

Denny to Wishaw Network Upgrade

Bonnybridge to Glenmavis 400 kV Overhead Line: Routeing & Consultation Document

May 2021



Denny to Wishaw Network Upgrade Routeing & Consultation Document

Prepared for:



Prepared by:



Quality information

Prepared by	Checked by	Verified by	Approved by
Various	R. Mauritzen	D. Ritchie	D. Ritchie

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1. Introduction

1.1 Denny to Wishaw Network Upgrade

This Routeing and Consultation (RCD) has been prepared by AECOM on behalf of SP Energy Networks (SPEN)¹ as part of the Denny to Wishaw Network Upgrade (DWNU), (hereafter also referred to as 'the Project'). The Project, which will upgrade the existing electricity transmission network in central Scotland as illustrated in Figure 1 includes new infrastructure, and some changes and reinforcements to existing infrastructure.

The RCD explains the background to the Project and describes the approach to and results of the first stage of development of the Project; the routeing study which has been undertaken in order to identify a preferred Route Option for a new overhead line (OHL) between Bonnybridge Substation and existing OHL north of Glenmavis. Further information about the DWNU is contained in the Project Need Case Document².

The key components of the Project which are addressed in this RCD comprise:

- Firstly, the increase in voltage (referred to as 'uprating') from 275 kV to 400 kV of an existing OHL between Denny North and Bonnybridge Substations (known as the ZG route) including associated works at the existing substations. This is referred to as the 'Uprated OHL' in this RCD.
- Secondly, the construction of a new build 400 kV OHL from the existing Bonnybridge Substation connecting to the existing Easterhouse to Newarthill OHL (known as the XX route) at an appropriate location around Glenmavis. This is referred to as the 'New-build OHL' in this RCD.

As part of DWNU, SPEN also need to uprate some other OHLs in central Scotland from 275 kV to 400 kV, but these will be subject to a separate consultation in due course.

1.2 Need for the Project

As part of their commitments to tackling climate change the Scottish and UK Governments have set legally binding targets to reach net zero in their greenhouse gas emissions by 2045 in Scotland and by 2050 in England and Wales. In delivering net zero, the electricity system - how electricity is generated, transmitted and used - is undergoing transformational change. Traditional power stations are being replaced by renewable generation such as onshore and offshore wind farms requiring the electricity transmission network to be modernised and reinforced.

SP Transmission plc (SPT), the Transmission Owner (TO) and Licence Holder responsible for the electricity transmission network in central and southern Scotland has a crucial role to play. Its transmission network enables the bulk transfer of renewable energy generated within its licence area as well as within SHE Transmission's licence area to the north, south to National Grid Electricity Transmission's (NGET) licence area and large centres of demand.

¹ SP Energy Networks (SPEN) is the trading name for Scottish Power Energy Network Holdings Limited. SPEN owns and operates the electricity transmission and distribution networks in central and southern Scotland through its wholly-owned subsidiaries SP Transmission plc and SP Distribution plc. These businesses are 'asset-owner companies' holding the regulated assets and Electricity Transmission and Distribution Licenses. SP Transmission plc is the transmission licensee.

² Refer to SPEN's Denny to Wishaw 400kV Reinforcement Need Case document (www.dennywishaw.co.uk)

National Grid Electricity System Operator (NGESO) is responsible for the operation of high voltage electricity transmission system in Great Britain, also known as the 'super grid', which operates at 275 and 400 kV. NGESO undertake a number of activities on annual basis to ensure the economic and efficient operation of the transmission system. This includes the Network Options Assessment (NOA), an economic assessment of projects proposed by TOs including SPT to provide network capacity and meet the future needs of the electricity transmission network. The analysis in NOA allows recommendations to be made as to which projects will be economic and efficient to develop and the optimal timing of those projects.

The Denny-Wishaw Network Upgrade proposed by SPT to upgrade and reinforce its electricity network in central Scotland has been assessed through this process noting the requirement to support and enhance cross-border transmission capacity through the Scottish central belt and enable the efficient transmission of electricity generated from renewable sources. The Project was given a 'proceed' signal in the most recent 2020/21 NOA publication. In response to the NOA recommendations, SPEN acting on behalf of the SPT, is undertaking further detailed studies including this Routeing Study to develop the Project. For further information about the Project reference should be made to the Need Case document³.

1.3 SP Transmission's Statutory Duties and Licence Obligations

As the holder of a transmission licence under the Electricity Act 1989 ('the Act'), SPT is subject to a number of statutory duties and licence obligations. These include a requirement "to develop and maintain an efficient, coordinated and economical system of electricity transmission". SPT is also required to provide for new electricity generators wishing to connect to the transmission system in its licence area; to make its transmission system available for these purposes and to ensure that the system is fit for purpose through appropriate reinforcements to accommodate the contracted capacity. In addition, in formulating transmission proposals, SPT is subject to duties under Schedule 9 of the Act: "(a) to have regard to the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features of special interest and of protecting sites, buildings and objects of architectural, historic or archaeological interest; and, (b) to do what it reasonably can to mitigate any effect which the proposals would have on the natural beauty of the countryside or on any such flora, fauna, features, sites, buildings or objects." These statutory duties and licence obligations underpin how SPEN approach the development of new electricity transmission infrastructure from network reinforcements to grid connections with the objective of ensuring that it is technically feasible, economically viable and on balance, causes the least disturbance to both the environment and the people who live, work and enjoy recreation within it.

³ Refer to SPEN's Denny to Wishaw 400kV Reinforcement Need Case document (www.dennywishaw.co.uk)



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PROJECT

DENNY TO WISHAW NETWORK UPGRADE

CLIENT

SP Energy Networks

KEY

- – Approximate Network Boundary
- Substation Location

SPT Network

- 132kV
- 275kV
- 400kV
- SP Transmission

TITLE

FIGURE 1 EXISTING TRANSMISSION IN CENTRAL SCOTLAND

REFERENCE CU_210506_CD_1_v2

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1.4 The Development and Consenting of the Project

The Project⁴ will comprise the following key phases:

- Phase 1. Routeing and Consultation. Phase 1 comprises a routeing study in which alternative Route Options for the New-build OHL between Bonnybridge Substation and Glenmavis have been identified and assessed taking into account a range of environmental, technical and economic routeing considerations. It concludes with the identification of a preferred Route Option which is then subject to consultation (referred to as Phase 1 Consultation). Responses to the consultation will be evaluated and inform confirmation of a proposed route to be taken forward to Phase 2. This RCD relates to Phase 1 but also provides information about the Uprated OHL between Denny North and Bonnybridge Substations.
- Phase 2. Detailed Route Design and Environmental Impact Assessment (EIA). The Project, comprising both the New-build OHL and Uprated OHL between Denny North and Bonnybridge Substations and substation works will require to be subject to EIA under the Electricity Works (EIA) (Scotland) Regulations 2017. The EIA process will seek to avoid, prevent or reduce and if possible, offset likely significant adverse effects of the Project on the environment through an iterative design process. The EIA process comprises a number of steps starting with scoping and concluding with the production of an EIA Report which will accompany the applications for consent. During this phase SPEN will also undertake a second round of public consultation (referred to Phase 2 Consultation) on the detailed design of the proposed New-build OHL and the Uprated OHL between Denny North and Bonnybridge Substations.
- Phase 3. Applications for Consent. SPEN will be applying to the Scottish Ministers for consent under section 37 of the Electricity Act 1989, to install, and keep installed, the proposed New-build OHL. An additional section 37 application will also be required for the proposed Uprated OHL between Denny North and Bonnybridge Substations. The EIA Report will accompany both applications for section 37 consent. At the same time, SPEN will also apply to Scottish Ministers for deemed planning permission under Section 57(2) of the Town and Country Planning (Scotland) Act 1997, for the New-build OHL and separately for the Uprated OHL between Denny North and Bonnybridge Substations and ancillary development.

As described in section 1.1, the Project also includes uprating of OHLs between Denny North and Easterhouse, Newarthill and Wishaw Substations as well as works at the substations. The uprating of the existing OHLs from 275 kV to 400 kV will require new conductors (wires) and electrical insulators to be placed on the existing towers and along existing routes. These uprating and substation works do not involve significant new build, will be carried out in advance of the New- build OHL and Uprated OHL between Denny North and Bonnybridge Substations and are not included in the Phase 1 Consultation. However, the uprating and substation works will be subject to their own consultation as well as EIA and applications for section 37 consent and deemed planning permission.

1.5 Purpose and Structure of this Document

The primary purpose of this RCD is to report on Phase 1 of the Project; the routeing study which has been undertaken and the preferred Route Option which has been identified for the New-build OHL between Bonnybridge and Glenmavis. It also provides information on the uprated OHL between Denny North and Bonnybridge Substations. The RCD has been published in parallel with the start of public consultation on Project. The objective of this is to seek feedback on the preferred Route Option from statutory and non-statutory consultees as well as local communities and use this feedback to inform subsequent stages of the Project.

⁴ Those part of the Project comprising the New-build OHL, Uprated OHL between Denny North and Bonnybridge Substations and substation works.

The structure of the RCD is set out below. It describes the approach taken to identifying and assessing alternative Route Options in a clear, systematic manner in accordance with SPEN's statutory duties and licence obligations and taking into account industry-recognised approaches to the routeing of OHLs.

Section	Description	
1. Introduction	Provides an introduction to the Project, SPEN's statutory obligations and an outline of the purpose and structure of the Report.	
2. Project Description	Provides an overview of the New-Build and Uprated OHL and their key physical components including details of construction requirements.	
3. Approach to Routeing	Describes SPEN's general approach to the routeing following established practices and sets out the approach to the Project.	
4. The Study Area	Identifies and describes the Study Area in which the routeing study is undertaken as well as key constraints or features within it.	
5. The Routeing Strategy	Describes the Project-specific Routeing Strategy applied to the identification and assessment of alternative Route Options.	
6. Route Corridors	Describes the identification and assessment of alternative Route Corridors within the Study Area.	
7. Route Options	Describes the identification and assessment of alternative Route Options within the Study Area.	
8. The Preferred Route Option	Identifies and describes the Preferred Route Option including the reasons for its selection.	
9. Next Steps	Describes the key next steps in the Project including consultation on the Preferred Route Option as well as subsequent stages.	

2. Project Description

2.1 Introduction

This section provides a brief description of the infrastructure which would be required for the DWNU Project. As described in the previous section, the Project comprises two main components, namely the uprating of existing OHLs from 275 kV to 400 kV and construction of new 400 kV OHL. This section focuses on the latter. It should be noted that given the early stage in the Project's development, this information is not confirmation of a final design, however, it is considered appropriate for the purposes of the routeing study and to inform the first round of consultation. A second round of pre-application public consultation will be undertaken to consult on the detailed design of the proposed New-build OHL and Uprated OHLs, including further details on ancillary works such as substation works, construction access tracks and construction areas.

2.2 New-build Overhead Line – Typical Infrastructure Requirements

Overview

OHLs transmit electricity by conductors (or wires) which are suspended at a specified height above ground and supported by wood poles or steel lattice towers, spaced at intervals. The conductors can be made of aluminium or steel strands. Most OHLs operating at 132 kV and above carry two 3-phase circuits, with one circuit strung on each side of a tower. An earth wire may also be required to provide lightning protection. The conductors are strung from insulators attached to the lower cross-arms and prevent the electric current from crossing to the tower. As the Project will operate at 400 kV the OHL will be comprised of steel lattice towers. It is expected that the OHL will be carried on L8 towers. A typical L8 tower is shown in Figure 2.

Steel Tower Types

There are three types of tower which may be required at various points along the Project's New-build OHL route:

- Suspension or Line Tower: these typically form most of an OHL route and are used where the tower is part of a straight-line section of the OHL route;
- Tension or Angle Tower: these are used where an OHL route changes direction where there is a horizontal or vertical deviation. There are three main types of angle tower:
 - 30 degrees,
 - 60 degrees and
 - 90 degrees.
- Terminal Tower: these are used when an OHL terminates at a substation or on to an underground cable section via a separate cable sealing end compound or platform.

Steel Tower Heights and Span Lengths

As noted above the Project is expected to utilise an L8 steel tower. These have a standard design height of 46 m, however, this can vary up to approximately 63 m according to the electrical safety clearance to the ground, which may be a factor when crossing areas such as roads or raised areas of ground.

The distance between adjacent OHL towers, known as the 'span length', is approximately 300 m but can be increased to up to a maximum 350 m if there is a requirement to span an obstacle such as a loch.

Steel Tower Appearance

Steel towers are constructed from galvanised steel and typically grey in colour which becomes duller over time (approximately 18 months). The shade of grey is not distinguishable at distance and normally appears as grades of light and dark. Where towers are viewed against the sky, colour cannot be relied upon to diminish visibility, since the lighting characteristics of the sky vary greatly.

2.3 New-build Overhead Line – Typical Construction Requirements

Overview

The construction of OHLs follows a well-established process. As well as the OHL it also requires additional temporary land-take and infrastructure, for example temporary accesses to tower locations and temporary construction compounds to store materials.

Construction

Key phases of construction comprise the following activities:

- Tree felling or lopping (where required);
- Preparation of accesses;
- Excavation of foundations;
- Tower delivery;
- Erection of towers;
- Delivery of conductors and stringing equipment;
- Insulator and conductor erection and tensioning; and
- Clearance and reinstatement.

The total duration of construction activity at any single tower site is approximately two weeks for tower foundations, one to two weeks for tower construction, and up to four weeks for conductor erection and stringing depending on the size of the tower and the number of the conductors to be strung. These periods are spread over about four months, with periods of inactivity between, or longer if construction difficulties are experienced elsewhere along the line or ground conditions prevent normal progress. The construction period for wood pole lines is normally less than for tower lines.

Prior to constructing the OHL, temporary accesses will be constructed, as necessary, and laydown /storage areas established, usually mid-way along the route. Any trees which may impact on safety clearances will be removed or lopped. Following commissioning of the OHL, all equipment and temporary access of construction areas will be removed with the land being reinstated to its former use/condition.

Operation and Maintenance

OHLs require minimal maintenance. The condition of tower steelwork and foundations is monitored regularly, periodic painting of the tower steelwork may be required, and components are regularly inspected for corrosion, wear and deterioration. Towers which have deteriorated significantly may be

dismantled carefully and replaced. There is also an ongoing requirement to ensure that any vegetation within proximity to the OHL does not impact on safety clearances.

Decommissioning

If an OHL line is to be decommissioned, steel towers will be removed with components re-used where possible. Foundations are removed to a minimum depth of approximately 1m below ground level, the area around the base of the tower is cleared and the ground reinstated.

2.4 Uprated Overhead Line – Typical Construction Requirements

Overview

The existing OHL between Denny North and Bonnybridge Substations was constructed circa 1975 and is supported on the L8 steel tower design, similar to that which is proposed for the New-build OHL described in section 2.2. This tower design can support OHLs operating at a voltage of either 275 or 400kV.

The existing towers carry twelve conductors and an earth wire. Each conductor is joined to the tower cross arm via an insulator string (comprising glass/polymer dishes). The conductors and earth wire will not require to be replaced in order to facilitate the upgrade of the line to 400kV. However, the insulators will need to be replaced to allow for the increased clearances required for the increased voltage of the line⁵. A typical L8 tower is shown in Figure 2.

Construction

The uprating of the existing OHL will comprise of the following activities:

- Delivery of conductors and stringing equipment;
- Insulator and conductor erection and tensioning; and
- Clearance and reinstatement.

Prior to uprating the OHL, temporary accesses will be constructed, as necessary, and laydown /storage areas established, usually mid-way along the route.

Linesmen will climb each tower and attach a pul-lift from tower crossarm to conductors. This allows the existing insulator to be unbolted before being lowered to the ground using a tractor and winch. The tractor and winch are then used to lift the new insulator on to the tower cross arm before being attached to the cross arm and conductors. Once the new insulator is in place, the pul-lift is removed. This process is then repeated for the remaining insulators on the tower.

Following commissioning of the OHL, all equipment and temporary access of construction areas will be removed with the land being reinstated to its former use/condition.

⁵ Insulators prevent electricity from arcing (jumping) from live conductors to the steel body of the tower.





View of existing L8 Overhead Line Tower near Bonnybridge



View of existing L8 Overhead Line Tower near Bonnybridge



PROJECT

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CLIENT

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KEY

TITLE FIGURE 2 STANDARD L8 OVERHEAD LINE TOWER

REFERENCE CU_210506_CD_2_v1

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3. Approach to Routeing

3.1 Approach to Overhead Line Routeing

SPEN's Approach to Overhead Line Routeing

In 2015, as part of a wider industry review involving Government and the Office of Gas and Electricity Markets (Ofgem), SPEN reviewed its approach to routeing. This review concluded that the requirement to balance statutory duties and licence obligations comprising economic, technical and environmental factors continues to support the development of an OHL in most circumstances. However, SPEN also concluded that there are certain circumstances in which development of an underground cable (UGC) should be considered.

SPEN undertook a further review of their approach in 2020 as part of preparing their RIIO-T2⁶ Business Plan which reaffirmed these conclusions. As part of the review SPEN consulted on and published an updated version of '*Major Infrastructure Projects: Approach to Routeing and Environmental Impact Assessment*⁷⁷ which describes their general approach to routeing new electricity transmission infrastructure.

The basic premise of the approach set out by SPEN is that the main effect of an OHL is visual and that the degree of visual impact can be reduced by careful routeing; for example by using topography and trees to provide screening and/or background to the OHL and by routeing the OHL at a distance from settlements and roads. In addition, OHL routeing takes into account other environmental and technical considerations and will avoid, wherever possible, the most sensitive and valued natural and man-made features.

Established Practice for Overhead Line Routeing

In 1959, Lord Holford, then advisor to the Central Electricity Generating Board (CEGB), developed a series of guidelines with regard to the routeing of high voltage OHLs which have subsequently become known as the "Holford Rules" ('the Rules'). It is generally accepted across the industry that the Rules should continue to inform the routeing of high voltage OHLs. The Rules were reviewed in the early 1990s by the National Grid Company (NGC) Plc. (now National Grid Electricity Transmission (NGET)) with notes of clarification added to update them and reflect up to date circumstances. A subsequent review of the Rules including the NGC clarification notes was undertaken by Scottish Hydro Electric Transmission Limited (SHETL) (now SHE Transmission plc) in 2003 to reflect Scottish circumstances. A copy of the Rules as well including notes added through subsequent reviews by NGC, SHETL and most recently by SPEN is contained in Appendix A.

The basic premise of SPEN's general approach outlined above draws on the Rules including avoidance of areas of highest or high amenity value where possible as well as consideration of landform, topography and vegetation in order to reduce landscape and visual effects.

⁶ RIIO-T2 is the current price control and runs from April 2021 to March 2026. RIIO stands for 'Revenue = Incentives + Innovation + Outputs'. It's a framework used by Ofgem to ensure that network companies, like SPEN, provide a safe and reliable service, value for money, maximise performance, operate efficiently, innovate and ensure the resilience of their networks for current and future customers.

⁷ Link to updated routeing guidance to be added here ((www.dennywishaw.co.uk)

General Routeing Considerations

In line with SPT's statutory duties and licence obligations and drawing upon established practice, routeing considerations comprise environmental, technical and economic factors. The routeing considerations inform the identification and assessment of Route Options ensuring that it is both robust and transparent.

Routeing considerations also take account of the guidance contained in the Holford Rules and relevant notes or clarifications. In identifying routeing considerations which are relevant to the Project and study area (defined in section 4) the Rules and relevant notes or clarifications have been interpreted and applied to the routeing study.

The Rules are broadly hierarchical with Rules 1 and 2 placing considerable emphasis on avoiding areas of the highest or high amenity value. Rule 1 advises that routes should avoid major areas of the highest amenity value where possible and Rule 2 that routes should avoid smaller areas of high amenity value by deviation.

The term "amenity" has generally been interpreted as designated areas or sites of scenic, landscape, nature conservation, scientific, architectural or historical interest. This is consistent with SPT's duties under Schedule 9 to the Electricity Act 1989. For the purposes of this study, the term 'amenity' has been replaced by 'environmental' to more appropriately reflect the intrinsic environmental, social and cultural value of such designated areas.

The review undertaken by SHETL in 2003 provides examples of areas "highest" or "high" amenity or environmental value and states that such areas "*require to be established on a project-by-project basis considering Schedule 9 of the Electricity Act 1989*". For the purposes of this study, such areas are considered to be strategic routeing considerations and include international and national designations such as sites designated for nature conservation or heritage designations.

The Rules do not identify what constitutes "*major areas*" or "*smaller areas*" but indicate that consideration should also be given to the spatial extent of areas of highest or high amenity or environmental value. Value is not considered to be related to the size of an area, so for the purposes of this study this has been interpreted as the extent to which areas of the highest or high amenity or environmental value are avoidable in routeing.

The notes and clarifications provide guidance with regard to areas of moderate or low amenity or environmental value noting that regional or local areas or sites should be identified from development plans. For the purposes of this study, such areas are considered to comprise detailed routeing considerations and include local wildlife sites or reserves, woodland and outdoor recreational areas such as country parks.

While the Rules do not address residential areas, the subsequent notes and clarifications provide guidance stating "avoid routeing close to residential areas as far as possible on grounds of general amenity". For the purposes of this study, settlements have been defined as areas of the highest amenity or environmental value and are therefore a strategic routeing consideration. Smaller clusters or individual properties are considered to be a deviation issue or a detailed routeing consideration.

Rules 3, 4, 5 and 6 highlight the importance of considering landscape and visual matters in routeing including giving consideration to landscape character including sensitivity to OHLs, the use of landform and woodland to reduce visual intrusion or prevent skylining and the presence of other OHLs and the potential to create 'wirescapes'. For the purposes of this study, landscape and visual considerations have informed the identification of Route Options taking account of considerations described above.

Specific technical or economic considerations are not identified in the Rules or notes and clarifications, however, these form part of SPT's statutory duties. For the purposes of this study this includes the directness of Route Options as well as matters affecting SPEN's ability to build, operate and maintain

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an OHL within the Route Options identified, for example taking account of existing electricity transmission or distribution infrastructure, topography, side slope gradients, altitude, ground conditions and accessibility.

3.2 Routeing Methodology

Overview of Approach to Routeing

The approach to identifying and assessing alternative Route Options for the Project is illustrated below in Figure 3. It follows SPEN's approach and draws upon established practice ensuring that it is robust and transparent. It is a systematic and iterative approach in which an increasing level of detail is applied at each step concluding with the identification of a preferred Route Option to be subject to consultation.

There are broadly three key activities, firstly informed by steps 1 to 3, the definition of a routeing strategy specific to the Project, secondly in steps 4 to 5 the identification and assessment of route corridors and finally the identification of Route Options within them in steps 6 and 7. Route corridors are necessarily larger taking account of strategic routeing considerations while Route Options are defined taking account of detailed routeing considerations. Steps 4 to 7 ensure that route corridors and options are tested and refined taking into account the Routeing Strategy as well as feedback received from consultation with key stakeholders.



Figure 3 Routeing Methodology

Project Routeing Objective

The first step in the approach has been to identify a Project Routeing Objective which takes account of SPT's statutory duties and licence obligations. In accordance with SPEN's overall approach to routeing, the Routeing Objective for the new-build OHL between Bonnybridge and Glenmavis is "*To identify a technically feasible and economically viable 400 kV overhead line route between Bonnybridge*

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Substation and an appropriate tie-in point on the existing overhead line route from Easterhouse to Newarthill which causes, on balance, least disturbance to the environment of the study area and the people who live, work and enjoy recreation within it."

Stakeholder Engagement

At key stages during the Routeing Study, focused consultation has been undertaken with statutory stakeholders through a Statutory Stakeholder Liaison Group (SSLG). It comprises representatives from the Scottish Government Energy Consents Unit (ECU), North Lanarkshire and Falkirk Councils, Historic Environment Scotland (HES), NatureScot, the Scottish Environment Protection Agency (SEPA) and Scottish Forestry. The purpose of the SSLG was to provide information to statutory stakeholders as well as seek feedback on:

- The approach to routeing, in particular regarding specific routeing constraints or considerations which stakeholders wished to see addressed as part of the routeing strategy;
- The Route Options identified in order to identify and address potential constraints or concerns as part of an iterative approach to refining Route Options; and
- The emerging preferred Route Option in order to explain the rationale for its selection and seek feedback on potential concerns to be addressed in taking it forward.

4. The Study Area

4.1 Overview

This section describes the identification of the study area and routeing considerations within it as set out in Steps 2 and 3 of the routeing methodology illustrated in Figure 3. This takes into account established approaches to OHL routeing described in the previous section including SPEN's approach to routeing as well as the guidance contained in the Rules.

4.2 Description of the Study Area

The extents of the Study Area, illustrated in Figure 4, have been informed by a combination of desk and field-based analysis coupled with an understanding of the need to balance potential adverse environmental effects with technical feasibility and economic viability.

The northern and southern boundaries of the Study Area are defined by the existing infrastructure into which the New-build OHL will connect. As such the northern boundary is defined by the existing Bonnybridge Substation where potential Route Options would start. The southern boundary is defined by the section of the existing Easterhouse to Newarthill OHL which is routed west to east (north of Coatbridge and Airdrie) where potential Route Options would end. The eastern boundary of the Study Area has been defined by the southwest edge of the settlements of Falkirk and Shieldhill and consideration of the potential length and directness of potential Route Options. The western boundary of the Study Area has been defined by the settlements of Cumbernauld and Glenboig.

The landscape character of the Study Area is variable, with a series of large-scale open plateau moorland and forestry, interspersed with smaller scale rolling agricultural and settled lowlands. There is also a strong influence of former mineral workings and development throughout the Study Area and particularly in the south towards Airdrie.

This is a relatively well settled landscape, with a mix of larger towns (Falkirk & Bonnybridge, Cumbernauld, Airdrie) along the fringes of the Study Area, numerous small villages (Slamannan, Greengairs and Glenmavis) and a range of scattered farms and individual houses throughout. There is generally a greater concentration of settlement within the north, west and south of the Study Area, with the central and eastern areas generally more sparsely settled and limited to individual properties or small clusters of properties.

There is an extensive network of roads throughout the Study Area, including the A73 which cuts northsouth across the west of the area providing a connection between the M80 and Cumbernauld in the north and Airdrie and the M8 to the south. Other A and B class roads cross the Study Area providing connections to the smaller villages, with a series of smaller unclassified roads and tracks leading to scattered farms and individual properties.

Existing electrical infrastructure is also an existing feature throughout the Study Area and includes OHLs between Bonnybridge and Cumbernauld in the west, Bonnybridge and Bathgate in the east, and the Easterhouse to Newarthill OHL in the south. Other notable development includes a number of wind turbines, extensive areas of former mineral workings and a large landfill site to the south of Greengairs.

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Scale





PROJECT DENNY TO WISHAW NETWORK UPGRADE

CLIENT

SP Energy Networks

KEY

- Study Area
- Bonnybridge Substation
- Easterhouse to Newarthill Overhead Line
- Local Authority Boundary

TITLE
FIGURE 4
STUDY AREA

REF	ERENC	E		
CU	_210506_	CD	_4_	v6

SHEET NUMBER of 1

DATE	
06/05/2021	I



4.3 **Project Routeing Considerations**

Overview

In line with step 3 of the routeing methodology illustrated in Figure 3 and described in section 3, routeing considerations within the Study Area have been identified to help inform the Routeing Strategy and the identification and assessment of Route Options. Routeing considerations have been separated into two distinct categories: strategic routeing considerations which inform the identification of Route Corridors and detailed considerations which inform the identification of Route Options.

Full details of strategic and detailed routeing considerations within and adjacent to the Study Area and how they relate to the Rules and subsequent notes are contained in Appendix B.

Strategic Routeing Considerations

Strategic routeing considerations which inform the identification of Route Corridors are illustrated on Figure 5. These comprise large designated sites of international or national importance as well as larger settlements which are considered to be areas of the highest or high environmental value within the Study Area. This includes:

- The Antonine Wall World Heritage Site (WHS) and Scheduled Monument which extends east to west across the north of the Study Area,
- The Battle of Falkirk Inventory Battlefield site to the north of the Study Area immediately south of Falkirk and Camelon,
- The Slamannan Plateau Special Protection Area (SPA) and Site of Special Scientific Interest (SSSI) which occupies a significant area in the centre of the Study Area, and
- The larger settlements of Bonnybridge, Camelon, Cumbernauld and Glen Mavis which are located to the north, west and south of the Study Area.

In addition to the above, there are a number of other designated sites which are considered to be of highest or high environmental value within the Study Area, however, these tend to be smaller in size and more widely dispersed. This does not diminish their importance within the routeing study but does mean when developing larger route corridors they may not be avoidable. Such constraints have been identified and are also illustrated on Figure 5, however, given their scale they may be considered in more detail in the identification of Route Options within the Route Corridors. This includes:

- West Fannyside Moss, Blacklaw Moss and Blawhorn Moss all designated as Special Area of Conservations (SACs) and SSSIs;
- Howierig Muir, Darnrig Moss, Longriggend Moss and North Bellstane Plantation all designated SSSIs;
- A number of scheduled monuments including Roughcastle Fort, Thieves Hill and Avonhead Colliery and Drumbowie Farm; and
- A number of listed buildings including Lochgreen Farmhouse, Fannyside Mill, Luggiebank Bridge, Cleddans House and Glenboig Farm.



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PROJECT

DENNY TO WISHAW NETWORK UPGRADE

CLIENT

SP Energy Networks

KEY

- Study Area Bonnybridge Substation
- Easterhouse to Newarthill Overhead Line
- Listed Building
- Scheduled Monument
- World Heritage Site
- World Heritage Site Buffer Zone
- Inventory Battlefield
- Special Area of Conservation
- Special Protection Area
- Site of Special Scientific Interest
- Settlement / Urban Area (OS Open Data)

TITLE FIGURE 5 STRATEGIC ROUTEING CONSIDERATIONS

REFERENCE CU_210506_CD_5_v6

SHEET NUMBER of 1

Detailed Routeing Considerations

Detailed routeing considerations which inform the identification of Route Options are illustrated on Figure 6. These comprise other sites or features of environmental value as including:

- The Slamannan Plateau / Avon Valley Special Landscape Area (SLA) which occupies a significant area to the east of the Study Area,
- Palacerigg Country Park which is located to east of the Study Area and supports a range of outdoor recreational activities,
- Sites of local or regional ecological importance such as Forest Wood Scottish Wildlife Trust (SWT) Reserve adjacent to Palacerigg Country Park,
- Areas of important environmental features including priority peatland habitats as well as ancient and native woodland sites.
- Areas allocated to future housing development also referred to as Community Growth Areas (CGAs) including two areas to the east of Cumbernauld, and
- Individual and small clusters of residential properties including a 150 m trigger for consideration zone around them to enable consideration of proximity to Route Options⁸.

In addition to sites or features of environmental value, consideration has also been given to potential technical or engineering constraints that could influence Route Options. This includes existing or planned infrastructure as well as physical natural and man-made constraints such as topography or elevation, slope, ground conditions and watercourses as well as existing utilities, roads and railways. Detailed routeing considerations present within the Study Area include:

- Elevations are generally below 200m Above Ordnance Datum (AOD), however, an east to west ridgeline is present in south from Greengairs to Blackridge where elevations are up to 230mAOD.
- Much of the study area is flat or gently sloping, however, some moderately steeper slopes are present to the north as land rises from the railway lines and canal.
- The underlying ground conditions are mainly comprised of till but also include areas of peat deposits which generally coincide with priority peatland habitats.
- There are a small number of waterbodies within the Study Area including lochs and reservoirs as well as the River Avon which flows east from the Slamannan Plateau.
- The Forth and Clyde Canal crosses the north of the Study Area in a broadly east to west direction; the Falkirk Wheel is to the immediate east of the Study Area.
- Transport infrastructure includes the Edinburgh-Glasgow and Dunblane-Glasgow railway lines as well as a small number of A and B class roads and unclassified local roads.
- Existing transmission and distribution OHLs to the north and west of the Study Area including two 132 kV OHLs within the northern part of the Study Area,
- Existing and planned wind farms to the south of the Study Area including standoff distances from wind turbines (based on three times rotor diameter).
- Proposals for the East Airdrie Link Road which is currently being developed in the south of the Study Area.

⁸ 'Trigger for consideration' zones have been used to identify areas within which there may be potential for effects on individual residential properties which should be considered during the routeing stage.



Initials⁻

Coordinate System: British National Grid



PROJECT

DENNY TO WISHAW NETWORK UPGRADE

CLIENT

SP Energy Networks

KEY

- Study Area
- Bonnybridge Substation
- Easterhouse to Newarthill Overhead Line
- Listed Building 0
- Wind Turbine Location
- Wind Turbine Location 3x Rotor Buffer
- Existing Transmission and Distribution Infrastructure
- Allocated Housing Site

Potential Residential Property 150m Trigger for Consideration

- Palacerigg Country Park
- Special Landscape Area
- Scottish Wildlife Trust Reserve
- Ancient Woodland
- Native Woodland

East Airdrie Link Road (Indicative Route Options):

-	A1
-	B1
•	 C1



FIGURE 6 DETAILED ROUTEING CONSIDERATIONS

REFERENCE		
CU_210506_CD_6_v6		
SHEET NUMBER		

1 of 3



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Coordinate System: British National Grid





PROJECT

DENNY TO WISHAW NETWORK UPGRADE

CLIENT SP Energy Networks

KEY

- Study Area
- Bonnybridge Substation
- Easterhouse to Newarthill Overhead Line
- Listed Building 0
- Wind Turbine Location
- Wind Turbine Location 3x Rotor Buffer
- Existing Transmission and Distribution Infrastructure
- Allocated Housing Site

Potential Residential Property 150m Trigger for Consideration

- Palacerigg Country Park
- Special Landscape Area
- Scottish Wildlife Trust Reserve
- Ancient Woodland
- Native Woodland

East Airdrie Link Road (Indicative Route Options):

	A1
-	B 1
	C1



TITLE FIGURE 6 DETAILED ROUTEING CONSIDERATIONS

REFERENCE		
CU_210506_CD_6_v6		

SHEET NUMBER 2 of 3



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PROJECT

DENNY TO WISHAW NETWORK UPGRADE CLIENT

SP Energy Networks

KEY

- Study Area
- Bonnybridge Substation
- Easterhouse to Newarthill Overhead Line
- Listed Building 0
- Wind Turbine Location
- Wind Turbine Location 3x Rotor Buffer
- Existing Transmission and Distribution Infrastructure
- Allocated Housing Site

Potential Residential Property 150m Trigger for Consideration

- Palacerigg Country Park
- Special Landscape Area
- Scottish Wildlife Trust Reserve
- Ancient Woodland
- Native Woodland

East Airdrie Link Road (Indicative Route Options):

 A1
 B1
 C1



TITLE FIGURE 6 DETAILED ROUTEING CONSIDERATIONS

REFERENCE			
CU_210506_CD_6_v6			
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5. **Project Routeing Strategy**

5.1 Overview

The Project Routeing Strategy has been developed taking into account the routeing objective identified in section 3 and the routeing considerations identified in section 4. The purpose of the Project Routeing Strategy is to ensure a consistent approach to identifying and assessing Route Options leading to a preferred Route Option while ensuring that appropriate thought is given to balancing the routeing considerations which have been identified.

Given the wide range of routeing considerations which are present within the Study Area, the routeing strategy is necessarily broad. This reflects the areas of highest or high environmental value which are present including the Antonine Wall WHS, Slamannan Plateau SPA and settlement as well as taking account of landscape noting that the primary effects of an OHL are likely to be landscape and visual. The location and extent of areas of environmental or amenity value as well as the spread of settlement and dispersed nature of individual properties across large parts of the Study Area will require a careful balance to be struck between avoiding such areas and minimising, as far as possible, impacts on people.

5.2 **Project Routeing Strategy**

Route Options will be developed such that they:

- Are as direct as possible between Bonnybridge Substation and the Easterhouse to Newarthill OHL recognising the grain of the intervening landscape and responding to the contrast between the smooth plateau moorland to the east and the well-established fabric of the farmed and settled lowlands to the west;
- Minimise, as far as possible, potentially adverse effects on residential and visual amenity by taking account of the pattern and distribution of settlement and individual/clustered properties apparent across large parts of the Study Area;
- Cross the Antonine Wall WHS including its buffer zone at an appropriate location which takes account of its Statement of Outstanding Universal Value (SOUV) recognising that the Wall is one of the significant elements of Roman Limes in Europe and an outstanding example of the technological development of Roman military architecture and frontier defence marking the maximum extent of the power of the Roman Empire in the British Isles;
- Minimise, as far as possible, potentially adverse effects on Rough Castle Fort Scheduled Monument and its setting through careful routeing;
- Avoid, as far as possible, crossing the Slamannan Plateau Special Protection Area (SPA) also taking into account the potential for functionally linked habitats to be present as well as known flight lines or movements of the site's qualifying species;
- Minimise potential direct and indirect effects on:
 - all other statutory and non-statutory sites within the Study Area;
 - habitats and protected species;
 - recreational and access routes.
- Minimise, as far as possible, potentially adverse effects on the amenity of users of Palacerigg Country Park by taking account of the key landscape features and structure of the Country Park including the existing and proposed uses as well as the key views;

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• Take account of existing and planned land use and infrastructure as far as possible including extension of settlements, proximity to existing overhead lines and wind farms as well as proposals for the East Airdrie Link Road.

6. Identification & Appraisal of Route Corridors

6.1 Identification of Route Corridors

This section describes the identification and assessment of route corridors as set out in steps 4 and 5 of the routeing methodology illustrated in Figure 3. This takes into account the strategic routeing considerations identified in section 4 and Appendix B as well as the routeing strategy.

Given the scale and nature of the environmental constraints in the Study Area and the areas of highest environmental value (including Antonine Wall WHS, Forth and Clyde Canal and Rough Castle Fort Scheduled Monuments and the Slamannan Plateau SPA), two route corridors have emerged around the SPA. Due to their linear nature, the WHS and Scheduled Monuments extend across the entire Study Area from east to west and are unavoidable, however, the SPA occupies an area of land in the central portion of the Study Area to the east of Cumbernauld and west of the settlement of Slamannan. This has resulted in two route corridors as shown on Figure 7.

The route corridors flex in width taking account of the strategic routeing constraints and opportunities to develop Route Options within them. As highlighted in section 4 the nature of some constraints means that areas of high or highest environmental value are located within the route corridors. This is not because their importance is reduced but takes account of their size and opportunities to avoid them in developing more detailed Route Options.

6.2 Appraisal of Route Corridor A

Route Corridor A exits Bonnybridge Substation in a southern direction towards open land between the settlements of Bonnybridge (to the west) and Camelon (to the east). The Route Corridor requires to cross a number of features or constraints including the A803, Forth and Clyde Canal, Glasgow-Dunblane and Edinburgh-Glasgow railway lines as well as the Antonine Wall WHS and Scheduled Monument (SM). These features or constraints are all linear broadly extending east to west meaning that they cannot be avoided by the Route Corridor.

Once south of the Antonine Wall, Route Corridor A bears south west traversing land to the west of the Slamannan Plateau SPA. The Route Corridor is contained to a narrow section of land comprising a mix of open moorland and forested areas which are bounded to the east by the SPA and to the west by the settlement of Cumbernauld. It continues on a south western trajectory crossing Palacerigg Country Park and the southernmost extents of the SPA.

Once south of the SPA, the Route Corridor extends out to the east/south east comprising a large area enabling the development of Route Options which could connect to the existing Easterhouse to Newarthill OHL anywhere along its route from east of Glenboig to east of Airdrie.

6.3 Appraisal of Route Corridor B

Route Corridor B follows the same direction as that described for A from Bonnybridge Substation and crossing the A803, Forth and Clyde Canal, Glasgow-Dunblane and Edinburgh-Glasgow railway lines as well as the Antonine Wall WHS and Scheduled Monument. South of the Antonine Wall Route Corridor B diverges continuing south to the east of the Slamannan Plateau SPA.

Route Corridor B continues to follow a southern direction occupying a narrow stretch of land between the SPA to the west and Darnrig Moss SSSI and the settlement of Slamannan to the east. This section of the Route Corridor extends into the western most extent of the Slamannan Plateau / Avon Valley SLA.

Once south of the SPA Route Corridor B converges with A extending to the west/south west. As described above this comprises a large area enabling the development of Route Options which could connect to the existing Easterhouse to Newarthill OHL anywhere along its route from east of Glenboig to east of Airdrie.

6.4 Conclusions

With the exception of the Antonine Wall WHS which cannot be avoided, Route Corridors A and B provide opportunities to avoid other areas of the highest or high environmental value. They are routed west and east of the Slamannan Plateau SPA respectively and avoid directly crossing the designated site. However, this means that Route Corridor A is closer to larger areas of settlement in the west while Route Corridor B crosses fields in the east which are regularly used by bean geese, the qualifying features of the SPA. In the context of the strategic routeing considerations described in section 4, both route corridors are considered to be comparable without one offering a distinct environmental or engineering advantage over the other. As a result, it was concluded that both route corridors should be taken forward to step 6 with Route Options developed within each and subject to more detailed assessment.



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Coordinate System: British National Grid



PROJECT

8

DENNY TO WISHAW NETWORK UPGRADE

CLIENT

SP Energy Networks

KEY

- Study Area Route Corridor A
- Route Corridor B
- Bonnybridge Substation
- Easterhouse to Newarthill Overhead Line
- Scheduled Monument
- World Heritage Site
- World Heritage Site Buffer Zone
- Inventory Battlefield
- Special Area of Conservation
- Special Protection Area
- Site of Special Scientific Interest

TITLE FIGURE 7

ROUTE CORRIDORS

REFERENCE CU_210506_CD_7_v6

SHEET NUMBER 1 of 1

7. Identification & Appraisal of Route Options

7.1 Identification of Route Options

This section describes the identification and assessment of Route Options as set out in step 6 of the routeing methodology illustrated in Figure 3. Route Options have been developed within the Route Corridors described and illustrated in Section 6. The identification and appraisal of Route Options has been informed by desk-based studies using GIS and field work, combined with professional judgement taking into account detailed routeing considerations identified in section 4 and Appendix B as well as the Routeing Strategy set out in section 5.

7.2 Description of Route Options

The Route Options have been grouped to simplify the reporting based on geographic areas within the Route Corridor and are supported by Figure 8 (sheets 1-3). Each of the Route Options has been given a numerical and alphabetical reference and are shown on Figure 8 and described below moving north to south.

Bonnybridge Substation to Slamannan Plateau North

Four Route Options have been developed from the Bonnybridge substation to the north of the Slamannan Plateau (refer to Figure 8). All of these options have to cross a number of technical constraints including the Forth and Clyde Canal (also a Scheduled Monument) and two railway lines. There are also key environmental constraints in this section which are unavoidable due to their linear nature extending east to west across the entire Study Area. These are the Antonine Wall WHS and the Antonine Wall and Rough Castle Fort SM.

All four Route Options lie within the Lowland River Valleys Landscape Character Type (LCT) and the more local character area of the Lower Carron/Bonny Water which are characterised by the Forth valley floodplain and the densely settled urban fringe of Falkirk, Denny and Bonnybridge. This is a relatively large-scale landscape with the topography rising from the flat valley floor in the north to the wooded corridor around the Antonine Wall and beyond to the Slamannan Plateau in the south.

All four Route Options extend in a southerly direction crossing the above assets. Route Option 1a takes the most easterly route, to the immediate west of the Falkirk Wheel. Route Option 1b parallels the existing 132kV OHL and by doing so crosses the eastern corner of the Falkirk Planning Allocation site on the eastern edge of Bonnybridge. Route Option 1c follows the same route as 1b before diverging to the south of the Forth and Clyde Canal and railway corridors, extending to the south-west, away from Rough Castle Fort and closer to High Bonnybridge. Route Option 1d provides an alternative divergence to the southern extent of Route Option 1b.

Slamannan Plateau North to Slamannan Plateau South

Seven different Route Options have been identified within this section of the route corridor which extends across the Slamannan Plateau around the SPA. It is confined to the west by the settlement of Cumbernauld and to the east by the Slamannan Plateau/Avon Valley SLA. These Route Options are shown on Figure 8.

All of the options provide alternative routes around the SPA, minimising effects on views from residential properties and settlement and on the plateau moorland and urban fringe landscapes. There are, however, notable pinch points where it has not been possible to avoid some of the environmental constraints, particularly where Route Options cannot avoid crossing Palacerigg Country Park, due to the surrounding constraints of the SPA and the urban edge of Cumbernauld and the Community Growth Area. To the east of the SPA, Route Options are more limited and substantially constrained by the presence of Bean Geese using the fields to the east of the SPA, the designated SPA itself and the Slamannan Plateau SLA. Together these create a very narrow corridor through which to establish Route Options.

All Route Options initially fall within the Lowland Plateaux LCT but extend extensively across the Plateau Moorlands Landscape Character Area (LCA). This is predominantly a landscape of undulating and rolling plateau landform, moorland vegetation interspersed by scattered properties with medium and large blocks of coniferous forest which form prominent features across the plateau. The overriding character is one of a distinctive upland landscape, created by a combination of elevation, smooth plateau landform, moorland vegetation and occasional scattered settlement. Existing overhead lines are prominent vertical features across this landscape.

Slamannan Plateau South to Easterhouse to Newarthill OHL

Ten Route Options have been identified within this section of the Route Corridor from the southern extents of the Slamannan plateau to the connection with the Easterhouse to Newarthill OHL (refer to Figure 8).

The Route Options to the south of the SPA lie predominantly within the Plateau Moorland LCT and the local character area of the Plateau Moorlands Local Landscape Unit. The south-western section falls within the Plateau Farmland LCT and the Fragmented Farmlands Local Landscape Unit. The overriding character is one of an upland landscape, created by a combination of elevation, smooth plateau landform, moorland vegetation and occasional scattered settlement. This transitions to the south of the Study Area into a more gently undulating landform with pastoral farming, prominent settlements, a regular pattern of scattered properties and former mineral workings.

To the south across the plateau moorland the opportunity for different Route Options opens up, with fewer higher amenity constraints with scattered settlement and infrastructure providing local constraints including Greengairs and Greengairs East windfarms.

7.3 Appraisal of Route Options

Each of the Route Options has been appraised taking account of the routeing strategy and the routeing considerations set out in Appendix B against the following criteria:

- Landscape and Visual Amenity: this includes consideration of landscape character, visual and residential amenity as well as potential wirescape issues.
- Ecology including Forestry: this includes consideration of international, national and local designated sites as well as native woodland and Ancient Woodland Inventory sites.
- Cultural Heritage: this includes consideration of international and national designated heritage and archaeological sites or features.
- Tourism and Recreation: this includes consideration of visitor attractions such as country parks and recreational resources including walking or cycling routes.
- Land Use and Infrastructure: this includes consideration of different land uses including settlement, commercial forestry and industrial or energy uses as well as other infrastructure.

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• Physical Environmental Features and Technical/Engineering Constraints: this includes consideration of elevation and topography as well as watercourses and ground conditions.

The Detailed Route Option analysis and supporting thematic constraints plans are contained in Appendix C and summarised below.

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Scale





PROJECT

DENNY TO WISHAW NETWORK UPGRADE

CLIENT

SP Energy Networks

KEY

- Study Area
- Route Corridor
- -- Route Corridor Section
- Bonnybridge Substation
- Easterhouse to Newarthill Overhead Line

Route Options:

- Section 1
- Section 2
- Section 3
- Listed Building
- Wind Turbine Location
- Wind Turbine Location 3x Rotor Buffer
 - Existing Transmission and Distribution Infrastructure
- Allocated Housing Site
 - Potential Residential Property 150m Trigger for Consideration
- Palacerigg Country Park
- Special Landscape Area
- Scottish Wildlife Trust Reserve
- Ancient Woodland
- Native Woodland

East Airdrie Link Road (Indicative Route Options):

- A1
- **—** B1
- C1

TITLE FIGURE 8 ROUTE OPTIONS

REFERENCE
CU_210506_CD_8_v6
SHEET NUMBER

1 of 3



Coordinate System: British National Grid



PROJECT

DENNY TO WISHAW NETWORK UPGRADE CLIENT

SP Energy Networks

KEY

- Study Area Route Corridor
- -- Route Corridor Section
- Bonnybridge Substation

Route Options:

- Section 1
- Section 2
- Section 3
- Listed Building
- Wind Turbine Location
- Wind Turbine Location 3x Rotor Buffer
 - Existing Transmission and Distribution Infrastructure
- Allocated Housing Site
 - Potential Residential Property 150m Trigger for Consideration
- Palacerigg Country Park
- Special Landscape Area
- Scottish Wildlife Trust Reserve
- Ancient Woodland
- Native Woodland



TITLE FIGURE 8 ROUTE OPTIONS

REFERENCE
CU_210506_CD_8_v6
SHEET NUMBER

2 of 3



Coordinate System: British National Grid

Scale





PROJECT

DENNY TO WISHAW NETWORK UPGRADE

CLIENT SP Energy Networks

KEY

- Study Area
- Route Corridor
- -- Route Corridor Section
- Easterhouse to Newarthill Overhead Line

Route Options:

- Section 2
- Section 3
- Listed Building
- Wind Turbine Location
- Wind Turbine Location 3x Rotor Buffer
- Existing Transmission and Distribution Infrastructure
- Allocated Housing Site
 - Potential Residential Property 150m Trigger for Consideration
 - Palacerigg Country Park
- Special Landscape Area
- Scottish Wildlife Trust Reserve
- Ancient Woodland
- Native Woodland

East Airdrie Link Road (Indicative Route Options):

- A1
- **—** B1

C1



TITLE FIGURE 8 ROUTE OPTIONS

REFERENCE	
CU_210506_CD_8_v6	
SHEET NUMBER	

Bonnybridge Substation to Slamannan Plateau North

All of the Route Options within this section share similar, unavoidable environmental and technical constraints. The linear nature of constraints which extend east to west including the Antonine Wall WHS and Rough Castle Fort Scheduled Monument, the Forth and Clyde canal (also a Scheduled Monument) and two railway corridors all require to be crossed by any route. As a result it is a balance in determining a preferred Route Option which limits potential effects on these constraints which include sites of the highest amenity value within the Study Area.

All options cross parts of the Rough Castle Fort Scheduled Monument, although Route Options 1b and 1c cross parts of the Fort that are likely to be visited most often as a place of interest by members of the public. They are also likely to have most impact on the setting of this heritage asset due to the relatively open nature of the landscape. Route Option 1a is separated from the main part of the Fort by woodland and crosses at a location where the landscape is primarily characterised by regenerating woodland and restored ground with a shallow valley landform. On balance whilst Route Option 1a crosses the largest extent of native and Ancient Woodland, it can use these features to provide separation and partial screening of the Route Option from Rough Castle Fort and from the recreational resource of the Falkirk Wheel.

Route Option 1b parallels the existing 132 kV OHLs and so contributes substantially to cumulative wirescape issues which would not be considered acceptable in heritage or landscape and visual impact terms unless the existing OHLs are undergrounded. Route Option 1b also crosses the eastern corner of a mixed use/housing allocation site to the east of Bonnybridge. On balance Route Option 1a is considered the preferred option in this section of the route corridor.

Slamannan Plateau North to Slamannan Plateau South

The Route Options in this section extend across the Slamannan Plateau either east or west of the SPA. All four options considered in the first section of the strategic route corridor can connect with all of the Route Options considered in this section, so one doesn't need to influence the next.

Due to the constrained nature of the route corridor to the east of the SPA there is only one Route Option (2b) which threads its way across the plateau in between the SPA and Bean Goose fields, avoiding the trigger for consideration zones around the properties scattered across the landscape. Where possible the Route Option uses plantation woodland to partially screen and provide a backcloth to views of the Route Option as it crosses the moorland landscape. Route Option 2b also uses small deviations in alignment to avoid minor ridgelines within the landscape, the high points of which are often occupied by residential properties.

To the west of the SPA, Route Options 2d and 2e cross an open agricultural transitioning to moorland landscape which is sparsely settled with pockets of woodland cover and plantation woodland around its edges which provides varying containment to views experienced from locations around its periphery. The land rises to the south and consequently Route Options 2d and 2e are less elevated than 2c. Route Option 2c parallels the existing 132kV OHL crossing a landscape defined by agriculture and plantation woodland at its eastern extent to moorland and plantation woodland to the west. Aside from a section which passes close to a loose collection of properties at Tippetcraig, it is less settled than the landscape context of 2d and 2e and therefore preferable. However, Route Option 2c crosses the north western corner of the SPA and so consequently is least preferred of the three options. There is little difference in terms of landscape fit between Route Options 2d and 2e, although 2d provides a slightly more direct route.

The subsequent Route Options 2f and 2g continue in a south westerly direction with 2g following the alignment of the existing OHLs through the moorland plateau landscape, thereby concentrating the

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potential wirescape. Route Option 2f takes an alignment that disperses wirescape and follows lower topography to the north of a minor ridgeline through plantation woodland. The woodland backcloth would assist in assimilating parts of this Route Option into the landscape, however, this Route Option also passes in close proximity to the urban edge of Cumbernauld and would increase perception of OHL from the settlement. On balance Route Option 2g is considered to be preferable to 2f.

Taking into account the potential for functionally linked habitats to be present as well as known flight lines or movements of the SPA's qualifying species (Bean Goose) across the Slamannan Plateau, Route Option 2b is considered to be least preferred compared with the options which route to the west of the SPA. Of these options, Route Options 2d and 2g are on balance considered to be the preferred Route Options for traversing the Slamannan Plateau.

Slamannan Plateau South to Easterhouse to Newarthill OHL

All of the Route Options within this section thread routes which are as direct as possible to potential connection points along the Easterhouse to Newarthill OHL. Depending on whether the Route Option provides a continuation from the east or west of the Slamannan Plateau will determine which of the Route Options are followed in this section of the Route Corridor.

A continuation of Route Options to the west of the Slamannan Plateau will result in the unavoidable crossing through Palacerigg Country Park due to the presence of the Community Growth Area to the immediate east of Cumbernauld and the SPA. There are two alternative Route Options. Route Option 3f skirts the northern edge of the Country Park whilst 3e crosses the Park following a north south alignment. While potential effects on the amenity of users of the Country Park would be reduced by Route Option 3f (as it passes through the woodland), effects on landscape features would be increased. Route Option 3f would also be more prominent in views from Cumbernauld as it contours a minor ridgeline before diverting south across the eastern edge of another Community Growth Area. To the south of the Country Park, both options (3e, and 3f (which then continues south as option 3g)) cross minor ridgelines at oblique angles and then follow shallow valley landform, avoiding the increasingly dense pattern of scattered properties before reaching a terminating point along the existing OHL to the north of Glenmavis (Route Option 3i.) To the west, additional Route Options were considered providing a termination point further west along the Easterhouse to Newarthill OHL. These options do not provide further benefit over the Route Options described above as they encroach on various environmental constraints including Ancient Woodland, a SSSI and trigger for consideration zones associated with the increased density of residential properties present across the more settled lowland landscape.

For the continuation of Route Options to the east of the Slamannan Plateau, two principal Route Options have emerged (3a and 3b). Both of these Route Options pass through the extensive restored landscape to the west of Longriggend. Route Option 3b is aligned to the north of this area and 3a takes a less direct route to the south. A series of minor ridgelines run broadly east-west across this substantially modified landscape. Both Route Options avoid high points but Route Option 3a follows a slightly more elevated landform. Route Option 3a is also located to the north of a minor ridge that would provide some visual separation to the settlements of Caldercruix and Plains to the south. Route Option 3b passes to the north of a ridgeline that rises from Greengairs and Wattston and would not benefit to the same degree from topographic screening and separation to these settlements. Both of these options encroach on land subject to planning applications and on existing and proposed wind farm developments. There are two further options to achieve termination points on the Easterhouse to Newarthill OHL, north of Airdrie (Route Options 3c and 3d). Route Option 3d is slightly more preferable with regard to limiting effects on potential visual receptors.

8. The Preferred Route Option

8.1 Overview

This section describes the identification of the preferred Route Option as set out in step 7 of the routeing methodology illustrated in Figure 3. The preferred Route Option for the Project, taking account of the Routeing Objective and Strategy is shown on Figure 9. It comprises the following:

- Bonnybridge Substation to Slamannan Plateau North Route Option 1a
- Slamannan Plateau North to Slamannan Plateau South Route Options 2d and 2g
- Slamannan Plateau South to Easterhouse to Newarthill OHL Route Options 3e and 3i

The preferred Route Option for the New-build OHL will now be subject to consultation (referred to as Phase 1 Consultation). Responses to the consultation will then be evaluated and inform confirmation of a proposed route to be subject to detailed design and EIA.

8.2 The Preferred Route Option

The Routeing Objective was, in summary, to identify a technically feasible and economically viable route while minimising the impact on people and the environment as far as possible. The preferred Route Option is technically feasible and economically viable and, relative to other Route Options, avoids or reduces impacts on the environment and people who live, work and undertake recreational activities in the area as far as possible.

As set out in the Routeing Strategy this includes identifying as direct a route as possible between Bonnybridge Substation and the Easterhouse to Newarthill OHL while taking account of landscape character, residential and visual amenity, designated sites (including the Antonine Wall WHS and Slamannan Plateau SPA) as well as other constraints such as Palacerigg Country Park. The preferred Route Option has been developed and assessed taking account of the routeing strategy as summarised in the following sections.

Bonnybridge Substation to Slamannan Plateau North

The preferred Route Option crosses the Antonine Wall WHS at a location which minimises potential effects on the WHS and takes account of the elements identified in the SOUV as far as possible. It is also routed to the east of Rough Castle Fort Scheduled Monument and uses existing woodland to assist in separating and limiting effects on the setting of the Scheduled Monument. Subsequent development of the route alignment through the EIA stage will enable the towers to be positioned so there is no direct impact on the Scheduled Monuments and that localised areas of shallow landform are used to site the towers thereby reducing their visibility within the Rough Castle landscape. While the more detailed analysis of potential impacts and mitigation requirements will be undertaken as part of the EIA, it is clear from the routeing study that the addition of another OHL within the WHS and setting of the Scheduled Monuments will add to the overall cumulative wirescape. The rationalisation of the wirescape including undergrounding existing lower voltage OHLs is likely to be required in order to appropriately mitigate effects. Furthermore, careful consideration will also be required to minimise direct and indirect effects on unscheduled archaeology of national importance around the Antonine Wall and Rough Castle areas.

The route alignment stage will also provide the opportunity to avoid wherever possible, direct effects on areas of Ancient Woodland where these fall within the preferred Route Option corridor.

Slamannan Plateau North to Slamannan Plateau South

The preferred Route Option in this section avoids crossing the Slamannan Plateau SPA. By routeing to the west of the SPA it avoids impacting the main areas where there is a greater potential for functionally linked habitats to exist as well as known flight lines. Route Options 2d and 2g cross sparsely settled landscapes transitioning from agricultural to moorland plateau, using pockets of woodland and plantation forestry to assist in containing views and as a result are preferred to Route Options 2c and 2f. Route Option 2g is located further away from the settlement edge of Cumbernauld but as a consequence it results in a concentration of wirescape as it parallels the existing OHLs across the plateau landscape. This larger scale, moorland plateau landscape has a reasonable capacity to accommodate this type of development, however, subject to the more detailed analysis of potential impacts and mitigation requirements to be undertaken as part of the EIA, some rationalisation of the wirescape may be required to mitigate landscape and visual effects.

Slamannan Plateau South to Easterhouse to Newarthill OHL

Settlement pattern within this section becomes more concentrated with preferred Route Options 3e and 3i minimising as far as possible, potentially adverse effects on residential and visual amenity. Whilst crossing Palacerigg Country Park is unavoidable due to the presence of the SPA and the settlement edge of Cumbernauld, Route Option 3e provides a route which minimises, as far as possible, potentially adverse effects on the amenity of users of the Country Park using woodland, topography and mature tree planting to assist in partially screening the preferred Route Option. Route Options 3e and 3i avoid the Community Growth Areas and existing and planned land use and infrastructure particularly to the north of Airdrie and to the east of the A73. Where Forest Wood Scottish Wildlife Trust (SWT) Reserve and sections of Ancient Woodland are crossed by Route Option 3e, the route alignment stage, in parallel to the EIA will provide the opportunity to minimise impacts on these resources. The tie in point on the Easterhouse to Newarthill OHL provides the most direct point connecting to an existing angle tower on the OHL whilst minimising potential adverse effects on residential and visual amenity. Whilst Windsor Drive (Pinwinnie Recovery Site) is currently being developed for housing, the development layout has been designed to reflect the existing OHL wayleave and consequently there is a proposed offset between the residential properties and the existing angle tower and preferred tie in point.



Coordinate System: British National Grid



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PROJECT DENNY TO WISHAW NETWORK UPGRADE

CLIENT

SP Energy Networks

KEY

- Study Area
- Route Corridor
- Bonnybridge Substation
- Easterhouse to Newarthill Overhead Line
- Preferred Route Option
- Discounted Route Option

TITLE FIGURE 9 PREFERRED ROUTE OPTION

REFERENCE CU_210506_CD_9_v6

SHEET NUMBER 1 of 3



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PROJECT

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TITLE FIGURE 9 PREFERRED ROUTE OPTION

REF	ERENC	E		
CU	_210506_	CD	9	_v6

SHEET NUMBER 3 of 3

9. Consultation and Next Steps

9.1 The Consultation for the Project

As set out in section 1.4, SPEN will be required to apply to Scottish Ministers for consent under section 37 of the Electricity Act 1989 to install, and keep installed, the proposed New-build OHL. At the same time, SPEN will also apply for deemed planning permission for the proposed New-build OHL and associated works under Section 57(2) of the Town and Country Planning (Scotland) Act 1997.

An additional application for section 37 consent will also be required for the proposed Uprated OHL between Denny North and Bonnybridge Substations. Again, SPEN will also apply to Scottish Ministers for deemed planning permission under Section 57(2) of the Town and Country Planning (Scotland) Act 1997 for this Uprated OHL and ancillary development including works at the substations⁹.

As noted in section 1, the uprating of OHLs between Denny North and Easterhouse, Newarthill and Wishaw Substations as well as works at the substations are being progressed separately and will be subject to their own consultation as well as EIA and applications for section 37 consent and deemed planning permission. These works are not considered further in this RCD.

While there are no formal pre-application requirements for consultation in seeking section 37 consent and deemed planning permission, SPEN is embracing best practice as promoted by Scottish Government Energy Consents and Deployment Unit's and which encourages applicants to engage with stakeholders and the public in order to develop their proposals in advance of such applications being made. SPEN has also embraced Scottish Government Planning Advice Note 3/2010 on Community Engagement. This guidance describes engagement as "giving people a genuine opportunity to have a say on a development plan or proposal which affects them; listening to what they say and reaching a decision in an open and transparent way taking account of all views expressed."

Therefore, prior to the submissions, SPEN will carry out two rounds of consultation with stakeholders and the public. The two rounds are:

- Round One: Public consultation on the preferred Route Option, as detailed in this RCD.
- Round Two: Public consultation on the detailed route alignment of the New Build OHL.

The deadline for receipt of feedback for this Round One consultation will be June 21st, 2021.

Following the submission of applications for Section 37 consent and deemed planning permission, the Scottish Government Energy Consents Unit will, on behalf of Scottish Ministers, carry out further statutory consultation with the public and stakeholders, including both North Lanarkshire and Falkirk Councils.

9.2 Consultation Strategy

SPEN attaches great importance to the effect that its works may have on the environment and local communities and is very keen to hear the views of local people to help it develop the Denny to Wishaw Network Upgrade in the best way.

⁹ The uprating of OHLs between Denny North and Easterhouse, Newarthill and Wishaw Substations as well as works at the substations will be carried out in advance of the New- build OHL and Uprated OHL between Denny North and Bonnybridge Substations and substation works. These will be subject to their own consultation as well as EIA and applications for section 37 consent and deemed planning permission.

The overall objective of the consultation process is to ensure that all parties with an interest in the Project have access to accurate and up to date information and are given clear and easy ways in which to shape and inform SPEN's proposals at the pre-application stage. In addition, it is intended that the key issues identified through this process can be recorded and presented to decision makers in order to assist the consents process.

SPEN has taken steps to identify stakeholders and interested parties prior to the first round of consultation and is committed to continuing engagement with all stakeholders and communities to share our plans, and this will continue to take place at all levels, both during and outside consultation periods.

9.3 Consultees

SPEN has already been consulting statutory stakeholders through its Statutory Stakeholder Liaison Group (SSLG). This group comprises the Scottish Government, NatureScot, the Scottish Environment Protection Agency, Historic Environment Scotland, Scottish Forestry, Falkirk and North Lanarkshire Councils.

To ensure that all other residents and stakeholders potentially affected by the proposals are consulted, SPEN has defined a consultation zone which includes all residential and business addresses within 1 km of the preferred Route Option. Where the boundary of the zone bisects a community, we will extend it to ensure all addresses within that community are included. However, any member of the public (whether living within or outside the consultation zone) will be welcome to participate in the consultation and comment using one of the channels outlined within this document.

The consultation will include the following broad groups:

- Statutory and non-statutory consultees, including community councils;
- Elected members of Falkirk and North Lanarkshire Councils, the Members of Parliament (MP) and Members of the Scottish Parliament (MSPs) whose constituencies are within the consultation zone;
- Approximately 25,000 homes and businesses in the consultation zone;
- Known local interest and community groups operating in the parts of Falkirk and North Lanarkshire affected by the Project; and
- The public in general.

9.4 **Consultation Launch and Duration**

The first round of consultation will run for eight weeks from May 26th to June 21st, 2021.

Prior to the consultation, adverts will appear in local weekly newspapers at least seven days before the first exhibition. A press release will be issued to local media announcing the impending start of the consultation. Information explaining the project and the consultation will be posted out to homes, businesses, and known local interest and community groups within the local area, making them aware of the start of the consultation and inviting them to take part. Other key stakeholders and stakeholder groups will also be contacted, informed about our proposals and invited to take part.

9.5 The Focus of the First Round of Consultation

This RCD presents the findings of the routeing process undertaken for the Project, resulting in the identification of a preferred Route Option for the New-build OHL, that is the proposed 400 kV overhead line route between Bonnybridge Substation and Glenmavis. In addition, this RCD also provides further details on the proposed 'uprating', from 275kV to 400kV, of the existing overhead line running between Denny North and Bonnybridge substations.

The focus of the first round of consultation will be to ask for people's views on:

- The preferred Route Option;
- Any of the alternative Route Options considered during the appraisal process;
- The uprating of the existing overhead lines between Denny North and Bonnybridge substation; and
- Any other issues, suggestions or feedback; particularly views on the local area, for example areas used for recreation, local environmental features, and any plans to build along the preferred route.

9.6 Sources of Information about the Consultation

A map showing the consultation zone is provided Figure 10 and will be included in the principal sources of information about the consultation, which comprise the Project leaflet and the project website (<u>www.spenergynetworks.co.uk</u>)



Figure 10. Consultation Zone

Project leaflet

The Project leaflet will be mailed to every home and business in, or within, a kilometre of the preferred Route Option. It will include details on the Project, including a map showing how the preferred route connects with the existing transmission network, details relating to the consultation process and how to find out more about the Project and submit comments.

Project website

The website will act as a single source of truth and will build on the information provided in the leaflet. This will also host publicly available consultation documents for viewing or download, and an online feedback form. The feedback form will be available from May 26th 2021 until the deadline for receipt of feedback at midnight on June 21st, 2021.

How people can make a comment

There will be a number of ways for people to make comments:

- At one of our consultation webinars;
- Online, using the feedback form on the website;
- By post, using a paper feedback form, or by letter;
- By emailing the feedback form or in the body of an email; or
- By phone to the SPEN Project Consultation Contact Centre.

In person

Given the current COVID-19 restrictions, we are unable to hold face to face consultation events. However, SPEN have arranged a number of live webinars where members of the Project team will introduce the project and will be available to answer questions as part of a live Q&A session. We will also try to accommodate requests for bespoke online meetings with community councils and other stakeholder groups where possible.

Online

People will be able to make comments online at <u>www.dennywishaw.co.uk</u> using an interactive online version of the feedback form, which will be available until midnight on June 21st 2021.

Post

A hard-copy feedback form will be available at public exhibitions, for download from the website, by request to the SPEN Project Consultation Contact Centre on **0800 470 2376** or by email to **info@dennywishaw.co.uk**. Completed forms must be returned to **FREEPOST DENNY WISHAW** by June 21st 2021. If returning completed forms by post people are advised to allow up to 7 days for these to be received. It may not be possible to consider forms received after this date.

Email

SPEN will also accept comments relating to the specific focus of this second round of consultation by e-mail to **info@dennywishaw.co.uk** by June 21st 2021.

Phone

SPEN prefers to receive comments in writing as this helps avoid the risk of misinterpretation. However, where no other means are available, comments will be received via phone call free on **0800 470 2376**. The SPEN Project Consultation Contact Centre is open Monday to Friday (except some bank holidays) between the hours of 9am and 5.30pm. There is a voicemail facility outside these hours.

SPEN's Response

The responses received in the first round of consultation will be evaluated by SPEN and published in the form of a Consultation Summary of Feedback Report.

Although SPEN may not be able to respond to all individual comments, people will be able to request to be kept informed by email as and when there are Project developments, such as the availability of the Consultation Summary of Feedback Report. People interested in being kept informed in this way can register on the website or send their email address to **info@dennywishaw.co.uk**.

9.7 Confirmation of the Proposed Route and EIA

The responses received from the consultation process will be considered in combination with the findings of this RCD and inform the identification of the proposed route to be taken to next the phase of the Project.

The proposed route will then progress to a more detailed review to identify an overhead line alignment, including tower positions. This will be informed by the EIA, detailed engineering ground surveys and discussions with landowners. The alignment, including all ancillary development, will be included in the applications for section 37 consent and deemed planning permission. Ancillary development will include all development necessary to construct and operate the new 400 kV overhead line. An application for section 37 consent will also be submitted for the uprating of the Denny North to Bonnybridge overhead line. Deemed planning permission for the uprating and the substation works will also be sought. **These details will be the subject of a further round of pre-application public consultation during early 2022.**

SPEN will consult fully with affected landowners and occupiers on all aspects of the Project and will give them an opportunity to comment on proposals as they progress.

Appendix A – Holford Rules

Rule 1

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

Note on Rule 1

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

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

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

- Special Area of Conservation (SAC)
- Special Protection Area (SPA
- Ramsar Site
- National Scenic Areas (NSA)
- National Parks
- National Nature Reserves (NNR)
- Protected Coastal Zone Designations
- Sites of Special Scientific Interest (SSSI)
- Schedule of Ancient Monuments
- Listed Buildings
- Conservation Areas
- World Heritage Sites
- Historic Gardens and Designed Landscapes

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

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c) If there is an existing transmission line through an area of high amenity value and the surrounding land uses.

Rule 3

Other things being equal, choose the most direct line, with no sharp changes of direction and thus fewer 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 background wherever possible and when the line has to cross a ridge, secure this opaque background as long as possible and cross obliquely when a dip in the ridge provides an opportunity. Where it does not, cross directly, preferably between belts of trees.

Rule 5

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

Notes on Rules 4 and 5

- a) Utilise background and foreground features to reduce the apparent height and domination of towers from main viewpoints.
- b) Minimise the exposure of numbers of towers on prominent ridges and skylines.
- c) Where possible follow open space and run alongside, not through woodland or commercial forestry, and consider opportunities for skirting edges of copses and woods. Where there is no reasonable alternative to cutting through woodland or commercial forestry, the Forestry Commission Guidelines should be followed (Forest Landscape Design Guidelines, second edition, The Forestry Commission 1994 and Forest Design Planning A Guide to Good Practice, Simon Bell/The Forest Authority 1998).
- d) Protect existing vegetation, including woodland and hedgerows, and safeguard visual and ecological links with the surrounding landscape.

Rule 6

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

Note on Rule 6

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

Rule 7

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

Note on Rule 7

- a) When a line needs to pass through a development area, route it so as to minimise as far as possible the effect on development.
- b) Alignments should be chosen after consideration of impacts on the amenity of existing development and on proposals for new development.
- c) When siting substations take account of the impacts of the terminal towers and line connections that will need to be made and take advantage of screening features such as ground form and vegetation.

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.
- d) [Note: SHETL have reviewed the visual and landscape arguments for the use of lattice steel towers in Scotland and summarised these in a document entitled Overhead Transmission Line Tower Study 2004].

Further Notes on Clarification to The Holford Rules

Line Routeing and People

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

- a) Avoid routeing close to residential areas as far as possible on grounds of general amenity.
- b) In rural areas avoid as far as possible dominating isolated house, farms or other small-scale settlements.
- c) Minimise the visual effect perceived by users of roads, and public rights of way, paying particular attention to the effects of recreational, tourist and other well used routes.

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Appendix B – Routeing Considerations

Criterion	Identified Constraints / Features	Holford Rule	Routeing Considerations
Landscape and Visual Amenity	Slamannan Plateau / Avon Valley Special Landscape Area	Rule 2 ¹⁰ and Supp. notes	Route Options should avoid or reduce potentially adverse effects on the special qualities of the SLA as far as possible.
	Callendar Park Garden and Designed Landscape	Rule 1	Route Options should avoid or reduce potentially adverse effects on the special qualities of the GDL as far as possible.
	Visual amenity (settlements)	Rule 4 and Supp. notes	Route Options should be located away from settlement and residential properties
	Visual amenity (scattered individual properties inc. 150m 'trigger' zone)	Rule 4 and Supp. notes	landform and woodland to minimise visual intrusion and reduce potentially adverse effects.
	Landscape character (inc. sensitivity to or capacity for overhead lines)	Rules 4, 5 and 6	Route Options should avoid more sensitive landscapes as far as possible and respond to the character and grain of the landscape. Route Options should avoid crossing high points and ridgelines where possible and consider opportunities to make use of landform and woodland as a backcloth.
	Existing transmission and distribution network	Rule 6	Route Options should maintain a suitable separation distance from existing overhead lines in order to minimise the potential for adverse effects to occur as a result of a wirescape.
Ecology including Forestry ¹¹	Slamannan Plateau SPA (inc. functionally linked habitats and qualifying species flight lines)	Rule 1	Route Options should avoid crossing the Slamannan Plateau SPA and where possible take account of functionally linked habitat and flight lines of the site's qualifying species in order to avoid or reduce potentially adverse effects on the site and its qualifying bird species.
	West Fannyside Moss SAC	Rule 1	Route Options should avoid crossing
	Blawhorn Moss SAC		Area in order to avoid potentially adverse
	Black Loch Moss SAC		effects on them.
	Slamannan Plateau SSSI	Rule 1	Route Options should take account of and
	West Fannyside Moss SSSI	Rule 1	present throughout the Study Area in
	Blawhorn Moss SSSI	Rule 1	order to avoid or reduce potentially adverse effects on them.
	Black Loch Moss SSSI	Rule 1	
	North Bellstane Plantation SSSI	Rule 1	
	Longriggend Moss SSSI	Rule 1	
	Howierig Muir SSSI	Rule 1]
	Darnrig Moss SSSI	Rule 1]
	Dullatur Marsh SSSI	Rule 1	

¹⁰ Reference to the rule includes the notes to the rule. Supplementary notes are specifically identified.

¹¹ Some of the SSSI sites and their features will be assessed through their associated European designation.

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Criterion	Identified Constraints / Features	Holford Rule	Routeing Considerations			
	Bishop Loch SSSI	Rule 1				
	Lady Bell's Moss SSSI	Rule 1				
	Howierig Muir SSSI	Rule 1				
	Mollinsburn Road Cutting SSSI	Rule 1				
	Woodend Loch SSSI	Rule 1				
	Forest Wood SWT Reserve	Rule 2	Route Options should avoid or reduce as			
	Luggiebank Wood SWT Reserve	Rule 2	on non-statutory designated sites of			
	Fannyside RSPB Reserve	Rule 2	ecological or biodiversity interest.			
	Local Wildlife Sites	Rule 2				
	Ancient Woodland Inventory sites	Rule 2	Route Options should avoid areas of ancient and native woodland sites in order			
	Native Woodland for Scotland	Rules 4 and 5	to avoid or reduce potentially adverse effects on woodland areas.			
Cultural Heritage	Antonine Wall WHS (inc. buffer zone) and SM	Rule 1	Route Options should cross the Antonine Wall WHS at an appropriate location which takes account of the site's Statement of Outstanding Universal Value Statement (SOUV) and reduces as far as possible adverse effects on the site and its setting.			
	Wester Carmuirs SM Rule 1		Route Options should avoid or reduce as			
	Forth and Clyde Canal SM	Rule 1	Tar as possible potentially adverse effects on designated archaeology and heritage			
	Antonine Wall SM	Rule 1	sites including scheduled monuments,			
	Rough Castle Fort SM	Rule 1	well as their settings.			
	Avonhead Colliery SM	Rule 1				
	Drumbowie Farm SM	Rule 1				
	Thieves Hill deserted settlement SM	Rule 1				
	Listed buildings	Rule 1				
	Battle of Falkirk Inventory Battlefield Site	Rule 1				
	Non-designated archaeology (Historic Environment Record)	Rule 2	Route Options should avoid or reduce as far as possible potentially adverse effects on non-designated archaeology and heritage sites.			
Tourism and Recreation	Palacerigg Country Park	Rule 2	Route Options which require to cross Palacerigg Country Park should be carefully considered in order to reduce potentially adverse effects on the park and park users as far as possible.			
	Recreational Walking / Cycling Routes	Supp. notes	Route Options should avoid recognised walking or cycling routes where possible in order to avoid or reduce potentially adverse effects on users of them.			
Land Use and Infrastructure	Settlements (including individual properties)	Supp. notes	Route Options should avoid routeing close to settlements or residential properties where possible in order to avoid or reduce potentially adverse effects on general amenity.			

Criterion	Identified Constraints / Features	Holford Rule	Routeing Considerations
	Wind Farms	Rule 7	Where Route Options cross or are in the vicinity of existing or planned wind farms they should take account of a minimum separation distance from wind turbines of at least three times rotor diameter or the turbine height to blade tip plus ten percent in order to avoid any technical conflicts.
	Mineral extraction / opencast sites	Rule 7	Route Options should avoid operational mineral extraction sites, however, restored sites may provide feasible routeing opportunities.
	Other committed development	Rule 7	Route Options should consider other committed development in order to avoid or reduce potentially adverse effects or technical conflicts.
	Land Capability for Agriculture	n/a	Route Options should avoid best and most versatile (BMV) agricultural land where possible in order to avoid or reduce potentially adverse effects on agriculture.
	Commercial forestry	Rules 4 and 5	Route Options should avoid directly crossing commercial forestry where possible. Where avoidance is not possible consideration should be given to utilising existing wayleaves and reducing the amount of felling required.
Physical environmental features and technical / engineering constraints	Watercourses / bodies	n/a	Route Options should adhere to a 50 m separation zone from watercourses and bodies other than where they may require to be crossed.
	Flood zones	n/a	Route Options should in the first instance avoid flood zones. Where this is not possible, Route Options should cross flood zones where they are at their narrowest.
	Carbon and Peatland Mapping	Rule 2	Route Options should avoid areas identified as class 1 priority peatland habitat where possible in order to reduce potentially adverse effects as far as possible. Where such areas cannot be avoided Route Options should follow the shortest and most direct route where possible.
	Overhead line route length	Rule 3	Route Options should follow the shortest and most direct route possible whilst taking account of other environmental and technical constraints or impacts.
	Existing transmission and distribution network	Rule 6	Route Options should take account of existing transmission and distribution network infrastructure in order to avoid any technical conflicts.
	Topography, elevation and side slopes	n/a	Route Options should take account of topography, elevation and side slopes avoiding areas which could affect constructability and/or operability.

Appendix C – Route Options Analysis

Bonnybridge Substation to Slamannan Plateau North

Route Option	Landscape and Visual Amenity	Ecology including Forestry	Cultural Heritage	Tourism and Recreation	Land Use and Infrastructure
1a	This option lies within the Falkirk LCA 3(iii) Castlecary/Shieldhill Plateau Farmland and 4(iv) Lower Carron/Bonny Water character areas. These are characterised by the Forth valley floodplain and the densely settled urban fringe of Falkirk, Denny and Bonnybridge. This is a relatively large scale landscape with the topography rising from the flat valley floor in the north to the wooded corridor around the Antonine Wall and beyond to the Slamannan Plateau in the south. This option uses lower topography and woodland to potentially reduce the prominence of the OHL.	Howierig Muir SSSI lies to the immediate east of the southern part of this option but will be unaffected. The route would cross Ancient Woodland including areas of long-established plantation origin and Native Woodland Survey of Scotland (NWSS) woodland would be crossed by this option requiring a new wayleave to be created and woodland lost.	All of the options (1a-1c) cross the Antonine Wall WHS, Antonine Wall and Rough Castle Fort SM and the Forth and Clyde Canal SM. This option is also within close proximity to the Wester Carmuirs SM although this can be avoided during the development of the detailed route alignment. This option passes to the east of Rough Castle Fort, utilising a combination of shallow valley topography and woodland vegetation to assist in reducing potential visibility from the heritage asset.	This option crosses the Forth and Clyde Canal which is a widely used recreational resource and Core Water Route 013/466 and Core Path 013/420. It also passes within 400m of the Falkirk Wheel visitor attraction and whilst the woodland will provide some screening of the option it will remain partially visible from the visitor attraction. This option crosses the Antonine Wall WHS and Antonine Wall and Rough Castle Fort SM which is a visitor attraction and local recreational resource with various Core Paths extending through it. Further Core Paths are crossed including 003/1135, 003/1171, 003/1186 and 003/1116.	This route parallels an exi 33kV OHL between substation and the Forth and and crosses another 33kV and within Rough Castle wood southern extent it crosses a OHL and a gas pipeline altho can be avoided during route a It also crosses the Forth and and two railway lines.
1b	This option lies within the Falkirk LCA 3(iii) Castlecary/Shieldhill Plateau Farmland and 4(iv) Lower Carron/Bonny Water character areas. These are characterised by the Forth valley floodplain and the densely settled urban fringe of Falkirk, Denny and Bonnybridge. This is a relatively large scale landscape with the topography rising from the flat valley floor in the north to the wooded corridor around the Antonine Wall and beyond to the Slamannan Plateau in the south. Option 1b passes within the 150m trigger for consideration zone of residential properties at Bonnyhill Farm, although the existing 132kV lies within this same trigger zone.	This option parallels the existing 132kV OHL wayleave which crosses Ancient Woodland including areas of long established of plantation origin and NWSS woodland. The wayleave would need to be widened to accommodate this option with direct impacts on the Ancient Woodland.	All of the options (1a-1c) cross the Antonine Wall WHS, Antonine Wall and Rough Castle Fort SM and the Forth and Clyde Canal SM. This option parallels the double 132kV OHL which follows the lower lying land along the western side of the Fort. Given the offset required between the existing line and the proposed route any new towers associated with the proposed route would be located on higher ground, exacerbating the impact on the SM and WHS. From a heritage perspective, this option could only be considered if the existing 132kV OHLs are undergrounded.	This option crosses the Forth and Clyde Canal which is a widely used recreational resource and Core Water Route 013/466 and Core Path 013/420. It also passes within 1km of the Falkirk Wheel visitor attraction and whilst the woodland will provide some screening of the option it will remain partially visible from the visitor attraction. This option crosses the Antonine Wall WHS and Antonine Wall and Rough Castle Fort SM which is a visitor attraction and local recreational resource with various Core Paths extending through it. To the southern end of the route, Core Path 003/1155 is crossed.	This option parallels the doubl from Bonnybridge substation where it diverges to the north Road. It also crosses three 3 Rough Castle wood and an the immediate north of the Glasgow via Falkirk railway lin The south eastern corner allocation site on the east Bonnybridge is crossed by thi It also crosses the Forth and and two railway lines.
1c	This option lies within the Falkirk LCA 3(iii) Castlecary/Shieldhill Plateau Farmland and 4(iv) Lower Carron/Bonny Water character areas. These are characterised by the Forth valley floodplain and the densely settled urban fringe of Falkirk, Denny and Bonnybridge. This is a relatively large scale landscape with the topography rising from the flat valley floor in the north to the wooded corridor around the Antonine Wall and beyond to the Slamannan Plateau in the south. This option would extend the wirescape closer to Bonnybridge and High Bonnybridge settlements although	Whilst this option crosses an area of Ancient Woodland of long-established plantation origin and NWSS woodland it is limited to a shorter section compared with options 1a and 1b.	All of the options (1a-1c) cross the Antonine Wall WHS, Antonine Wall and Rough Castle Fort SM and the Forth and Clyde Canal SM. This option would increase the wirescape to the west of the SM and WHS, across an area of more open landscape increasing the potential visibility and impacts on setting of the heritage assets.	This option passes within 1.3km of the Falkirk Wheel visitor attraction and whilst the woodland will provide some screening of the option it will remain partially visible from the visitor attraction. This option crosses the Antonine Wall WHS and Antonine Wall and Rough Castle Fort SM which is a visitor attraction and local recreational resource with various Core Paths extending through it.	This option follows the initial between Bonnybridge sub immediately south of the Dunblane railway line and so Forth and Clyde Canal and ra well as paralleling the double In addition, it crosses a 33k southern extent. A gas pipeline is crossed by t can be avoided during route a It also crosses the Edinburgh via Falkirk railway line.

Physical and Technical Constraints tisting double South of Bonnybridge Substation the land Bonnybridge traversed by this option is flat and low-lying. Clyde Canal Moving south from the Forth and Clyde nd 11kV OHL Canal land rises gently from approximately dland. At its 40 to 110mAOD. The route option follows another 11kV a largely straight line up the hillslope ough the latter turning south west at Drove Loan at between 100 and 110mAOD. alignment. Clyde Canal With the exception of the Forth and Clyde Canal there are no significant watercourses close to this route option. ble 132kV OHL The land traversed by this option is flat and to the point low lying but moving south it gently rises of Lochgreen towards the Slamannan Plateau from 33kV OHLs in approximately 40 to 110mAOD. The route 11kV OHL to option follows a largely straight line up a Edinburgh to shallow gradient hillslope. ne. In addition to crossing the Forth and Clyde of housing Canal, the Rowan Tree Burn is located to tern edge of the immediate east of this option for much of is length. It drains in a northern direction is option. Clyde Canal into the Forth and Clyde Canal continuing into the Bonny Water further north. section of 1b This option follows a similar route to 1b until bstation and it is south of the Forth and Clyde Canal Glasgow to where it cuts across a shallow gradient so crosses the hillslope in a south westerly direction ailway lines as before turning south where it crosses the e 132kV OHL. Edinburgh to Glasgow railway line. kV OHL at its In addition to crossing the Forth and Clyde Canal, the route option is routed close to St this option but Helens Loch at the east of High Bonnybridge. alignment. gh to Glasgow

Route Option	Landscape and Visual Amenity	Ecology including Forestry	Cultural Heritage	Tourism and Recreation	Land Use and Infrastructure	Physical and Technical Constraints
	woodland and industrial development provides some separation.					
1d	This option lies within the Falkirk LCA 3(iii) Castlecary/Shieldhall Plateau Farmland. It follows the route of a 33kV wood pole line as it heads south-west across open farmland. Whilst this concentrates wirescape within the landscape, the proximity to the wood pole line would emphasise the scale of the proposals.	There are no ecological designations affected by this option.	There are no designated heritage assets affected by this option.	There are no recreational resources affected by this option.	This option parallels a short section of 33kV wood pole line.	This option follows a similar route to 1b until it is south of Bonnyhill Farm where it cuts across a shallow gradient hillslope in a westerly direction to the Slamannan Plateau.
Summary	Landscape character within this section is broadly the same for all Route Options. The main routeing considerations which help to differentiate between options relate to wirescape effects, proximity to settlement or recreational areas and making best use of woodland to reduce the prominence of OHL routes. Option 1a is routed closer to the Falkirk Wheel, however, the existing woodland to the east of the corridor provides opportunities to reduce the prominence of the OHL route. Option 1b is considered likely to have greater landscape and visual effects due to its proximity to existing OHLs. Options 1c and 1d are routed in closer proximity to residential properties compared to other options.	Howierig Muir is the only designated ecology site within this section. While it is close to Option 1a it is located sufficiently far enough away that it should not be affected. All route options within this section have the potential to cross and impact on woodland including Ancient Woodland and NWSS woodland. The main difference between options is the extent to which they interact with woodland. The majority of Option 1a is routed through woodland and would require a new wayleave to be established. While Option 1b crosses comparatively less woodland, it would require the existing wayleaves followed by the 132 kV OHL to be extended.	All route options in this section require to cross designated heritage features. While these designated features are unavoidable, where they are crossed does result in some differences in the potential impacts of route options. The main routeing consideration is the extent to which Route Options add to the wirescape and exacerbate these effects. This would be most significant for Option 1b which parallels the existing OHL route. Option 1a crosses to the east and while some setting impacts can be reduced by a combination of topography and woodland, wirescape effects will remain. Option 1c is located within a comparatively more open landscape to the west and has greater potential to impact the setting of heritage assets.	The key tourism and recreational resources include cultural heritage sites, core paths, Forth and Clyde Canal and the Falkirk Wheel. The Route Options interact with these constraints to differing extents, some, such as Core Paths require to be crossed by Route Options while others such as the Falkirk Wheel are located in proximity to the Route Options. The main routeing consideration is the extent to which Route Options directly impact recreational areas or the amenity of visitors to those areas. While option 1a is closest to the Falkirk Wheel all options other than 1d will be visible from it. Similarly all options cross Core Paths including paths which provide access to designated heritage sites.	There is a range of infrastructure present within this section including roads and railway lines as well as existing transmission and distribution OHLs. Certain constraints such as the railway lines cannot be avoided and must be crossed for all options. The housing allocation site to the east of Bonnybridge would be crossed by Option 1b and is comparatively less preferable to other options. Routeing in close proximity to existing OHLs is feasible, however, as noted elsewhere can result in wirescape issues. Neither existing land use or infrastructure are considered to be significant constraints to Route Options.	Landform and topography within this section is broadly similar for all Route Options. Route options cross relatively steeper slopes moving south towards the Slamannan Plateau. Slopes and elevation are not considered to pose a significant constraint to the Route Options and do not significantly influence the selection of a preferred Route Option.

Slamannan Plateau North to Slamannan Plateau South

Route Option	Landscape and Visual Amenity	Ecology including Forestry	Cultural Heritage	Tourism and Recreation	Land Use and Infrastructure	Physical and Technical Constraints
2a	This short section of connecting route falls within the Falkirk LCA 3(iii) Castlecary/Shieldhill Plateau Farmland. The route takes a broadly south east alignment extending across farmland and crosses the northern tip of Drum Wood Ancient Woodland.	This Route Option crosses the northern tip of Drum Wood Ancient Woodland.	There are no designated heritage assets affected by this option.	There are no recreational assets affected by this option.	The end of this Route Option crosses the double 132kV OHL.	This short section crosses gently rising land and crosses the Rowan Burn.
2b	This Route Option falls almost entirely within the Falkirk LCA 3(iii) Castlecary/Shieldhill Plateau Farmland except for the southern tip of the route which extends into the North Lanarkshire LCA 7 – Plateau Moorlands. This is an open, farmed plateau landscape interspersed with woodland and extensive plantation woodland and is sparsely settled with scattered properties. The Slamannan Plateau/Avon Valley SLA lies at its nearest point 500m to the east of the route. Intervening vegetation and undulating landform would help to limit effects on the setting of the SLA and its special qualities. The route passes some of the scattered properties and their associated 150m trigger for consideration zones, although impinging on them could be largely avoided at detailed alignment.	This Route Option whilst avoiding crossing any designated sites lies to the east of the Slamannan Plateau SPA and SSSI at varying distances and between Bean Goose fields. In addition, it crosses four areas of NWSS woodland as well as Craigburn Ancient Woodland. It is also in close proximity to Ancient Woodland although the latter could be avoided during route alignment. A small section of this option crosses an area of blanket bog identified as Class 1 Carbon Rich Soils and Peat.	The Thieves Hill SM lies within the southern section of this Route Option, although direct effects on the SM can be avoided during route alignment, impacts on setting of the asset could result.	This option crosses Core Paths 003/1146 and 023/1007.	Sections of this Route Option cross commercial forestry and would require clear felling to establish new wayleaves. The northern point of this Route Option crosses the 132kV OHL as it diverges to the south east. This Route Option also crosses a further three 11kV OHLs along its length. To the north of the Garbethhill Burn, a site with planning consent for leisure purposes lies adjacent to the Route Option although direct impacts on the site can be avoided.	This route option extends across the Slamannan Plateau. While there are small areas of moderately steeper gradients around Loanfoot Wood the majority of the landform is flat or rises gently. This route option requires to cross the River Avon close to where it rises on the Plateau.
2c	This option lies within the Falkirk LCA 3(ii) Darnrig/Gardrum Plateau Moorland and 3(iii) Castlecary/Shieldhill Plateau Farmland and runs parallel to an existing 132kV OHL. Whilst this concentrates wirescape within the landscape and potentially limits the amount of vegetation removal required within the sections of woodland it will increase the presence of this corridor of OHLs across the plateau moorland and farmland landscape. This option passes close to a cluster of residential properties at Tippet Craigs and within the 150m trigger for consideration zone.	As this option parallels the 132kV OHL which currently crosses the north western corner of the Slamannan Plateau SPA and SSSI, it too crosses these designated areas. In addition the existing wayleaves for the 132kV OHL which pass through ancient and NWSS woodland would require widening to accommodate this Route Option. A small section of this option crosses an area of blanket bog identified as Class 1 Carbon Rich Soils and Peat.	There are no designated heritage assets affected by this option.	This option crosses Core Path 003/1200.	This option parallels the 132kV OHL and also crosses an 11kV OHL adjacent to Tippet Craigs. Sections of this option, where it parallels the existing 132kV OHL utilise existing wayleaves through commercial forestry which would require to be widened.	This route option follows a south western alignment across the shallow gradient slopes of the northern part of the Slamannan Plateau. Elevations rise approximately 50m from approximately 110 to 160mAOD. The Rowan Burn requires to be crossed to the west of Loanfoot Wood.
2d	This option lies within the Falkirk LCA 3(ii) Darnrig/Gardrum Plateau Moorland and 3(iii) Castlecary/Shieldhill Plateau Farmland. This section extends west across agricultural land west of Bonnyhill Farm. The option crosses Hillview road and passes between blocks of woodland to the north of a collection of dwellings at 'Birchwood Farm', which may provide a degree of visual screening from some nearby residential properties and roads. As the alignment extends south-west it traverses an area of sparsely settled moorland, passing to the east of a	The southern section of the Route Option lies between, but not crossing, the Slamannan Plateau SPA to the east, and fields used by Bean Goose to the west. This option crosses areas of Ancient Woodland and NWSS woodland, although impacts on these could be reduced during the route alignment stage.	There are no designated heritage assets affected by this option.	There are no recreational resources affected by this option.	At the northern extent, this option crosses the double 132kV OHL and the 11kV OHL which runs alongside the 132kV OHL. It subsequently crosses another 11kV OHL and at the southern end runs parallel to a 33kV OHL.	This route extends west across the slopes above the Edinburgh to Glasgow railway line. It broadly follows the 100m contour line before turning south west cutting across more gently rising slopes to the east of Castlecary High Wood. The Rowan Burn requires to be crossed to the west of Drum Wood.

Route Option	Landscape and Visual Amenity	Ecology including Forestry	Cultural Heritage	Tourism and Recreation	Land Use and Infrastructure	Physical and Technical Constraints
	collection of agricultural buildings, before rising to cross a minor ridgeline west of Tippet Craigs and to the east of Castlecary High Wood. This option passes within the 150m trigger for consideration zone of four residential properties.					
2e	This option lies within the Falkirk LCA 3(ii) Darnrig/Gardrum Plateau Moorland and 3(iii) Castlecary/Shieldhill Plateau Farmland. It partially follows the alignment of an existing 33kV wood pole line which whilst concentrating wirescape within the landscape would also contrast in scale. Where the route changes direction to align south at a point within an area moorland, an angle tower at this point could be sited to take advantage of woodland cover north of Lochdrum. As this section heads south, it crosses a minor ridgeline to the east of Tippet Craigs. This option passes within the 150m trigger for consideration zone of two residential properties.	The north western edge of the Slamannan Plateau SPA and SSSI is within 65m of the southern extent of this option. Four areas of NWSS woodland lie in proximity to the Route Option but could be avoided during route alignment.	There are no designated heritage assets affected by this option.	There are no recreational resources affected by this option.	This option partially follows a 33kV wood pole OHL, crossing the same line where the route changes direction to align south where it crosses another 11kV OHL.	This option is similar to 2d. It follows the 100m contour line in western direction before turning south. From here it takes a direct route over the hillslopes. The gradient is shallow with elevation increasing by approximately 50 m over a distance of 1.6 km. There are no watercourses crossed by the option however a small number of ponds or lochans are present nearby.
2f	The northern part of this option lies within the Falkirk LCA 3(ii) Darnrig/Gardrum Plateau Moorland and 3(iii) Castlecary/Shieldhill Plateau Farmland before extending into the North Lanarkshire LCA 7, Plateau Moorlands. This Route Option diverts to the north-east towards Cumbernauld to reduce the potential extent of cumulative wirescape with existing OHLs. A combination of woodland cover and lower topography may assist in reducing the potential prominence of the proposals within the landscape, albeit this section would be in proximity to Cumbernauld. There is a change of direction as the alignment of existing OHL, in the process it crosses a series of minor ridgelines within the landscape, however, the change of angle could be set to cross these ridgelines at a perpendicular angle.	This option crosses moorland between the Slamannan Plateau SPA and SSSI to the east and fields used by Bean Goose to the north west. In addition it crosses two areas of NWSS woodland, one of which contains Ancient Woodland along the watercourse to the west of Glenhead.	There are no designated heritage assets affected by this option.	This option crosses Core Path 130 and at the end of the Route Option, Core Path 133.	At the northern extent this option crosses the 132kV OHL and the double 33kV OHL. It also crosses an 11kV OHL towards the southern extent of the option. A large section of this route option crosses commercial forestry to the east of Abronhill and would require clear felling to establish new wayleaves.	This option crosses flatter land as it heads south west towards Abronhill. While moderately steep slopes are present the route broadly follows the landform. This route option crosses the Walton Burn which is also the boundary between Falkirk and North Lanarkshire Councils.
2g	The northern section of this option lies within the Falkirk LCA 3(ii) Darnrig/Gardrum Plateau Moorland before extending into a similar moorland character area defined in the North Lanarkshire LCA 7 – Plateau Moorland. This Route Option follows the alignment of the 132kV and 33kV OHLs as they extend south west across an elevated plateau. In general, there are few visual receptors within this part of the Study Area. Together with the undulating local landform and areas of woodland cover, there are few	This option parallels the 132kV and double 33kV OHLs which lie to the immediate west of the Slamannan Plateau SPA and SSSI and cross the designated land at a peripheral point to the north of Palacerigg Country Park. The southern extent of this Route Option also crosses the Forest Wood SWT reserve, parallel to the existing OHLs which currently cross it. In addition there are pockets of NWSS woodland across the moorland as well as a concentrated area of Ancient Woodland	There are no designated heritage assets affected by this option.	The southern extent of this Route Option crosses the northern periphery of Palacerigg Country Park. The Country Park is a recreational resource with a visitor centre, golf course and various Core Paths of which 135 and 248 would be crossed by this option. This option crosses the northern periphery of the park and whilst not impacting the recreational facilities would be visible from sections of the Country Park, although established woodland and trees within the park would	This Route Option parallels the 132kV OHL and double 33kV OHL. The Mid-Forest CGA lies to the immediate west of this Route Option with intervening Ancient Woodland and native woodland providing some separation.	This option crosses flatter land to east of Abronhill. Elevations are approximately 150-160mAOD as the route follows an existing OHL wayleave through woodland.

Denny to Wishaw Network Upgrade Routeing & Consultation Document

Route Option	Landscape and Visual Amenity	Ecology including Forestry	Cultural Heritage	Tourism and Recreation	Land Use and Infrastructure	Physical and Technical Constraints
	locations within c.1-1.5km of the existing OHLs where the wirescape has a pronounced bearing on views or the pattern of the landscape. This option passes between the cluster of properties of Crowbank, Arns and Old Shields and their associated 150m trigger for consideration zone.	within the southern section of the Forest Wood SWT reserve. A small section of this option crosses an area of blanket bog identified as Class 1 Carbon Rich Soils and Peat.		offer some degree of screening and integration.		
Summary	Landscape character within this section is broadly similar for all Route Options reflecting the plateau moorland landscape with occasional scattered settlement. Option 2b uses plantation woodland to partially screen and provide a backcloth to views as it crosses the moorland landscape avoiding minor ridgelines and the SLA to the east. Whilst scattered settlement is characteristic of this whole section there are comparatively fewer residential properties compared with the options to the west due to the presence of the settlement edge at Cumbernauld. Options 2d and 2e cross an open agricultural transitioning to moorland landscape which is less elevated than Option 2c as the land rises to the south. Option 2c also parallels the existing 132 kV OHL which runs in close proximity to residential properties, increasing the wirescape. Option 2g continues to parallel the existing 132 kV OHL across the moorland plateau which has the potential to increase the wirescape but is further away from the settlement edge of Cumbernauld relative to Option 2f.	The Slamannan Plateau SPA and SSSI designated sites are present in this section with Route Option 2c crossing the northern corner of the designation and is consequently the least preferred Route Option. Option 2b lies to the east of the SPA and SSSI and between the concentration of fields which are used by the Bean Geese so is similarly not preferred. Sections of Options 2d and 2f whilst west of the SPA also lie between fields used by the Bean Geese and the SPA, although these fields are fewer and more dispersed compared with those to the east of the designated area. All route options within this section have the potential to cross and impact on woodland including Ancient Woodland and NWSS woodland. The main difference between options is the extent to which they interact with woodland. Option 2g at the southern extent crosses the Forest Wood SWT reserve, parallel to the existing OHLs which currently cross it.	The only designated heritage asset in this section is the Thieves Hill SM which lies within the southern section of Option 2b. Whilst direct effects on the SM can be avoided during route alignment, impacts on the setting of the asset could result and as a consequence Option 2b is least preferred from a cultural heritage perspective.	The key tourism and recreational resource in this section is Palacerigg Country Park and the wider network of Core Paths. The main routeing consideration is the extent to which Route Options directly impact the Country Park or the amenity of visitors to it. The southern extent of Option 2g crosses into the northern section of the Country Park, parallel to the existing 132 kV OHL. All Options other than 2e cross at least one Core Path, however these are not considered to be significant constraints to Route Options.	There is a range of existing transmission and distribution OHLs within this section. Routeing in close proximity to existing OHLs is feasible, however, as noted elsewhere can result in wirescape issues. Neither existing land use or infrastructure are considered to be significant constraints to Route Options.	Landform and topography within this section is broadly similar for all Route Options. Route options cross relatively steeper slopes moving south onto the Slamannan Plateau which then generally smooth out and become more rolling across the plateau landform. Slopes and elevation are not considered to pose a significant constraint to the Route Options and do not significantly influence the selection of a preferred Route Option.

Slamannan Plateau South to Easterhouse to Newarthill OHL

Route Option	Landscape and Visual Amenity	Ecology including Forestry	Cultural Heritage	Tourism and Recreation	Land Use and Infrastructure	Physical and Technical Constraints
3a	This Route Option falls almost entirely within North Lanarkshire LCA 7 – Plateau Moorlands other than the very final short section which extends into the Fragmented Farmlands (LCA 5). The overriding character of this Route Option is open moorland interspersed with plantation woodland and scattered properties. Further south the landscape contains evidence of former industrial uses alongside an increase in settlement pattern and development including the presence of wind turbines. The 150m residential trigger for consideration zones are occasionally encroached by this Route Option particularly in the section to the west of Longriggend	This Route Option lies to the east of Longriggend Moss SSSI avoiding directly impacting this designated site. The route also crosses various sections of NWSS woodland.	There are no designated heritage assets affected by this option.	This Route Option crosses Core Path 161 to the north west of Caldercruix.	This route crosses three 11kV OHLs. There are also existing (Greendykeside) and proposed wind farms (Greengairs and Greengairs East) in close proximity to this Route Option although route alignment stage would enable the necessary rotor offset to be achieved. Further planning applications for mainly industrial/commercial development are also crossed by this Route Option along its southern extents. The proposed Airdrie Link Road (indicative options) is also crossed by this Route Option to the north west of Plains.	This route crosses the southern part of the Slamannan Plateau. Elevations are higher, typically around 190-200mAOD but land is generally flat or very gently sloping. Watercourses are present to the south of this option including the North Burn which drains the plateau in southern direction.
3b	This Route Option falls entirely within North Lanarkshire LCA 7 – Plateau Moorlands. The overriding character is of open moorland interspersed by pockets of woodland and scattered properties. To the south the landscape contains strong evidence of former and current industrial uses alongside an increase in settlement pattern and industrial development. The Route Option provides offset to settlement at Greengairs and Wattston although encroaches on the trigger for consideration zones of some clusters of residential property whilst making use of a landscape modified by industrial use.	This Route Option crosses four areas of NWSS woodland. A small section of this option crosses an area of blanket bog identified as Class 1 Carbon Rich Soils and Peat.	There are no designated heritage assets affected by this option.	This Route Option crosses Core Path 159 on Meikle Drumgray Road.	This route crosses four 11kV OHLs. It also encroaches on the rotor offset of the existing Greendykeside and Easter Glentore wind turbines as well as parts of the proposed Greengairs wind farm and South of Meikle Drumgray wind turbine. Further planning applications for mainly industrial/commercial development are also crossed by this Route Option along its length to the south of Greengairs and Wattston. The proposed Airdrie Link Road (indicative options) is also crossed by this Route Option to the north west of Plains.	This route crosses the southern part of the Slamannan Plateau and the west facing slope of Hill of Drumgray. Elevations are higher, typically around 190-200mAOD but land is generally flat or very gently sloping. This option crosses an unnamed watercourse that drains the Hill of Drumgray into the Cameron Burn to the west.
3c	This short section of route lies within the North Lanarkshire LCA 7 – Plateau Moorlands although the landscape character exhibits strong urban fringe characteristics with agricultural land and former industrial land uses surrounded by settlement. In order to tie in with the existing Easterhouse to Newarthill OHL, the trigger for consideration zones of some clusters of residential properties would be encroached at Holehills.	This Route Option crosses one area of NWSS woodland which could be avoided during route alignment.	There are no designated heritage assets affected by this option.	There are no recreational assets affected by this option.	This route crosses the A73 but avoids all other land use constraints.	This short section of route is routed across relatively flat land at an elevation of 190mAOD. The route broadly follows and crosses the Leaend Burn.
3d	This short section of route lies within the North Lanarkshire LCA 5 – Fragmented Farmlands and is characteristic of urban fringe farmland dominated by existing and former industrial land uses and settlement. This section extends south-west towards a terminal tower to the east of the Stirling Road industrial Estate. This option provides a degree of separation from residential areas within Airdrie. The alignment is restricted by residential property trigger for consideration zones.	This Route Option avoids any ecological sites.	There are no designated heritage assets affected by this option.	There are no recreational assets affected by this option.	This route crosses two 11kV OHLs.	This short section of route is routed across relatively flat land at an elevation of 190mAOD. The route broadly crosses and then follows the North Burn to the existing Easterhouse to Newarthill OHL.
3e	This route falls within the North Lanarkshire LCA 7 – Plateau Moorlands.	This Route Option crosses an area of Ancient Woodland and NWSS woodland along the watercourse to the north of Hulks	There are no designated heritage assets affected by this option.	This option crosses Palacerigg Country Park using existing woodland and mature vegetation to reduce the prominence of the	The northern part of this Route Option diverges from the existing OHLs before	This route option crosses relatively flat land within Palacerigg Country Park before traversing gently falling slopes towards

Route Option	Landscape and Visual Amenity	Ecology including Forestry	Cultural Heritage	Tourism and Recreation	Land Use and Infrastructure	Physical and Technical Constraints
	This option extends southwards through the Palacerigg Country Park to take a more direct route towards the termination point. The alignment diverts south-west, using woodland to provide potential visual screening. The landscape also becomes increasingly more settled with the Route Option encroaching on the 150m trigger for consideration zones of two residential properties.	Road. It subsequently crosses two further areas of NWSS woodland.		proposals from users of the wider Country Park. Detailed route alignment could further avoid direct impacts on the golf course and the core visitor attractions as well as the proposed hub areas and key routes between the Country Park and Cumbernauld as identified in the evolving masterplan for the Country Park currently being developed by North Lanarkshire Council. The route also crosses Core Paths 139, 140 and 248.	crossing a 33kV OHL around Hulks Road followed by an 11kV OHL.	Loandhead. It follows the hillslopes in a south western towards the A73. This route option crosses and then follows the Luggie Water which flows to the west of Loanhead.
3f	This route falls within the North Lanarkshire LCA 7 – Plateau Moorlands which becomes increasingly settled towards the southern extent of the Route Option. It is aligned to the northern edge of Palacerigg Country Park through an area of mixed deciduous woodland, parts of which are Ancient Woodland. While potential effects on the amenity of users of the Country Park would be reduced by the localised woodland cover, effects on landscape features may be increased. As the route diverts south it passes between minor ridgelines and utilises shelterbelt woodland to provide a degree of visual screening, particularly in views from the south and east. At this point it passes to the east of a site allocated for housing development east of the B8054 (Lenziemill Road). As the alignment heads south, the potential to align the route is restricted in part by proximity to the 150m trigger for consideration zones of residential properties at Palacerigg Golf Centre, Luggiebank and scattered dwellings to the east.	This Route Option crosses the Forest Wood SWT reserve and associated Ancient Woodland. Adjacent to this Ancient Woodland the route continues to cross an area of NWSS woodland. Towards the southern extent of this Route Option a second SWT reserve is crossed (Luggiebank) which also contains Ancient Woodland.	There are no designated heritage assets affected by this option.	This option crosses the northern edge of Palacerigg Country Park through an area of woodland which may assist in reducing the prominence of the proposals from users of the wider Country Park area. It also crosses various Core Paths both within the Country Park and within the wider landscape including Core Paths 137, 138, 139, 140 and 248.	The early part of this Route Option diverges from the existing OHLs but subsequently crosses a 33kV OHL adjacent to Forest Wood SWT reserve. Where the route diverts south it crosses through the eastern section of the Palacerigg CGA. The Cumbernauld model flying club also lies to the east of this section of the route.	This route option crosses relatively flat land within Palacerigg Country Park before crossing a shallow valley through which the Luggie Water flows. On the southern side of the shallow valley the slope rises up gently towards Coathill.
3g	This route falls within the North Lanarkshire LCA 7 – Plateau Moorlands and traverses open agricultural land and sections of plantation woodland to the south. It is constrained by the 150m trigger for consideration zones of residential properties along its route which are often encroached upon with this option.	Ancient Woodland around Muirhead Glen lies within the route corridor but direct effects could be avoided during route alignment. Additional sections of NWSS woodland are also crossed by this Route Option.	There are no designated heritage assets affected by this option.	This Route Option crosses Core Path 157 along Cameron Road.	This Route Option crosses four sections of 11kV OHL along its length.	This route option crosses the east facing slope of Coathill with land gently rising up to 150mAOD as it heads south crossing the Cameron Burn.
3h	This route falls within the North Lanarkshire LCA 7 – Plateau Moorlands before extending into LCA 6 – Plateau Farmlands. The landscape becomes increasingly agricultural and urban fringe in character with a denser concentration of clustered properties. The 150m trigger for consideration zones of residential properties are consequently more difficult to avoid and are often encroached upon with this Route Option. Where the route diverts south west woodland cover could provide visual	This route crosses the North Bellstane Plantation SSSI and Ancient Woodland as well as a further area of Ancient Woodland towards the southern extent of this Route Option. Several further areas of NWSS woodland are also crossed by the route.	There are no designated heritage assets affected by this option.	This option crosses Core Path 107 along Gain and Shankburn Road.	The Route Option crosses two separate 11kV OHLs along its length.	This route option is routed across gently sloping side slopes. Elevations are between approximately 110 and 120mAOD as it traverses the slopes of Coathill and Black Craig.

Route Option	Landscape and Visual Amenity	Ecology including Forestry	Cultural Heritage	Tourism and Recreation	Land Use and Infrastructure	Physical and Technical Constraints
	screening before it continues across open agricultural land crossing a further substantial block of woodland.					
3i	This route falls within the North Lanarkshire LCA 6 – Plateau Farmlands and LCA 7 – Plateau Moorlands although the local landscape is characterised by open agricultural land interspersed with plantation woodland and increasingly dense settlement pattern. This section heads broadly south-west as it crosses the A73 between a gap in residential trigger for consideration zones, north of Riggend. The route extends through the Cullochrig Plantation, traversing a minor ridgeline, before diverting southward across open agricultural land, plantation woodland and areas that have undergone landscape restoration.	This route crosses sections of NWSS woodland to the north of Riggend and two smaller pockets adjacent to Brackenhirst Road.	There are no designated heritage assets affected by this option.	This Route Option crosses Core Path 157 along Cameron Road.	This Route Option crosses one 11kV. The proposed Airdrie Link Road (indicative options) is also crossed by this Route Option to the immediate north of Riggend. The connection to the existing Easterhouse to Newarthill OHL fringes one side of a CGA (Windsor Drive) which is currently being constructed.	This route option crosses the side slops of Cullochrig. Elevation increases slightly to 170mAOD closer to the tee-in point on the Easterhouse to Newarthill OHL but the majority of this option crosses flat or gently sloping land at 150mAOD. This route option crosses the Cameron Burn and the Shank Burn.
3j	This route falls within the settled urban fringe landscape of the North Lanarkshire LCA 6 – Plateau Farmlands. This section diverts broadly south-west across agricultural land, following an alignment that is constrained by the 150m residential trigger for consideration zones.	This route crosses two small areas of NWSS woodland although during route alignment stage there would be the potential to avoid direct impacts to them.	There are no designated heritage assets affected by this option.	There are no recreational assets affected by this option.	Towards the southern extent of this option an 11kV and two 33kV OHLs are crossed. Adjacent to Yelts Hole Road a consented planning application for agricultural use lies within close proximity to this Route Option, however, the site can be avoided during route alignment.	For the majority of its length this option traverse relatively flat land at around 110mAOD. The route option crosses the Gartverrie Burn where it connects to the Easterhouse to Newarthill OHL.
Summary	Landscape character across this section follows a relatively similar pattern, transitioning from the plateau moorland landscape in the north to the more settled and rolling, fragmented farmland and urban fringe landscape to the south. A regular pattern of scattered properties and settlement is apparent across this whole section which increases the potential visual effects of all the Route Options with no real preference between them. Option 3b uses a localised ridgeline to provide some visual separation from the settlements at Greengairs and Wattston. Visual effects on recreational users of Palacerigg Country Park will be impacted by both Options 3e and 3f with 3e resulting in comparatively greater visual effect although Option 3f could have a greater impact on landscape features through the removal of woodland. Overall Options 3a, 3b, 3c and 3d would have comparatively less of an effect on landscape character due to the more industrial and modified nature of the landscape.	Longriggend Moss and North Bellstane Plantation SSSIs are the only designated ecological sites within this section. While Longriggend Moss SSSI is close to Option 3a it is located sufficiently far enough away that it should not be affected. However, Option 3h crosses North Bellstane Plantation SSSI and is consequently the least preferred of the Options. All route options within this section have the potential to cross and impact on woodland including Ancient Woodland and NWSS woodland. The main difference between options is the extent to which they interact with woodland and the varying requirements to create new wayleaves.	There are no designated heritage assets within this section and consequently Cultural Heritage considerations are not considered to influence the selection of a preferred Route Option.	The key tourism and recreational resource in this section is Palacerigg Country Park and the network of Core Paths, the majority of which are associated with this recreational resource. The main routeing consideration is the extent to which Route Options directly impact the Country Park or the amenity of visitors to it. Options 3e and 3f both cross the Country Park so from a recreational resource are least desirable. Option 3f skirts the northern edge comparatively limiting potential effects on the amenity of users compared with Option 3e which crosses the Park following a north south alignment. All other options avoid the Park and are consequently preferable from a tourism and recreational perspective. All Options other than 3c, 3d and 3j cross at least one Core Path, however these are not considered to be significant constraints to Route Options.	There is a range of infrastructure present within this section including roads, existing transmission and distribution OHLs as well as Community Growth Areas and windfarms. Option 3f crosses the eastern section of the Palacerigg CGA and consequently is comparatively less preferred than other options. Options 3a and 3b both encroach on the rotor offset of existing wind turbines as well as various planning applications for industrial/commercial development which together makes these options less desirable. There is a range of existing transmission and distribution OHLs within this section. Whilst routeing in close proximity to existing OHLs is feasible, however, as noted elsewhere can result in wirescape issues. From a land use and infrastructure perspective Options 3e, 3g, 3h, 3i and 3j provide fewer constraints.	Landform and topography within this section is broadly similar for all Route Options. Route options in the north of this section cross the rolling plateau landform which transitions to the south of this section into a more gently undulating landform with former mineral workings creating localised contrast in topography. Slopes and elevation are not considered to pose a significant constraint to the Route Options and do not significantly influence the selection of a preferred Route Option.

