- Category C(S) Listed Buildings
- Other Cultural Heritage Sites
- Category B Listed Building

Existing & Proposed Infrastructure

- Existing Electricity Substation
- Existing 400V Electricity Services
- Existing 132kV Electricity Services

General

- Study Area Corridor
- Route Options Corridors

Figure 8b

Route Corridor

Options Overall

Constraints

Sheet 2

6847_Fig8b_SH12

Sept 2007

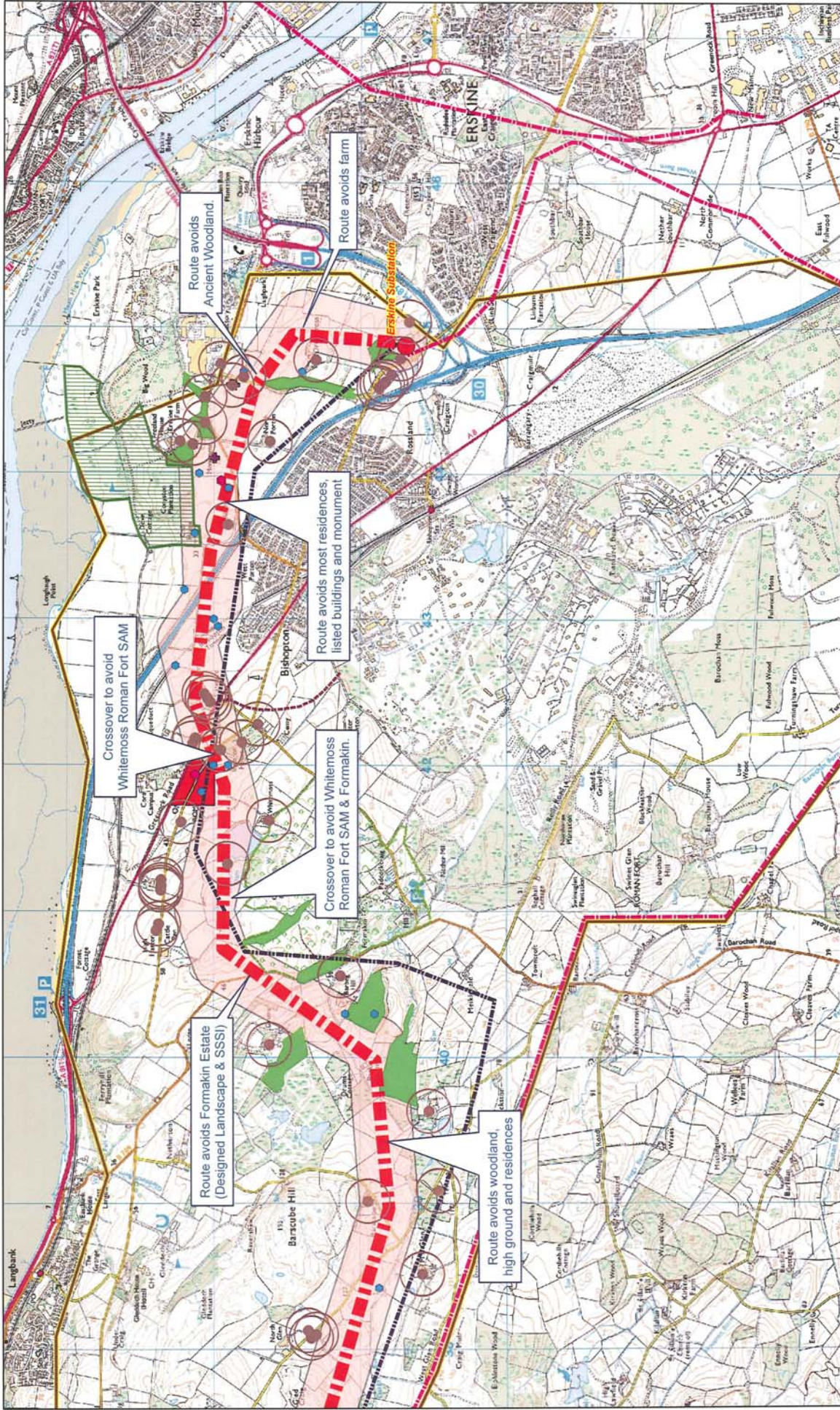


Figure 9a
Preferred
Route Alignment
Constraints
Sheet 1

6847_Fig9a_Sht1
 Sept 2007

Erskine to Devo Moor Overhead Line Route

Ironside Farrar Ltd

<p>Cat 1: National/Significant Constraints</p> <ul style="list-style-type: none"> ● Site of Scheduled Quality ● Gas Transmission Pipe ● Historic Gardens & Designed Landscape ● Scheduled Ancient Monuments ● Historic Scotland Sites ● Bishops Development 	<p>Cat 2: Regional/Moderate Constraints</p> <ul style="list-style-type: none"> ● Category B Listed Building ● Other Cultural Heritage Sites ● Residential Properties and 150m Offset ● Golf Courses ● Ancient Woodlands 	<p>General</p> <ul style="list-style-type: none"> ● Existing 400v Electricity Services ● Existing 132v Electricity Services ● Preferred Route ● Study Area Corridor ● Preferred Route Corridor ● Existing Electricity Substation
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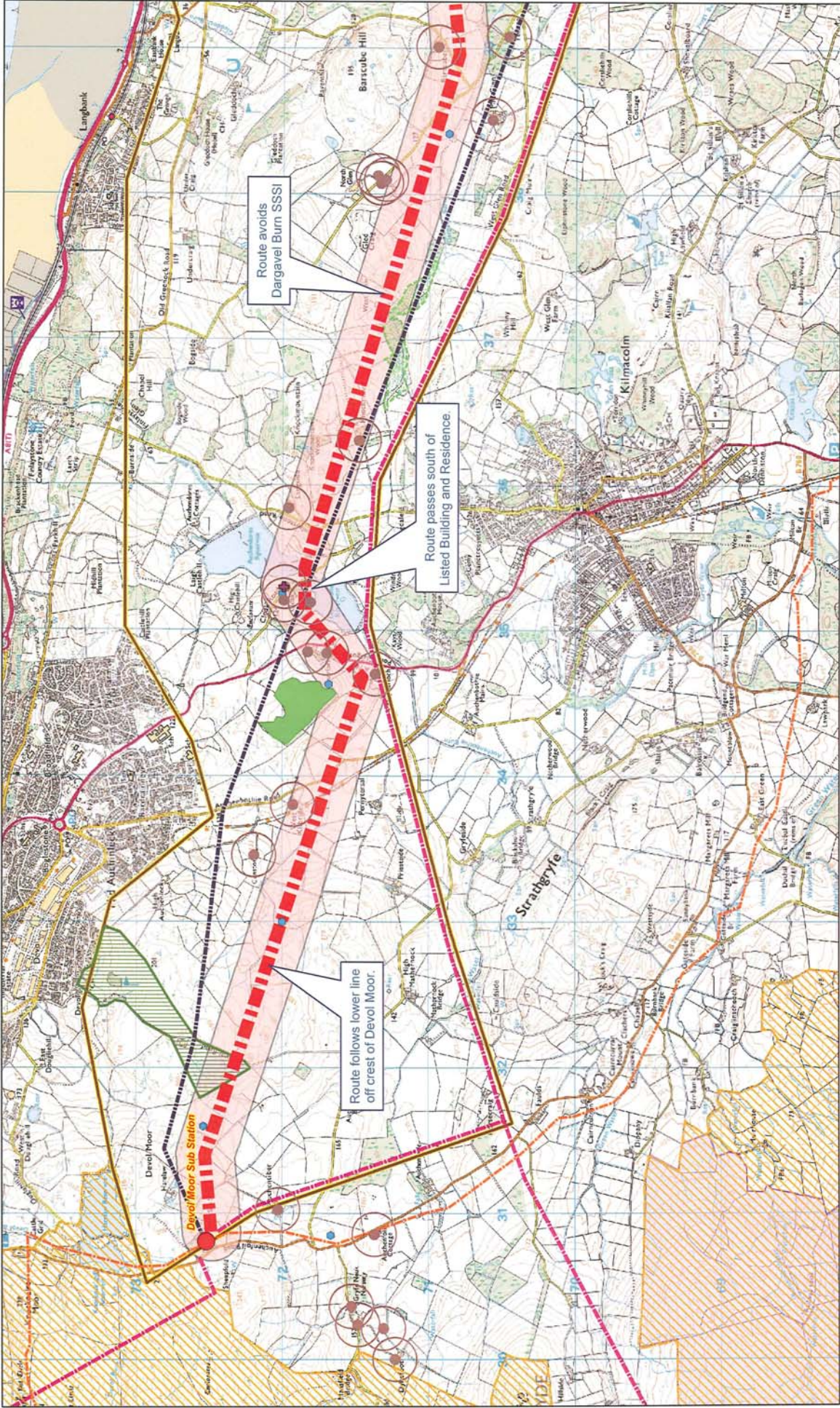


Figure 9b
Preferred
Route Alignment
Constraints
Sheet 2

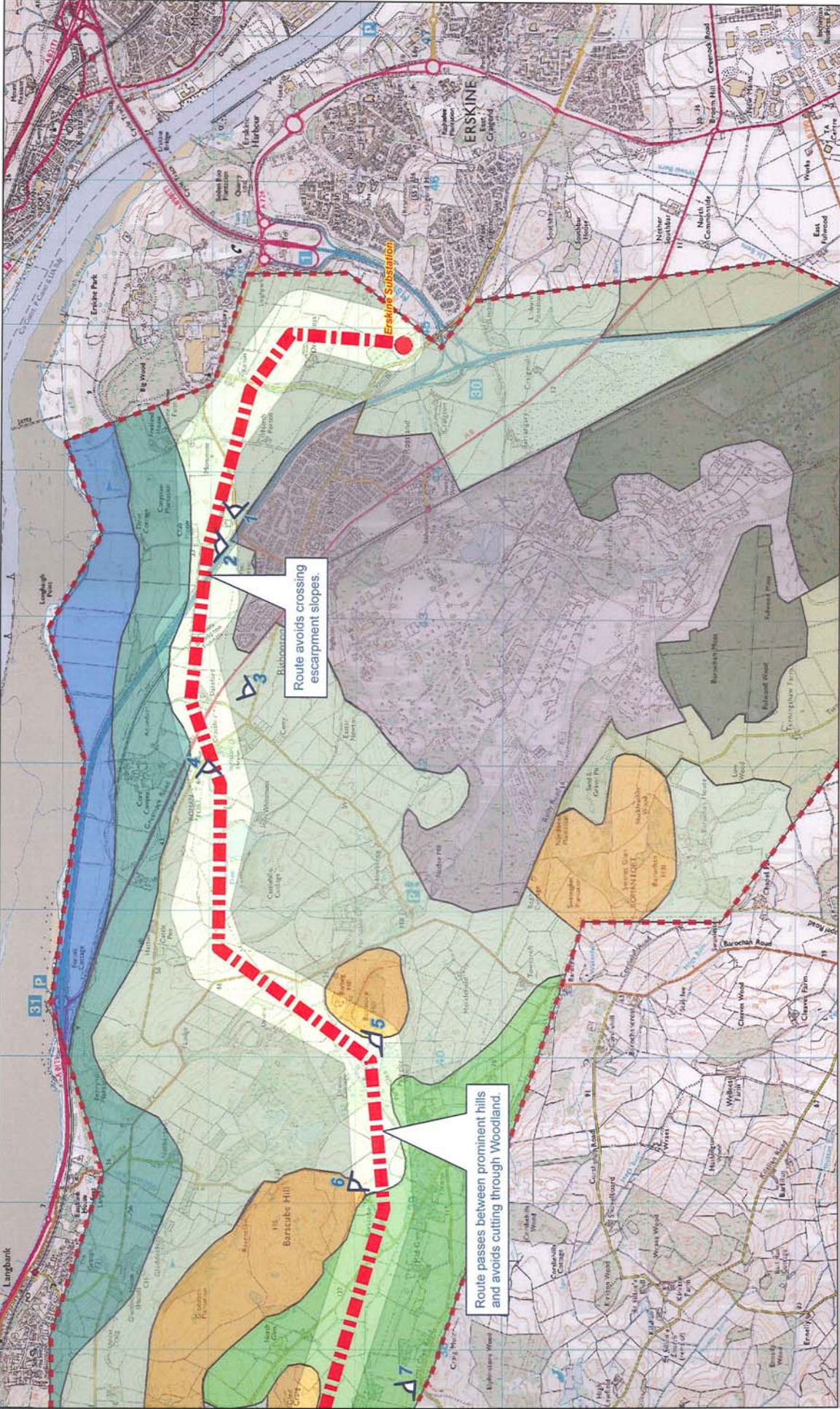
Erskine to Devol Moor Overhead Line Route

Ironside Farrar Ltd

- Cat 1: National/Significant Constraints**
- Site of Scheduled Quality
 - Gas Transmission Pipe
 - Bibbington Development
 - SSSIs

- Cat 2: Regional/Moderate Constraints**
- Category B Listed Building
 - Other Cultural Heritage Sites
 - Residential Properties and 150m Offset
 - Golf Courses
 - Ancient Woodlands

- General**
- Existing Electricity Substation
 - Preferred Route
 - Existing 400kV Electricity Services
 - Existing 132kV Electricity Services in its network
 - Study Area Corridor
 - Preferred Route Corridor



Erskine to Devol Moor Overhead Line Route

Figure 10a
Preferred Route Alignment
Local Landscape Character
Sheet 1

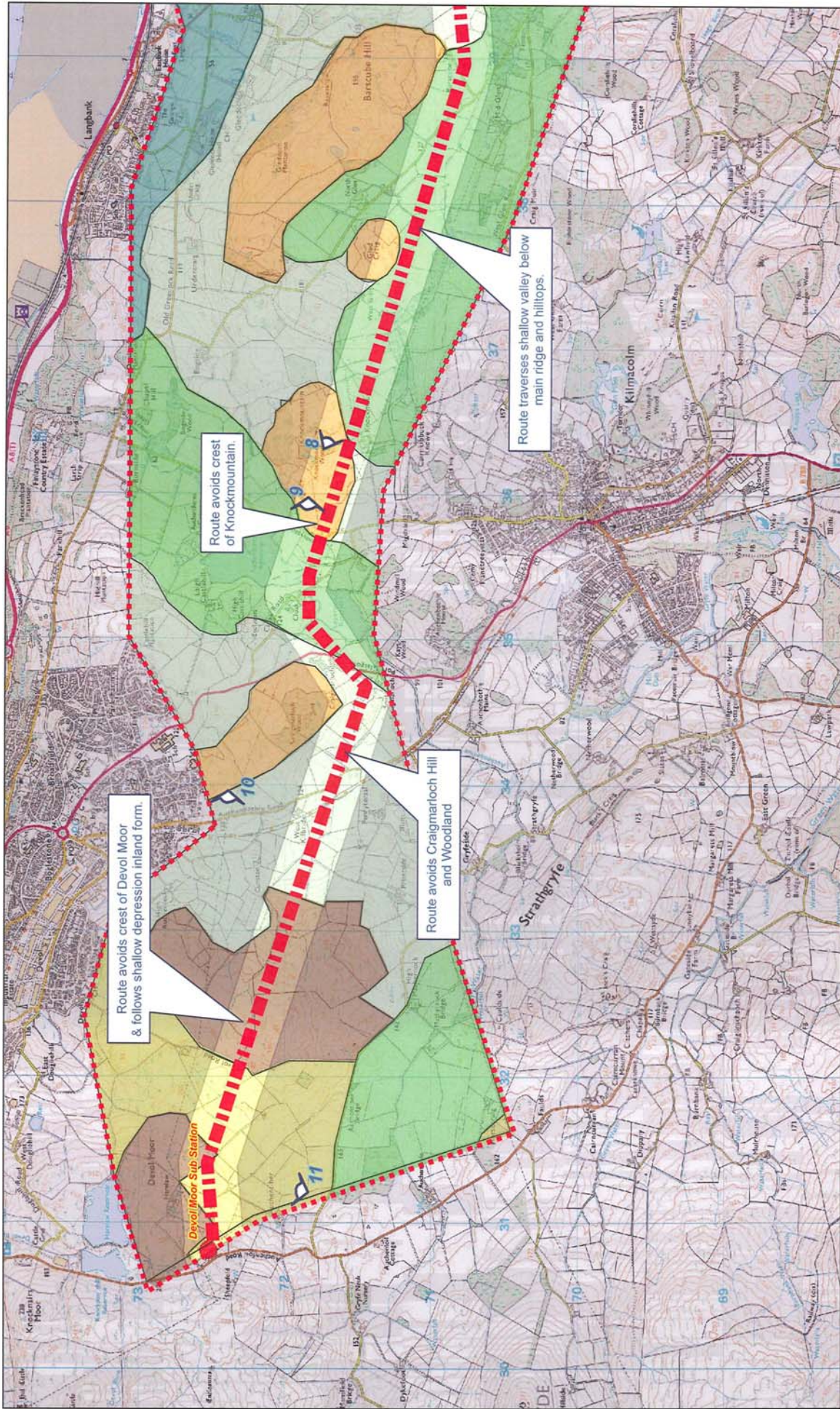
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General

- Preferred Route
- Study Area Corridor
- Existing Electricity Substation
- Photo Locations (see photo sheets)

Local Landscape Character Types & Areas

- Escarpment
- Raised Beach
- Rolling Pastureland
- Rocky Hills & Ridges
- Pastoral Valleys
- Lowland Arable Farmland
- Improved Upland Pasture
- Forestry
- Moorland
- Settlement and Industry



Erskine to Devol Moor Overhead Line Route

Figure 10b
Preferred Route Alignment
Local Landscape Character
Sheet 2

Sep 2007 6847_Fig10b_Sht2

General		Local Landscape Character Types & Areas	
	Study Area Corridor		Escarpment
	Preferred Route		Lowland Arable Farmland
	Existing Electricity Substation		Improved Upland Pasture
	Photo Locations (see photo sheets)		Raising Beach
			Rolling Pastureland
			Rocky Hills & Ridges
			Pastoral Valleys
			Forestry
			Moorland
			Settlement and Industry



6847 Site Photographs

1: Entrance to Erskine Golf Club, looking east. The preferred alignment crosses the B815 beyond the trees.



2: Drive to Erskine Golf club looking north. The preferred alignment crosses this and follows the line of trees to the left to cross the M8.

Erskine to Devol Moor Overhead Line Route

Photographs of Preferred Alignment



3: Bishopton. The preferred alignment passes north of the town, following the line of trees.



4: The existing line crosses Whitemoss Roman Fort SAM. The preferred alignment will cross to the left, avoiding the designated area.

Erskine to Devol Moor Overhead Line Route

Photographs of Preferred Alignment



5: Park Erskine seen from Barmore Hill. The preferred alignment will pass across the low ground and between the area of trees.



6: View east from Barscube Hill. The preferred alignment will emerge from the trees and cross the fields to the right.

Erskine to Devol Moor Overhead Line Route

Photographs of Preferred Alignment



6947 Site Photographs

7: Dargavel Glen. The preferred alignment is aligned along the valley below the hill crests



8: Knockmountain. The preferred alignment passes between the farm and the foreground hillside.

Erskine to Devol Moor Overhead Line Route

Photographs of Preferred Alignment



9: The preferred alignment passes between Leperstone and Auchindores Reservoirs before passing left to the south of the densely wooded top of Craigmearloch Hill.



10: Devol Moor. The Preferred alignment passes south of the existing line (left in the photograph).

Erskine to Devol Moor Overhead Line Route Photographs of Preferred Alignment



6947 Site Photographs

11: Devol Moor. The preferred alignment will be lower on the hillside than the existing.

APPENDICES

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 routing 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 and their review confirmed the relevance of “Rules” in overhead Line routing.

APPENDIX 2 – GLOSSARY

Angle Tower: A tower erected to allow for a change in direction of the line.

Circuit: Consists of metal conductors, single or grouped in bundles of two (twin) or four (quad), one bundle for each of the three phases in which the electricity is transmitted. Two circuits are usually strung on each tower, one circuit on each side of the tower, giving the greatest economic benefits and minimising the numbers of towers required.

Conductor: The name given to the metallic wires strung from tower to tower to carry electric current.

Double Circuit: Transmission towers carrying two circuits, one either side of the tower. See circuit.

Earth Conductor: A wire erected above the topmost conductor at the tower peak for protection against lightning strikes. It 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 tower body. Glass, polymeric or porcelain insulators can be used.

Insulator Strings: Insulator units assembled in articulated strings between the tower steelwork and conductors.

Kilovolt (kV): 1,000 volts.

Lattice Steel Tower: The standard form of support structure for high voltage transmission lines in the UK. They are constructed as an open framework of steel angle sections.

Line Tower: A tower erected to divide the overhead transmission line into manageable sections

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 lattice steel towers or 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.

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environmentalconsultants



Central Environmental Surveys
Natural Resource Management Consultancy



Headland Archaeology Ltd.



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