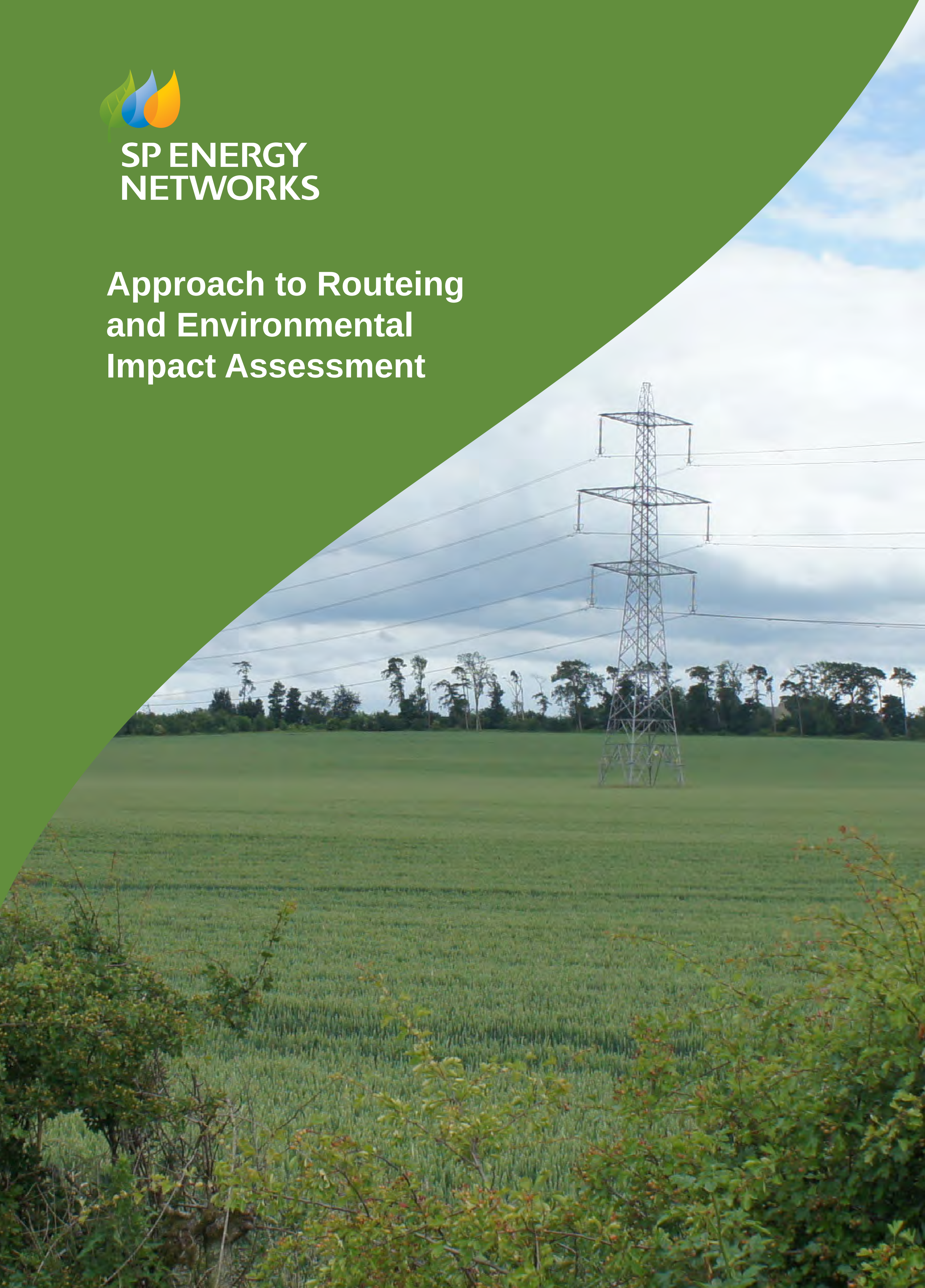
SP ENERGY NETWORKS

Approach to Routeing and Environmental Impact Assessment



Foreword

Electricity is an essential part of our everyday lives. We all expect to have access to it at the flick of a switch and we take its presence in our homes and workplaces as a given.

The way we live, the way we work and the way we all use energy is changing at an unprecedented scale. Rapid transformation is required to meet ambitious net zero targets set by governments and expected by society to address the climate emergency. We must act fast to support this transition by accelerating progress to a low carbon economy, increasing resilience and by helping to create fair, healthy and prosperous communities.

We must plan the future we need, taking a proactive approach which balances environmental, technical and economic considerations. One of the most significant changes we face is the shift away from centralised generation to multiple smaller scale renewable sources, both on and off shore, which are geographically distributed.

The UK Government forecast the use of green electricity will double by 2050. This change will require more renewable sources and more network to move this clean energy around.

High voltage, high capacity overhead lines are the proven economic and reliable choice for the bulk transmission of electricity throughout the world.

The routeing of overhead lines is a complex process, requiring a balance to be struck between statutory obligations, engineering requirements, economic viability, the environment, and people who live, work, enjoy recreation and pass through it. I strongly believe that this industry leading approach will help to find that crucial balance between these considerations.

Major electrical infrastructure projects can understandably generate considerable public interest and debate, particularly in relation to local concerns such as visual amenity. Given the importance of these projects to society as a whole, it is critical that public debate is well-informed. This document has been written to provide a better understanding, for all those involved in the consideration of major electrical infrastructure projects, of our approach to the routeing and environmental impact assessment (EIA), our approach to consulting effectively and our approach to transparency in decision making.

I firmly believe that by taking the approach to development outlined in this document we can plan for a better future, quicker.

Frank Mitchell
CEO, SP Energy Networks

Contents

01

02

03

04

Appendices

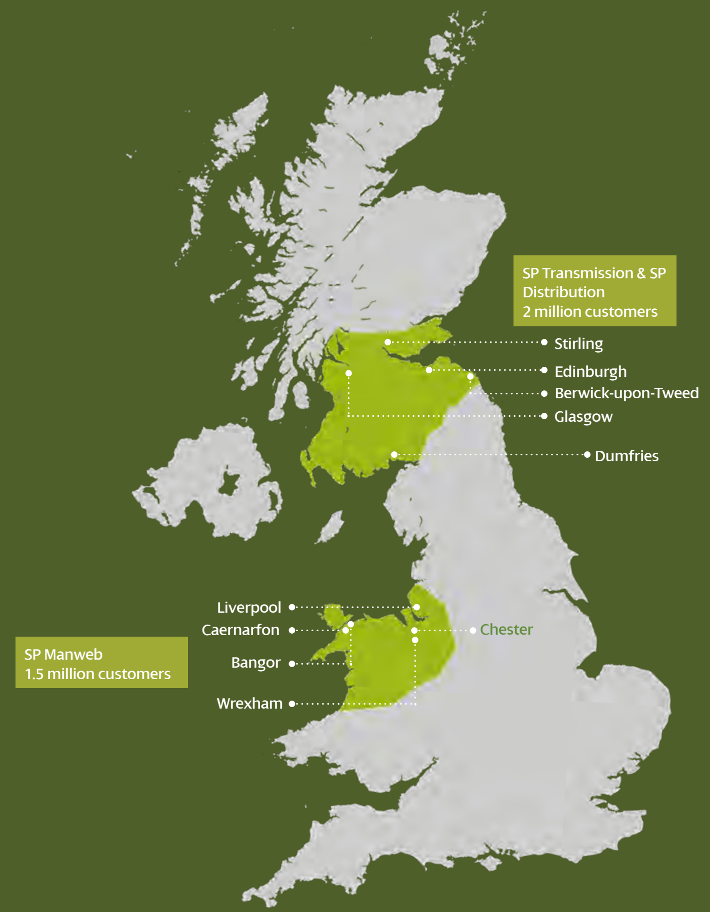
01 Introduction

❮ PREVIOUS PAGE

1.1

Introduction

SP Energy Networks (SPEN) is part of the ScottishPower Group of companies. SPEN owns three regulated electricity network businesses in the UK. These businesses are 'asset-owner companies' holding the regulated assets and Electricity Transmission and Distribution Licenses of ScottishPower. SPEN operates, maintains and develops the network of cables, overhead lines and substations transporting electricity to around 3.5 million connected customers in the South of Scotland, Cheshire, Merseyside, North Shropshire and North Wales.



SP Transmission plc (SPT) owns the transmission network in central and southern Scotland. SPT takes electricity generated from power stations, windfarms and various other utilities and transports it through the transmission network, consisting of over 4000km of overhead lines and 320km of underground cables. SPT also has 132 grid substations on the transmission network where the high voltage supply is reduced to a lower voltage for distribution to customers.

The electricity system in the UK is going through a transformational change as we move towards a low carbon economy. Traditional large fossil fuel centralised power stations, mostly near the sea, are being replaced by renewable energy that is geographically more spread out. The SPT area is therefore crucial to the delivery of the UK Government's renewable energy objectives due to its location in an area of outstanding renewable resource and its position between the SSEN and NGET areas. We have a unique role in connecting renewable generation and bulk transfer of renewable energy from the SSEN and SPT areas into NGET. Our activities therefore benefit stakeholders throughout the UK.

SPEN's other two regulated network businesses are Distribution Network Operators (DNO); SP Distribution plc (SPD) and SP Manweb plc (SPM). The electricity distribution networks are regional and transport electricity at a lower voltage (33kV and below) from the national (transmission) grid to industrial, commercial and domestic users. In addition to distribution voltages, SPM also operate the 132kV network in Cheshire, Merseyside and North Wales (in England and Wales, 132kV is classed as a distribution voltage). SPM and SPD own 30,000 substations, 40,000km of overhead lines and 65,000km of underground cables.

NEXT PAGE ❯

1.2

The Purpose
of this Document

SPEN has a legal duty to develop and maintain a technically feasible and economically viable transmission and distribution system. SPEN must fulfil this duty by also having due regard to environmental interests including natural and cultural assets and people.

SPEN has published this document for the following reasons:

- Transmission overhead lines have technical requirements which influence their routeing and siting. It is essential that environmental and technical requirements are understood and balanced in route/site selection;
- Transmission overhead lines and underground cables are developments which follow a linear route and, in common with other similar forms of developments such as roads and pipelines, have particular characteristics which distinguish them from developments on a single site;
- whilst SPEN has significant experience of this process, to date, there has been little guidance published on the identification and appraisal of transmission overhead line routes and the assessment of their likely environmental effects.

1.3

Intended Users
of the Document

This document is intended to provide a reference point for:

- statutory and non-statutory consultees for major electrical infrastructure applications;
- consultants commissioned by SPEN to undertake line routeing and environmental impact assessment (EIA) work;
- Company staff and representatives who commission line routeing and EIA work;
- anyone with an interest in project proposals being brought forward by SPEN.

1.4

The Scope
of this Document

This document applies to transmission overhead lines which are defined as any overhead line operating at 132 kilovolts (kV) and above.

The document explains:

- SPEN's approach to selecting a route for an overhead line and/or underground cable in accordance with its statutory duties under the Electricity Act 1989;
- SPEN's approach to considering circumstances for undergrounding sections of transmission overhead lines;
- SPEN's approach to assessing the environmental effects of major electrical infrastructure projects in accordance with EIA legislation.

The following appendices are also included:

- Appendix 1 explains the purpose of the transmission and distribution network and SPEN's overall approach to planning transmission overhead line projects;
- Appendix 2 sets out the legal and consenting requirements for major electrical infrastructure projects;
- Appendix 3 explains the characteristics of an overhead line, an underground cable and associated infrastructure;
- Appendix 4 sets out the Holford Rules for routeing high voltage overhead transmission lines, and subsequent clarifications;
- Appendix 5 explains SPEN's approach to addressing biodiversity net gain;
- Appendix 6 provides a glossary of terms.

This document is relevant to Scotland, England and Wales, with reference made to any differences in legislative process where relevant.

02

The SPEN Approach to Routeing and Siting

PREVIOUS PAGE

L12 400kV towers

2.1

The SPEN Approach to Routeing and Siting

SPEN's overall approach is based on the premise that one of the major effects of an overhead line is visual, as a result of its scale relative to objects in the vicinity such as buildings and trees. As there is no technical way of reducing this other than choice of towers, and only limited ways of achieving screening through planting, one of the most effective ways of causing the least visual disturbance from a new overhead line is by careful routeing. However, the importance of other likely environmental considerations, including matters such as biodiversity, also play a significant role in this process. On that basis, a well routed line takes account of other environmental and technical considerations, even if the length is increased in consequence.

Where undergrounding of an overhead line is required the routeing for these sections will have different technical requirements and environmental considerations than those for an overhead line. For example, once installed, an underground cable will have less visual impact than an overhead line but may have a greater impact on ecological habitats and species and on archaeological remains, given the level of ground disturbance. For these reasons, the route for an underground cable may be different from that for an overhead line.

SPEN is committed to achieving Biodiversity Net Gain (BNG) across all of its Projects at a Business-wide level. Achieving this at an individual Project level when routeing and constructing new electrical infrastructure is a challenging objective given SPEN's role as a regulated business and the ability to obtain land not required for the purposes of developing, operating and maintaining its network. However, SPEN's overall approach to routeing places the core aims of BNG within the wider consideration of environmental matters which need to be balanced when routeing new infrastructure. The Approach to BNG will therefore be developed on a project by project basis with due regard to the relevant national policy in Scotland, England and Wales. A summary of SPEN's approach to achieving BNG at an individual project level is included in Appendix 5 of this document.

L2 275kV tower

02

2.2

A Staged Approach to Routeing, Siting and Environmental Impact Assessment

SPEN's approach to the routeing and environmental impact assessment (EIA) of overhead lines and and associated infrastructure (such as underground cable sections):

- **Stage 1:**
  Identification and appraisal of route options to select a preferred route including consultation with stakeholders and the wider public to establish a proposed route.
- **Stage 2:**
  EIA of the proposed alignment and any associated infrastructure. This is an important stage in that the EIA process is used to further refine the route alignment to avoid and reduce potential environmental effects. Confirmation of the alignment for application purposes.

Stage 1

Route Selection

Under the Electricity Act 1989, SPEN is required to consider technical, economic and environmental matters, and reach a balance between them. This means that the proposed route will be the one, selected after an appraisal of a number of route options, which balances technical feasibility and economic viability with the least disturbance to the environment and to people. Following engagement with relevant stakeholders, including local communities, professional judgement is used to establish the balance between landscape, biodiversity, environmental issues and people. Depending on the nature and scale of a project, there may be multiple stages of consultation to develop and inform the selection of a proposed route.

Stage 2

Environmental Impact Assessment

After the selection of a proposed alignment, it is necessary, in the majority of cases, to undertake an EIA of the likely environmental effects, and to reduce, offset or prevent significant adverse effects, where practicable. This results in the alignment for application purposes.

2.3

The Importance of Stakeholder Engagement

SPEN attaches great importance to the effect that its works may have on the environment and on people. In seeking to achieve ' least disturbance', SPEN is keen to engage with key stakeholders including local communities and others who may have an interest in the project. This engagement process begins at the early stages of development of projects to ensure that the project design balances the views of stakeholders and communities with SPEN's statutory obligations.

In Scotland, the requirements for public consultation in relation to applications for overhead line consent are not prescriptive. However, Scottish Ministers encourage developers to follow consultation principles as set out within the Town and Country Planning (Development Management Procedure) Regulations (Scotland) 2013 and the relevant provisions of the Town and Country (Scotland) Act 1997 (as amended). The requirements for consultation on substations falling into either the major or national development categories are covered under the same legislation as outlined above. The public consultation requirements for Nationally Significant Infrastructure Projects (NSIP) projects in England and Wales are set out in sections 42 and 47 of the Planning Act 2008. This includes preparation of a Consultation Report which sets out the feedback received throughout the process and how SPEN has responded to this. SPEN will engage with stakeholders at the following key stages:

The Four Steps of Consultation

Illustration Two

1 Pre-project notification and engagement

2 Information gathering

3 Obtaining feedback on emerging route options and substation sites

4 The EIA stage

1 Pre-project notification and engagement:

Discussions are undertaken with consenting bodies, planning authorities, and statutory consultees such as NatureScot (formerly Scottish Natural Heritage), Scottish Forestry, Natural England and Natural Resources Wales. Early and proactive engagement enables the views of these consultees to inform project design, and both their advice on routeing and assessment methodologies and their suggestions for engaging with other interested parties and local communities to be taken into account. It also provides consultees with an early understanding of the likely programme to submission of the application for consent, which assists in ensuring that they are able to engage effectively and in a timely manner as the project progresses. In Scotland, depending on the size and scale of the Project, the Scottish Government may establish a Statutory Stakeholder Community Liaison Group (SSLG) for the duration of a Project. This group would be chaired by the Scottish Government and would bring together SPEN and the statutory consultees involved in the decision-making process, to ensure key information on all aspects of the Project is shared, discussed and consulted on at each stage of the process.

2 Information gathering:

To inform the routeing stage, information on relevant environmental and planning considerations within the project study area is requested from statutory consultees and other relevant organisations such as the Royal Society for the Protection of Birds and local Wildlife Trusts. In conjunction with this, or in parallel, consultation may be undertaken to gather feedback on proposed data gathering techniques (such as seasonal bird surveys) for comparing route options.

3 Obtaining feedback on emerging route options and substation sites:

A number of different methods may be used to gather feedback on emerging project details, depending on the size and characteristics of the project. This often includes discussion of any alternative corridors, line routes, cable section routes and substation sites which are being considered.

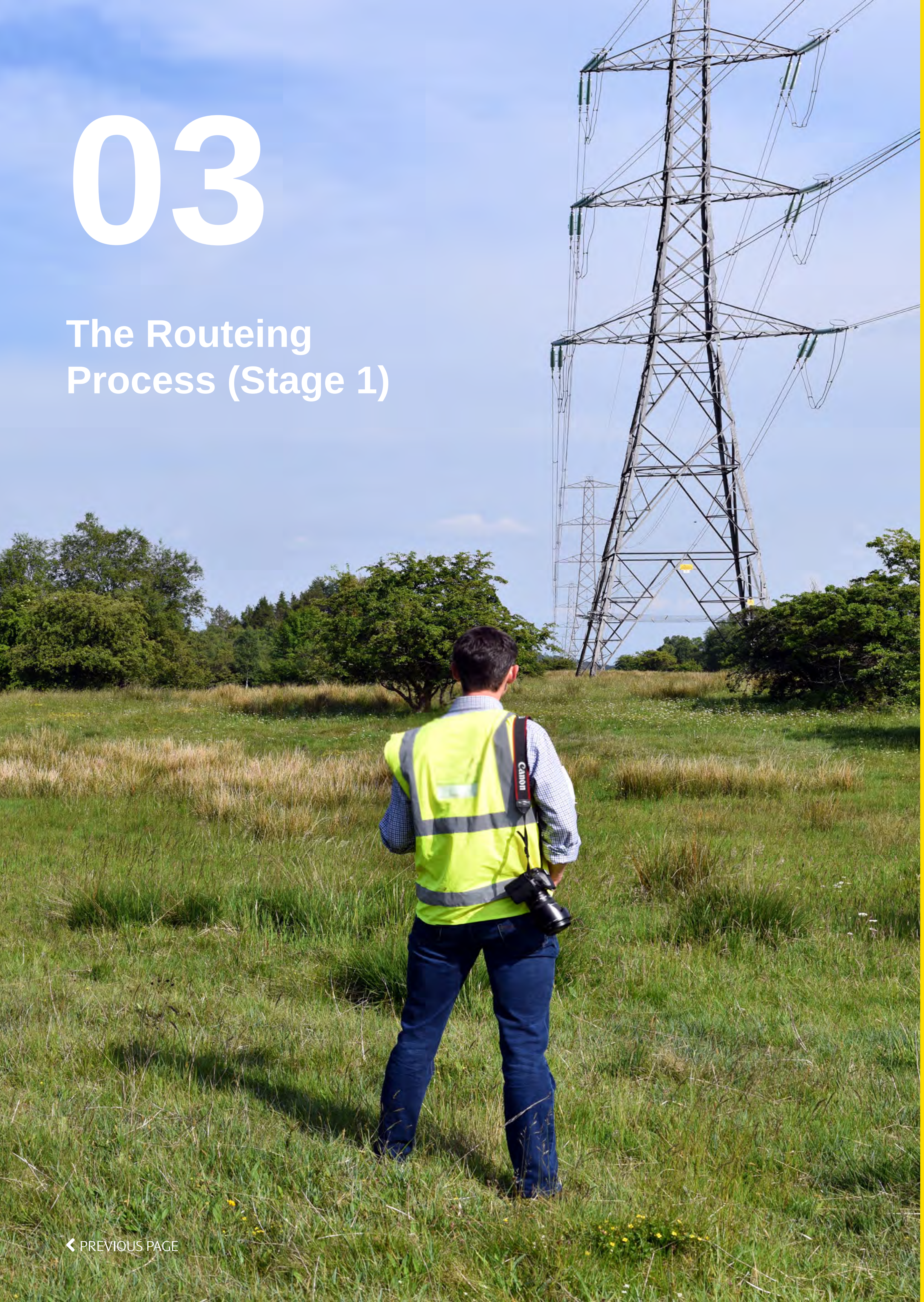
For larger projects, these alternatives may be set out in a 'Routeing Consultation Document' which is issued to statutory consultees, and made available on SPEN's website, at Council offices and in public libraries, with its availability to the public advertised in the press. Local exhibition(s) and/or public meetings may also be arranged if considered beneficial, with supporting flyers/leaflets and/or feedback forms to aid people's understanding of the project in order to get feedback on the routeing process. Where face to face events are not possible, SPEN will look to virtual methods of informing consultation and gathering feedback from stakeholders such as project specific websites to host virtual consultations to share relevant information.

SPEN's approach to consulting on major electrical infrastructure projects is to consult on a series of route options clearly indicating a preferred route, setting out the reasons for the other route options being discarded. These consultations are aimed at everyone with a potential interest, including key stakeholders involved in the planning process, communities and landowners.

4 The EIA stage:

The results of stakeholder engagement are taken into consideration and used to confirm the 'proposed route' (and substation site if relevant) for progression to EIA. The main purpose of the EIA is to identify the significant effects arising from a project. Further consultation is carried out during the EIA stage, including additional information gathering, and the preparation of a publically available Scoping Report which accompanies a 'Request for a Scoping Opinion' to the consenting authority as to the information to be provided in the EIA Report/Environmental Statement, including the proposed assessment methodologies. For example, the Scoping Report will set out the proposed ecological and archaeological surveys, and the viewpoints proposed to inform the assessment of visual impacts. Feedback received at this stage will also inform development of appropriate mitigation strategies as the EIA process is progressed.

Reference will also be made to any relevant legislation, industry standards and good practice guidance. Further public engagement is also undertaken as necessary and in accordance with EIA good practice. In England and Wales, this will also comply with the requirements of the Planning Act 2008, which includes the preparation of a 'Preliminary Environmental Information Report' to enable stakeholders, including the local community, to understand the environmental effects of the proposed development so as to inform their responses regarding the proposed development. In accordance with the relevant consenting requirements in Scotland, England and Wales, the EIA Report/Environmental Statement is consulted upon by the determining authority as an accompanying document to the application for consent.



03

The Routeing Process (Stage 1)

3.1

Introduction

This chapter describes the process which SPEN follows to select a proposed route/site for an overhead line and associated infrastructure. This process is important because the most effective method of causing 'least disturbance' to the environment and to people is by careful routeing.

3.2

The Needs Case for a Project

The project design, subsequent routeing process and stakeholder engagement, are built on the needs case for a project. Whether a customer connection, such as for a new onshore wind farm, or a wider upgrade or replacement of existing infrastructure, the need for a project will involve assessing various technical and commercial factors for different options relevant to each project, in line with the legal obligations of SPEN's transmission and distribution licenses. In England and Wales, SPEN will produce a Strategic Options Report which sets out what these technical considerations are and the various options identified. The need case for projects in Scotland will be set out differently in each case as required.

In addition, the planning need for all electrical infrastructure projects at 132kV and above is established via the relevant national policy for Scotland, England and Wales[1] which class these projects as nationally significant development and support projects which fulfil a national need.

Having established the need for a project and the two points of connection, the starting point is generally to identify an overhead line route. If an underground cable is required for a section of an overhead line route, the objective is to minimise the length of underground cable necessary to overcome the constraint to overhead line routeing, consistent with a balance between technical, economic viability, and environmental considerations.

[1]Currently the National Planning Framework (NPF) in Scotland and National Policy Statements (NPS) 1 and 5 in England and Wales.

3.3

The Approach to Routeing an Overhead Line

The approach to routeing an overhead line is based on the premise that one of the major effects of an overhead line is visual and that the degree of visual intrusion can be reduced by careful routeing. A reduction in visual intrusion can be achieved by routeing the line to fit the topography, by using topography and trees to provide screening and/or backclothing, and by routeing the line at a distance from settlements and roads. However, the importance of environmental issues, including matters such as biodiversity and cultural heritage, also play a significant role in this process.

On that basis, a well-routed line takes into account other environmental and technical considerations and will avoid, wherever possible, areas of high amenity value.

Environmental considerations include potential effects on (in no hierarchical order):

- visual amenity;
- landscape character;
- ecology and ornithology;
- Forestry and woodland (including areas of ancient and native woodland);
- hydrology, hydrogeology, geology (such as carbon-rich soils and deep peat) and water resources;
- cultural heritage including archaeology;
- land uses including mineral operations and agriculture; and
- recreation and tourism.

Technical considerations which can influence routeing include the existing electricity transmission network, access requirements, slope gradient, altitude, waterbodies and peat and the existence of wind farms.

Every project broadly follows the well-established and sequential step-by-step process summarised in the flow diagram at the end of this chapter.

Whilst presented as a linear process for simplicity, the approach is iterative and the steps may be re-visited several times. The outcome of each step is subject to a technical and, where relevant, consultation, 'check' with key stakeholders including the public, prior to commencing the next step. Professional judgement is used to establish explicitly the balance between technical, economic viability and environmental factors.

Each of the steps is described below.

3.4

The Routeing Objective

The routeing objective is founded on license obligations and schedule 9 responsibilities under the Electricity Act 1989. As such, the routeing objective guides the process of identifying and assessing options and is used to test the outcomes and conclusions of the process to ensure that an appropriate balance between engineering requirements, economic viability, the environment and people has been achieved.

Example Routeing Objective

To fulful SPEN's statutory and licence duties, the Routeing Objective for the Project is:

"To identify a technically feasible and economically viable route for a continuous 132kV overhead line connection, supported on lattice steel towers. This route should, on balance, cause the least disturbance to the environment and the people who live, work and enjoy recreation within it".

3.5

Established Practice for Overhead Line Routeing

The Holford Rules

It is generally accepted across the electricity industry that the guidelines developed by the late Lord Holford in 1959 for routeing overhead lines, 'The Holford Rules', should continue to be employed as the basis for routeing high voltage overhead lines. The Holford Rules were reviewed circa 1992 by the National Grid Company (NGC) Plc. (now National Grid Transmission (NGT)) as owner and operator of the electricity transmission network in England and Wales, with notes of clarification added to update the Rules. A subsequent review of the Holford Rules (and NGC clarification notes) was undertaken by Scottish Hydro Electric Transmission Limited (SHETL) in 2003 to reflect Scottish circumstances. The Holford Rules also include Supplementary Notes on the Siting of Substations. Additional guidance on the siting of substations is provided by 'The Horlock Rules'.

Rule 1

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

Rule 2

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

Rule 3

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

Rule 4

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

Rule 5

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

Rule 6

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

Rule 7

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

Read Holford Rule Notes here

Forestry Guidelines

SPEN recognises the critical role which trees and forestry play in terms of our response to climate change, climate adaptation, biodiversity, landscape and habitat enhancement.

Wherever possible, overhead lines should be routed to avoid forestry and woodland areas, in particular, areas of ancient and native woodland. However, wherever this is not possible, overhead lines should be routed to follow open space and to run alongside, not through, woodland. Where there is no alternative route; an overhead line through a forested area should:

- minimise landscape impacts;
- avoid the line of sight of important views;
- be kept in valleys and depressions;
- not divide a hill into two similar parts where it crosses over a summit;
- cross skyline or ridges where they drop to a low point;
- follow alignments diagonal to the contour as far as possible;
- vary in the alignment to reflect the landform by rising in hollows and descending on ridges.

The UK Forestry Standard (UKFS) was published in 2017 and provides the national reference standard for managing forests in the UK to meet current needs without hindering future generations from meeting theirs. The UKFS is a high level document and recognises that Scotland's forests have a range of environmental, economic and social objectives. The UKFS defines standards and requirements, provides a basis for regulation and monitoring and sets guidelines for sustainable forest management.

While pre-dating the current UKFS, Scottish Forestry previously produced a series of more detailed guidelines for designing forests and accompanying development/infrastructure in forest design planning. These remain consistent with the latest UKFS requirements and include the 'Design techniques for forest management planning: practice guide'.

With respect to the design of the overhead line corridor, within the forest, the overhead line should seem to pass through a series of irregular spaces. The forest should appear to meet across the open space in some places so that the corridor does not split the forest completely. Where appropriate, and in line with relevant electrical and forest management safety guidance, careful consideration should also be given to the management of woodland edges for biodiversity and wildlife e.g. wildlife bridges.

As the Scottish Government is committed to maintaining and enhancing Scotland's forests and woodlands, it has developed the 'Control of Woodland Removal' Policy[2] (last updated in 2019) to guide decisions on woodland removal for the purpose of conversion to another land use. Woodland removal should be kept to a minimum and where woodland is felled, it should be replanted. The policy only supports woodland removal where it would achieve significant and clearly defined public benefits. In most cases, compensatory planting may form part of this balance.

This approach is consistent with the wider policy objectives of the UKFS, which also covers England and Wales and Northern Ireland, with respect to sustainable forest management.

The Horlock Rules for the Siting and Design of Substations

The Horlock Rules were devised in 2003 and updated in 2006 by National Grid Company (NGC) plc. The Horlock Rules provide guidelines for the siting and design of new substations, or substation extensions, to avoid or reduce the environmental effects of such developments.

[2]Control of Woodland Removal: Implementation Guidance (February 2019).

PREVIOUS PAGE


Cable sealing end platform

03

3.6

Circumstances for the Consideration of Undergrounding

As a guide, SPEN will consider undergrounding a 132kV, 275kV or 400kVoverhead line, or section of that line, under the following circumstances, where no suitable route for an overhead line can be identified:

- within a National Park or an Area of Outstanding Natural Beauty (AONB) or a National Scenic Area (NSA) where no suitable alternative route for an overhead line can be identified;
- within areas of regional or local character and amenity importance whether or not subject to landscape or scenic designation which are considered not to have capacity to accommodate an overhead line and where no suitable alternative route for an overhead line be identified;
- where the likely visual impact on residential areas or areas of historic importance or other areas[3] is very significant[4] and no alternative route for an overhead line can be identified;
- where the likely visual impact on a publicly accessible and recognised view or prospect visited and enjoyed by a large number of people within an area of importance for its scenic beauty, character, amenity or historical importance which may include such features as listed buildings and conservation areas is very significant and no alternative route for an overhead line can be identified;
- where from a review of the relevant environmental information it is concluded that the combination of likely adverse effects is very significant and that this cannot be satisfactorily avoided, reduced or offset by an alternative overhead line route;
- where technical constraints are such that no suitable overhead line route can be identified.

Under these circumstances, SPEN will make a clear and transparent decision on the undergrounding of a section of line. This will take into account feedback from consultations with stakeholders and the public in relation to the protection of a particular receptor in terms of the benefits/disbenefits of underground cable as an alternative to an overhead line. This decision will take into account the benefit, in planning terms, that could be achieved through undergrounding, without incurring excessive cost, and the effects of the technical issues associated with undergrounding on the overall reliability and availability of the connection, the risks to economic viability, including capital and maintenance costs, and deliverability of the project.

[3]Such as areas used for sport or recreation or the road network
[4]'Very significant' is identified through Environmental Impact Assessment (EIA) techniques and represents a degree of likely significant adverse effect, accepting that an overhead line is likely to have a significant adverse visual effect, that calls into question the continuity of an overhead line.

NEXT PAGE

3.7

Determination of Potential Effects

Overhead lines are large linear elements in the landscape. They potentially affect, to varying degrees, visual and other environmental aspects of the area through which they run. (see Illustration Three below).

An overhead line may have effects on the following:

- visual amenity;
- landscape character;
- ecology
- biodiversity (including areas of irreplaceable habitat);
- Forestry and woodland (including ancient and native woodlands);
- ornithology;
- hydrology and water resources;
- geology and soil;
- cultural heritage including archaeology;
- land uses including agriculture;
- recreation and tourism.

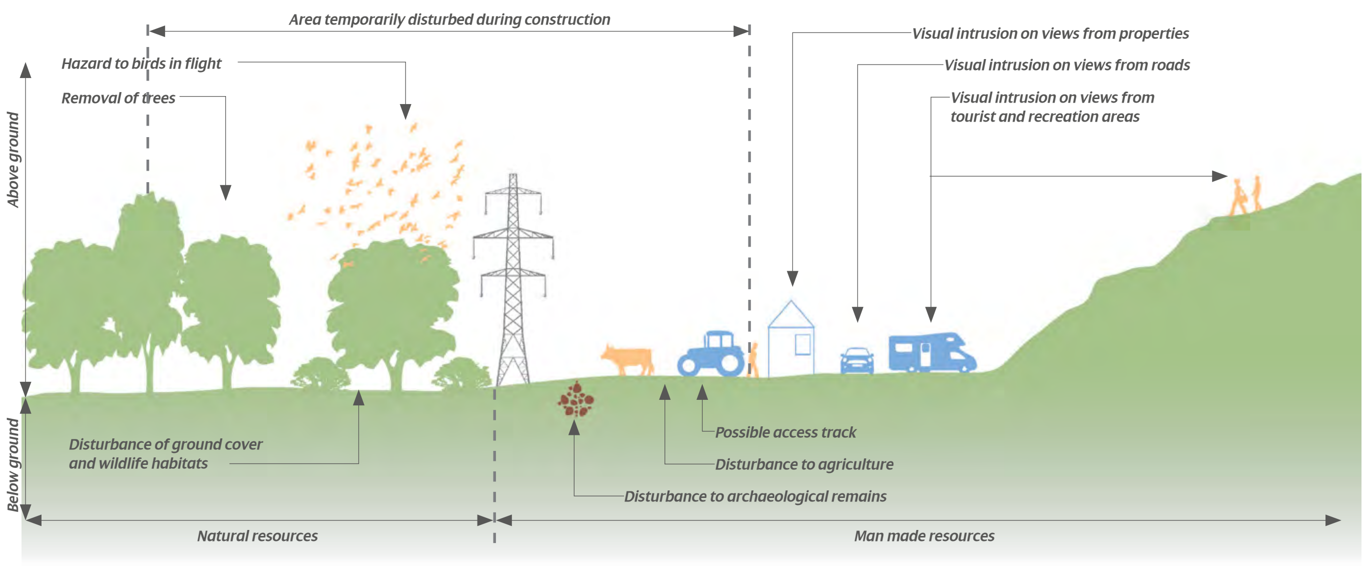
The scale of an overhead line relative to objects in close proximity, such as houses and trees, is such that the major effect is usually the visual intrusion of the towers on peoples views.

A line may also have an effect on the environment and on people as a result of disturbance during construction works and maintenance operations during the life of the line. This includes effects in relation to construction and operational noise, and from vehicle movements. Some effects, both direct and indirect, may be experienced outside of the wayleave corridor during construction and operation e.g. access tracks may have to be built to access the construction area.

The likely visual and physical effects are those relating to the supporting towers or, to a lesser extent, poles. These occupy a ground area and require below ground foundations which may disturb, for instance, archaeological remains or sites of nature conservation interest. Construction of the line may require temporary access tracks to be built. Conductors strung between towers or poles require clearance from trees and other objects. The towers/poles and conductors may be visible from houses, roads, recreational areas, tourist attractions and other important locations and may alter the character of the landscape in which they are sited.

Potential effects of an overhead line

Illustration Three:



3.8

Routeing Considerations and Collection of Background Information

The main environmental and technical considerations which should be taken into account in routeing an overhead line with least visual intrusion and least disturbance to the environment and to people are determined from a study of potential effects and established routeing practice. These 'routeing considerations' include topography, landscape character and areas of high amenity value.

A 'study area' is first defined and information on the main environmental considerations within it is gathered. In addition, information is gathered on the technical considerations which apply such as slope, altitude and the presence of waterbodies. Consultations are undertaken to obtain additional, up-to-date information on relevant considerations. The study area needs to be large enough to accommodate all likely route options, reflecting the Routeing Objective, taking account of factors such as topography and land use.

Considerations which are likely to constrain routeing are mapped together on a 'constraints map' which allows an overview to be taken of the routeing issues, with all major environmental and technical constraints in their relative locational context. The landscape character of the study area is also mapped. This can be based on general published studies, but will require refinement for the detail of the route selection.

Data sources for Wales will include 'LANDMAP', an information system used by Natural Resources Wales and based on the nationwide collation and evaluation of information about the landscape, including historical and cultural aspects and landscape habitats. LANDMAP is used as a reference tool for developing landscape policy and assessing development schemes in the context of landscape impact and is supported by a series of LANDMAP Guidance Notes which provide advice on how the tool can be used within a particular context. Whilst there is no specific guidance on the use of LANDMAP in routeing overhead transmission lines, SPEN views LANDMAP as an invaluable tool in informing each step of the routeing process, in part as a resource for baseline environmental information but also as an appraisal/evaluation tool in later routeing stages.

Where multiple lines are being routed simultaneously, or a line is being routed in close proximity to existing overhead lines, priority will generally be given to the line with the highest voltage (i.e. with the largest tower or pole types) when considering route options. However, in such instances, routeing priorities will be determined on a case by case basis using professional judgement, and informed by further consideration of existing landscape, land use, environmental and technical constraints, including areas of irreplaceable habitat.

3.9

Routeing Strategy

A Routeing Strategy is developed to provide clarity on how the overall Routeing Objective will be achieved for the specific project in question. This is based on established practice for routeing and careful consideration of the specific technical and environmental constraints and opportunities relating to routeing an overhead line through the identified study area.

Example Routeing Strategy

The Strategy for routeing the 275kV overhead line for the Project is as follows:

"To limit visual effects of the proposed 275kV line, line routes will seek to avoid high ground and ridgelines and will generally follow valleys, responding to the grain of the landscape, subject to avoiding areas of highest amenity value. In more densely populated areas, this might require compromise to minimise effects on residential visual amenity which will be considered on a case by case basis."

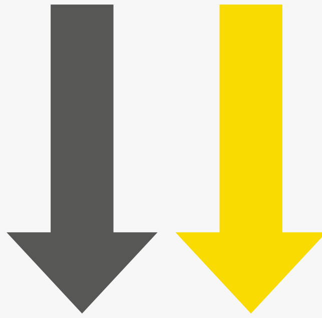
3.10

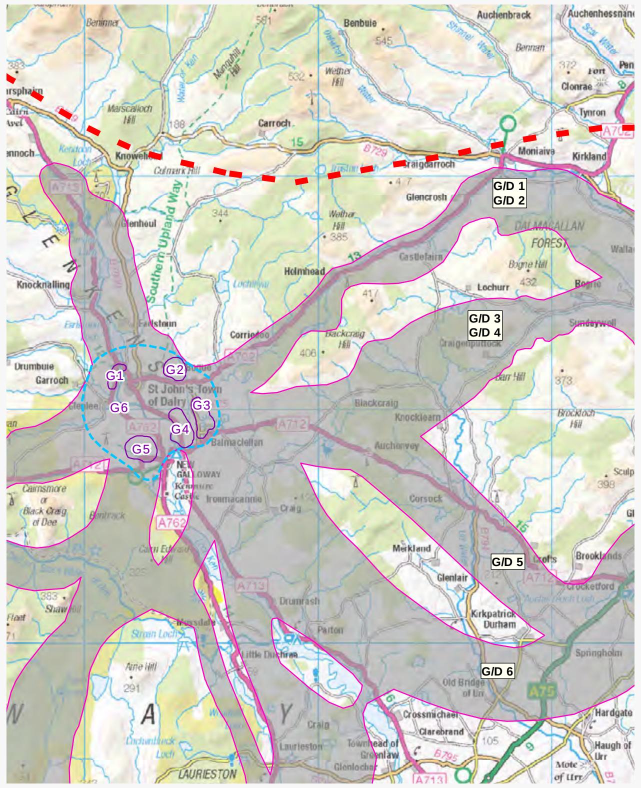
Development of Route Options

Considerations identified in the routeing strategy are applied to the study area to establish a number of possible 'route options'. This process involves the avoidance wherever possible of designated areas of high amenity value and irreplaceable habitat. These areas generally includes areas of natural and cultural heritage value designated at a national, European or international level as these are afforded the highest levels of policy protection.

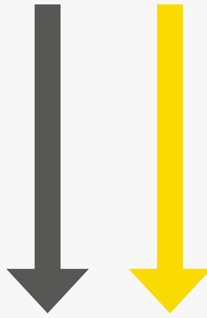
For some projects, it may be helpful to identify a number of 'strategic' corridor options which will be appraised prior to developing and appraising route options. The requirement for strategic routeing will be identified on a case by case basis, considering a range of factors such as the geographic size and scale of the study area between the points of connection, patterns of highest and high amenity sites and settlements or where the study area is split by a particular topographical feature such as a range of hills. Generally, corridor options are likely to cover a broader geographical area than route options, and the consideration of corridor options allows the routeing process to be informed by an additional stage of option appraisal and, where required, stakeholder engagement.

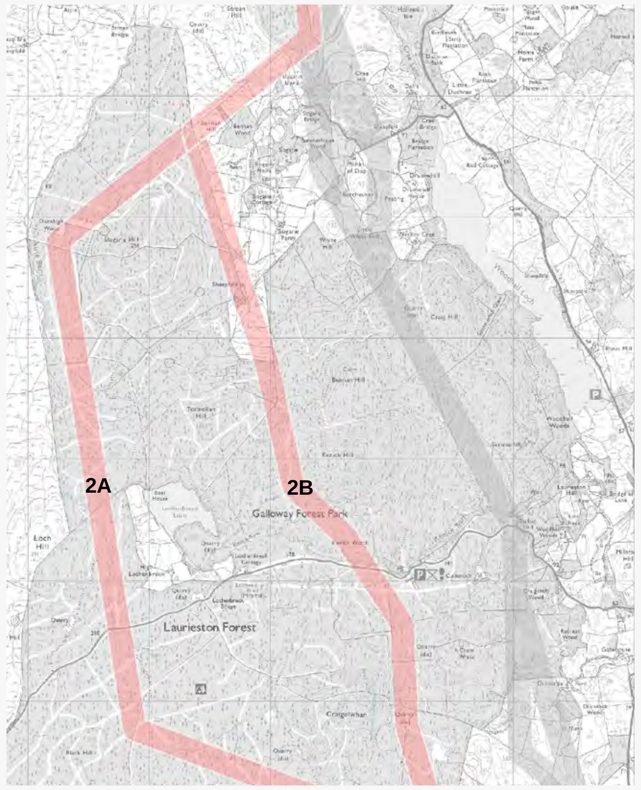
Strategic corridor





Route options





Route alignments

03

3.11

Appraisal of Route Options

Each route option is appraised against the agreed environmental and technical routeing considerations, which have supporting objectives. For example, in relation to visual amenity, one objective may be to avoid/reduce, as far is practicable, potential effects on views from residential receptors. For flood risk, the objective may be to cross flood zones at their narrowest point to minimise locating infrastructure within areas of flood risk. In relation to technical considerations, and the existing electricity network, the objective may be to avoid technical conflicts with existing or planned infrastructure.

In conjunction with the collection of relevant data and the appraisal of route options, the routeing considerations and related objectives may be re-appraised and updated as more information becomes available. Route options may then be rejected or modified, or new route options developed.

By definition, the route of the line must be continuous and as a consequence, the environmental advantages for routeing in one area may be offset by the disadvantages of routeing through an adjoining area. The options which perform poorly in this initial appraisal are rejected. The remaining route options are then further refined and re-appraised if necessary. The objective of this process is to identify the 'preferred route' which is technically feasible and economically viable whilst causing the least disturbance to the environment and to people.

3.12

Selection of a Preferred Route

After the comparative appraisal of route options, an emerging preferred option is subjected to a further technical check prior to SPEN confirming the preferred option. This is then taken forward for stakeholder, including public, consultation. The subsequent routeing and consultation document will provide details on route options considered and will provide a clear and transparent justification for the selection of the preferred route option

3.13

Modification of the Preferred Route

The preferred route is subjected to further consideration in response to public consultation, and may be modified further in the light of these consultations. Modifications may result in further consultation if necessary.

3.14

Selection of the Proposed Route

The preferred route, with any post consultation modifications, becomes the proposed route. This is then progressed to the EIA and detailed design stage to establish a final alignment, including locations for towers/poles and for any ancillary development required such as temporary construction access tracks, laydown areas and construction compounds.

The consideration of underground cable sections may be triggered by circumstances set out in section 3.5 above.

3.15

Identifying and Appraising Options for Underground Cable Sections

There is no established guidance for the routeing of underground cables. However, SPEN's approach is based on the premise that the most significant effects are likely to result from the level of ground disturbance required for the construction of cable trenches and associated works.

The process of identifying potential cable routes is primarily engineering led, in consideration of the same broad environmental considerations as set out for overhead line routeing. Where possible, cables will be routed to follow existing linear features that have already created disturbance such as roads or existing overhead line corridors. Cable construction may lead to vegetation changes which are visible when viewed from above, with this likely to be least visible in flat arable land, more visible in improved or semi- improved grassland used for grazing and most visible in upland semi-natural or natural ground cover. The best way to reduce or mitigate these effects is through careful route selection and successful habitat reinstatement. In addition, well routed cables take into account other environmental and technical considerations and seek to avoid, where possible, areas of irreplaceable habitats which are difficult to reinstate.

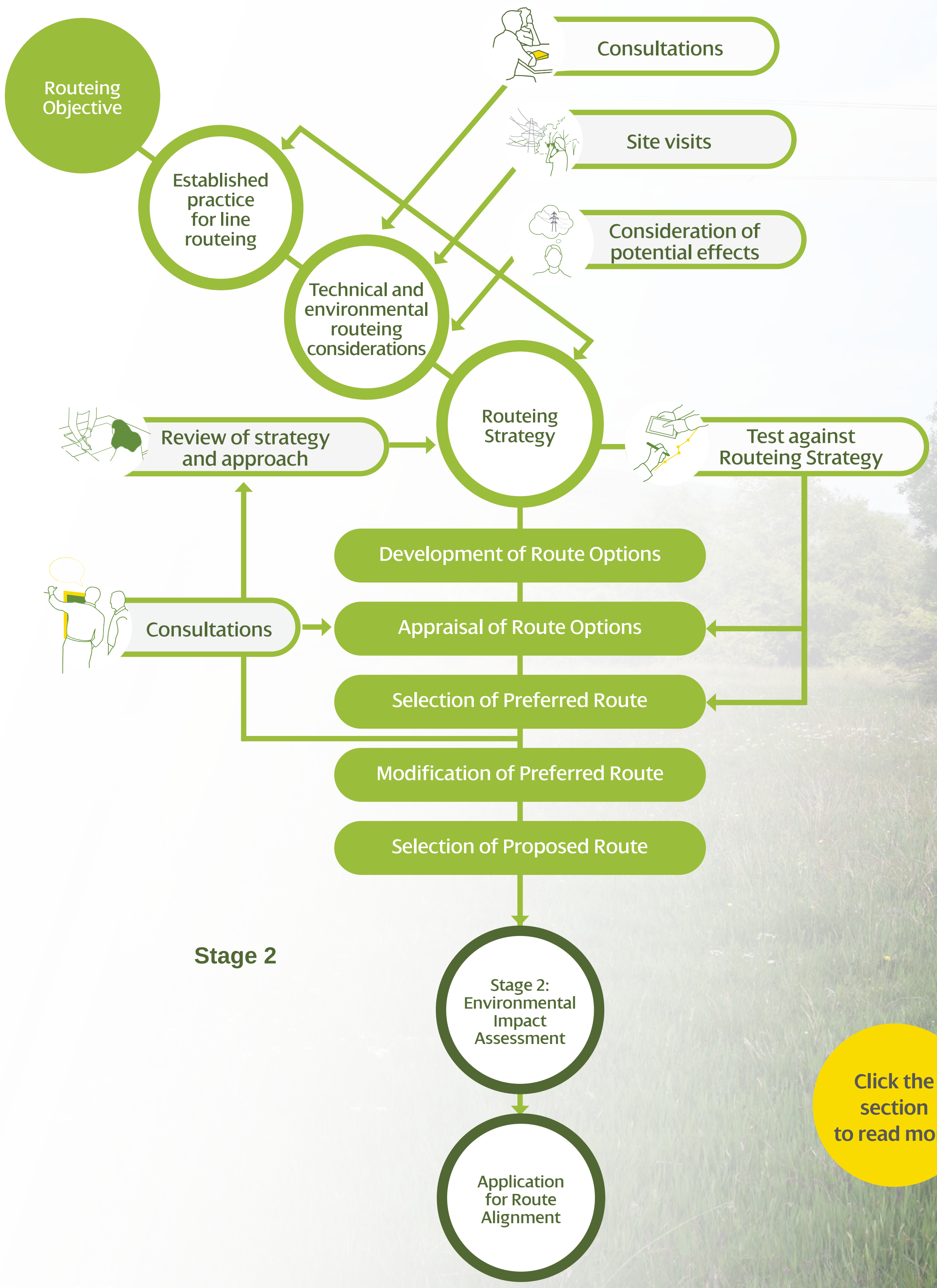
Some appraisal criteria will be similar to those applied to overhead lines such as the consideration of safety and reliability, ease of access for construction and maintenance and the level of disruption to third parties during construction and the ability to mitigate this. However, criteria that will be particularly important for underground cables include the following:

- suitable locations for transition between overhead line and cable (overhead lines may terminate to cable either via a separate 'sealing end compound' or by a gantry fitted to the tower body);
- safety and reliability;
- constructability;
- likely impact on the local environment during construction and ability to mitigate this;
- disruption to third parties during construction and ability to mitigate this;
- ground conditions, including risk of contamination and also ground stability;
- the need to cross wet areas and/or habitats that are difficult to reinstate;
- flood risk, proximity to water supplies and ability to cross watercourses at their narrowest point;
- long term visibility of the cable route post construction, including the length that will be seen and the distance at which it will be visible;
- likely long term loss of landscape features such as hedges or individual trees;
- likely permanent impacts on known and unknown archaeology;
- topographical and geological features;
- ground suitability and elevational alignment;
- the need for long term access for maintenance.

In siting the associated terminal towers and sealing end compounds, used to connect the cable section with an overhead line, due consideration is given to the Holford Rules, including the avoidance of areas of highest and high 'amenity' value where possible, the use of the visual containment offered by natural features such as woodland, and the potential use of bunding and/or screen planting where compatible with landscape character.

Routeing Process

Stage 1: The Routeing and Environmental Impact Assessment Process



Click the section to read more

04

Environmental Impact Assessment of Major Electrical Infrastructure Projects (Stage 2)

L12 400kV route

PREVIOUS PAGE

4.1

Introduction

Environmental Impact Assessment (EIA) is a systematic process intended to identify, predict and assess likely environmental effects of proposed projects and to provide a level of environmental information within the resultant EIA Report or Environmental Statement to assist decision-makers in making an informed decision on an application. EIA should focus on likely 'significant' effects and the measures available to avoid, prevent, reduce or offset significant adverse effects. EIA is part of the iterative process of overhead line routeing and, in conjunction with the technical design and landowner inputs, is used to refine the proposed route to a detailed alignment along with siting and design of tower or pole positions and ancillary development such as access tracks and construction areas. Once the design is 'frozen', the final assessment of environmental effects takes place.

In addition to the environmental factors considered at the routeing stage, there are a number of additional factors considered at this stage given that they relate to the specific location of the infrastructure, including the potential for temporary effects associated with the construction process.

These additional factors include:

- air quality and emissions including dust;
- noise and vibration;
- waste management;
- water quality and resources;
- electric and magnetic fields;
- traffic and transport effects.

The EIA Regulations also require consideration of likely effects in relation to human health, climate change and the vulnerability of the project to major accidents and/or disasters which would have significant adverse effects on the environment.

The objective at this stage remains to avoid, prevent or reduce likely effects on the environment and on people where possible. Minor refinements to the route alignment may be made in consultation with landowners, stakeholders and local communities if appropriate. At this stage, a review of likely adverse environmental effects is undertaken to determine whether or not there is any emerging case for the consideration of undergrounding any sections of the line.

4.2

The Needs Case for a Project

SPEN's overall approach to EIA is reviewed regularly to ensure compliance with regulatory requirements for EIA in Scotland, England and Wales. Further reviews are undertaken on a project by project basis, including a check against the list of information which is required to be included in an EIA Report/Environmental Statement.

Guidance on Assessment Methodologies

EIA Regulations do not specify the use of any particular methodology for the assessment process. However, there are a number of sources of good practice guidance available from consenting authorities and also from the Institute of Environmental Management and Assessment (IEMA) and other professional bodies. SPEN has, over the years, contributed to a number of these good practice guidance documents, which are not listed here as they are updated on a regular basis.

4.3

The Assessment and Reporting Process

Scoping the EIA

The first stage within the EIA process is to 'scope' the EIA, to focus the process on the key environmental issues and likely effects; to identify those which are unlikely to need detailed study; to ensure that up-to-date and relevant information is taken forward into the EIA Report/ES and to provide a means to discuss methods of impact assessment. This commonly involves the preparation of a Scoping Report which accompanies a 'Request for a Scoping Opinion' to the consenting authorities identified in Appendix 2, as to the information to be provided in the EIA Report/ES.

Collecting Baseline Information

The next stage in undertaking the assessment of the likely significant effects of the project is to establish the existing 'baseline' environmental conditions. This involves supplementing the information already obtained at the route selection stage with more detailed information for the proposed alignment, including the likely gathering of more field survey information. It also involves further consultation with both statutory and non-statutory consultees.

Identifying and Assessing Effects

EIA regulations require a description of the likely significant effects of the development on the environment, which should cover direct and indirect effects and any secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the development, resulting from:

a. the existence of the development;

b. the use of natural resources;

c. the emission of pollutants, the creation of nuisances and the elimination of waste.

The interaction between effects should also be considered. For example, the effects of an overhead line on visual amenity and on cultural heritage may interact to produce an indirect effect on tourism within an area.

The likely significance of effects will depend on the characteristics of the effect (type/extent/magnitude) and the sensitivity of the environment or people affected by the proposed development. With some EIA topics such as noise or air quality, it may be possible to use measurable, quantifiable, international or national guidelines or legislative criteria to identify the threshold at which an effect becomes significant. Central and local government and statutory bodies often have set standard thresholds of significance for a wide range of effects. Although not specifically set for EIA purposes, this information can be used, where appropriate, to determine significance thresholds. For other EIA topics such as landscape and visual amenity, the assessment of significance is more difficult, because the effect has to be measured using a combination of quantitative and qualitative criteria and an element of professional judgement is required.

The significance of identified effects will commonly be classified as 'major, moderate, minor or none'. Major and moderate effects are considered to be significant in the context of the EIA Regulations and minor or none are not considered to be significant.

Mitigation Measures

EIA regulations require a description of the measures envisaged "to prevent, reduce and where possible offset any significant adverse effects on the environment". Whilst these measures are often referred to collectively as mitigation, SPEN interprets the term to encompass measures to 'reduce' and 'offset' effects. This is because the most effective means of 'preventing' significant adverse effects associated with major electrical infrastructure projects is by careful routeing at the outset. Where mitigation measures are proposed, their likely effectiveness must be examined, and the significance of the effect re-assessed and adjusted, as appropriate.

Measures to reduce effects are embodied in detailed adjustments to the route alignment, in the placement of individual towers; and possibly, in selected locations, and also at substation sites, the management of existing vegetative cover and new tree, shrub and hedgerow planting. Proposals to offset effects such as off-site planting and woodland management depend on the co-operation of the relevant landowner.

Preparing the EIA Report/Environmental Statement

The EIA Report/Environmental Statement should present the findings of the EIA in a comprehensive, clear and objective manner. In accordance with EIA Regulations, a Non-Technical Summary of the EIA Report/Environmental Statement should also be prepared. This describes the EIA process and its findings in a manner that is easily understood by the general public.

The EIA Report/Environmental Statement should provide an outline of the main alternatives studied by the applicant (i.e. route options) with an indication, taking into account environmental effects, of the main reasons for the alternative selected (i.e. the proposed alignment). It is also SPEN's policy that every EIA Report/Environmental Statement should contain a chapter explaining how the methodology, assessment criteria, significance thresholds, and the document as a whole satisfy the requirements of the EIA Regulations. Each assessment chapter also details the assessment methodology used to assess the likely effect on the topic in question (for example on noise or landscape and visual amenity).

[1]Currently the National Planning Framework (NPF) in Scotland and National Policy Statements (NPS) 1 and 5 in England and Wales.

Examples of
Computer-aided Visualisation


Baseline Photograph showing existing overhead line.


Photomontage showing replacement overhead line.


Digital model showing proposed replacement overhead line.

Appendices

Appendix 1

The Transmission and Distribution Network

The Purpose of Overhead Lines and Underground Cables

The purpose of overhead lines and underground cables is to transmit and distribute electricity in large quantities between points of generation (such as power stations and wind farms) and load (demand) centres namely towns and cities, where the electricity is consumed. This infrastructure also provides interconnection between points of generation and to neighbouring power supply companies.

Our Overall Approach to Planning Major Electrical Infrastructure Projects

SPEN's system planning and design teams continually review the transmission and distribution networks to identify areas that require modernisation or reinforcement to meet the needs of both existing and future customers.

Once we have identified the need for a project, our system designers will consider the specific requirements of the project in conjunction with the existing electricity network in that geographic area. This will allow strategic system options to be identified and appraised (taking into account economic, technical and high level environmental considerations). Depending on the system requirements for the project these options might range from major change or rationalisation of the network in a particular area (replacing/ upgrading/ removing infrastructure) or, in the case of a new connection for generation development, the connection of new apparatus into the existing network that has sufficient capacity to accommodate this.

Once SPEN has identified the system requirements for the project then an appropriate engineering solution will be progressed in line with the steps identified in chapters 2 to 4 of this document.

The UK Government[4] and the Electricity Industry, including SPEN, constantly review their positions on the use of transmission overhead lines. The evidence available, including economic, technical and environmental factors, specifically statutory duties and licence obligations, will support an overhead line approach in most cases.

It is therefore SPEN's view that wherever practical, an overhead line approach is taken when planning and designing major electrical infrastructure projects. However, SPEN appreciates that there are specific circumstances in which an underground approach should be considered.

If, in certain circumstances, it is determined that an underground cable is required instead of an overhead line, the approach is to minimise the length of underground cable necessary to overcome the constraint to overhead line routeing, consistent with a balance between technical and economic viability, deliverability and environmental considerations.

As the transmission and distribution license holders for our network areas, SPEN is obliged to provide connections for new customers looking to connect to our networks. When making a connection offer to these customers, SPEN will offer a connection based on the most efficient and economically viable option (which is usually based on an overhead line solution), as per our statutory transmission and distribution license requirements. However the customer may decide, for reasons related to delivery programme for example, to request that this be designed as an underground cable solution. In such instances, SPEN will assess the viability of such a solution and the customer would be required to meet any additional costs associated with installing the connection underground.

[4]The National Policy Statement for Electricity Networks Infrastructure (EN-5) in England and Wales states that "Government does not believe that development of overhead lines is generally incompatible in principle with developers' duty under section 9 of the Electricity Act to have regard to amenity and to impacts" (paragraph 2.8.2).

PREVIOUS PAGE

Appendix 2

The Legal Framework

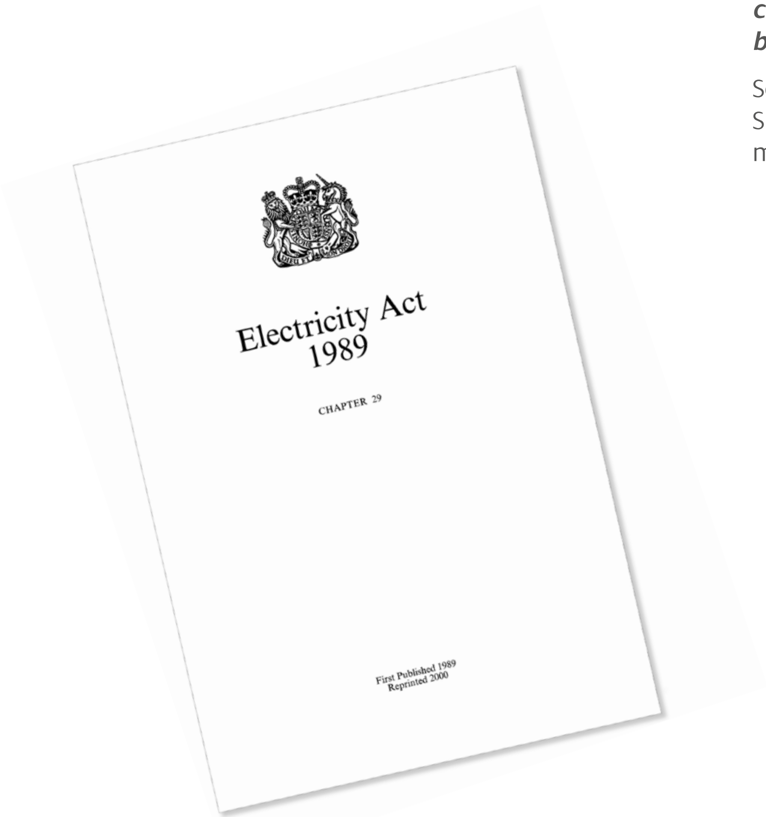
Introduction

There are a number of legal provisions which apply to the development of electricity transmission and distribution lines and associated infrastructure.

The principal legislation which applies in the UK is the Electricity Act 1989. SPEN is also subject to the requirements of "the Planning System". Scotland has a different planning system to England and Wales and, as a consequence, consenting requirements differ from those in England and Wales, as explained below.

The European Union, under Directive 2011/92/EU, also requires that member states ensure certain types of development are assessed in terms of their impact upon the environment (Environmental Impact Assessment (EIA)).

Although the UK has withdrawn recently from the EU, the UK government is committed to maintaining the highest environmental standards, and will continue to uphold international obligations through multilateral environmental agreements. For this reason, it is expected that it will be "business as usual" for EIA, at least in the foreseeable future.



Duties under the Electricity Act 1989

The Electricity Act 1989 provided for the privatisation of the electricity supply industry in the UK and established a licensing regime and a regulator for the industry. SPEN's licensed businesses are authorised to transmit and distribute electricity within its network areas. As such, the Company has a statutory obligation to carry out the duties outlined within the Electricity Act.

Section 9 of the Electricity Act states that it shall be the duty of a license holder "to develop and maintain an efficient, co-ordinated and economical system of electricity transmission/ distribution".

Schedule 9 of the Electricity Act requires SPEN to take account of specific factors in formulating any relevant proposals. This provides that SPEN must:

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

Separate Schedule 9 Statements set out how SPEN[5] and SP Manweb[6] will carry out their duties in developing and maintaining their electricity networks.

[5] https://www.spenergynetworks.co.uk/userfiles/file/Sched9SPTver9.pdf
[6] https://www.spenergynetworks.co.uk/userfiles/file/Sched9SPDver9.pdf

Consenting Requirements for Major Electrical Infrastructure Projects

Consenting Requirements in Scotland

Section 37 of the Electricity Act requires that, with the exception of certain specific examples, all electricity lines exceeding 20kV will require consent to be granted by the Scottish Ministers.

The Overhead Lines (Exemption) (Scotland) Regulations 2013 make provision for a defined list of works where the consent of the Scottish Ministers is not required under Section 37 of the Electricity Act 1989. These include some exemptions in relation to temporary diversions and also the replacement of existing lines within a specified distance and height, provided that the lines are not within a protected area (such as a European designated site, Site of Special Scientific Interest or Scheduled Monument).

This 'Section 37 consent' gives approval to install, and keep installed, an overhead electricity line. Section 57 of the Town & Country Planning (Scotland) Act 1997 as amended provides that "Planning permission may also be deemed to be granted in the case of development with government authorisation".

In certain circumstances, deemed planning permission may also include works that are 'ancillary' or necessary to the operation of the overhead line such as cable sealing and substation compounds. In some instances, there may also be the need for separate planning permission where development does not form part of a Section 37 application. For example, separate planning permission may be required for a substation which 'tees' into an overhead line but is not required for the overhead line to operate. Where consent for development is sought, an application must be made to the relevant planning authority, under the Town & Country Planning (Scotland) Act 1997 as amended, before such works are able to be carried out.

All development requires planning permission. However, some forms of development, including underground cables, typically are classed as 'permitted development' under the Town and Country Planning (General Permitted Development) Order.

Consenting Requirements in England and Wales

In England and Wales, applications for overhead lines up to 132kV and shorter than 2 kilometres (km) are also determined under Section 37 of The Electricity Act. These are determined by the Secretary of State for Energy, although since April 2019, Section 37 applications for renewable energy developments in Wales are decided by Welsh Ministers. Overhead lines of 132kV and 2km or more in England and Wales are determined under the Planning Act 2008 which sets out thresholds for the identification of large scale developments, known as Nationally Significant Infrastructure Projects (NSIPs). NSIPs require a type of consent known as a 'Development Consent Order' (DCO) under procedures governed by the Planning Act 2008 (and amended by the Localism Act 2011).

An 'above ground electric line with a voltage of 132kV or greater' falls under the definition of a NSIP if it has a length greater than 2km (Part 3, Section 16 of the Planning Act 2008, as amended by The Overhead Lines (Exempt Installations) Order 2010). As such, an application for a DCO must be submitted to the Secretary of State for Energy and Climate Change who will examine the application and issue a recommendation to the Secretary of State, who makes the final decision whether to grant or refuse development consent. A granted DCO may also cover any associated development such as underground cable sections that may be required and related development such as substations, if this is not permitted development, i.e. does not require EIA assessment (see below). In England, deemed planning permission can be granted under the DCO for such ancillary development. In Wales, associated development requires separate planning permission from the local planning authority.

All development requires planning permission. However, some forms of development, including underground cables, are classed as 'permitted development' under the Town and Country Planning (General Permitted Development) (England) Order 2015 and the Town and Country Planning (General Permitted Development) Order 1995 (as amended). Developments classified as permitted development unless they are considered to be subject to EIA assessment (see below) may automatically be granted planning permission, by statutory order, and do not require submission of a planning application to the local planning authority.

Environmental Impact Assessment

In Scotland, the relevant EIA requirements are contained in the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017.

In England and Wales, the relevant EIA requirements are contained in the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.

Under the provisions of these regulations, consent cannot be given for any 'EIA development' unless the consenting authority has considered environmental information, in accordance with the requirements of the regulations. Overhead lines of the type considered in this document, and their associated development, can constitute EIA development by virtue of their voltage and/or their length, meaning that they have the potential to have significant effects on the environment. These developments require an EIA to be undertaken with the findings presented in an EIA Report (Scotland) or an Environmental Statement (England and Wales) with the relevant consent application. Any sections of underground cable and substations which form a working part of a connection are included within the EIA as associated or ancillary development.

Importantly, if the consenting authority deems that a development requires EIA, in accordance with EIA Regulations, any permitted development rights are withdrawn and a consent application must be submitted and accompanied by an EIA Report/Environmental Statement.

If deemed planning permission is being sought for ancillary development, such as a substation, this development will also be considered within the EIA. If separate planning permission for a substation is required, the need for EIA will also be considered. Whilst the EIA regulations do not make explicit reference to substations in the list of projects which may require EIA, the potential requirement for EIA is tested against thresholds and criteria for project types which are broadly comparable.

After careful consideration of both the nature and scale of development, SPEN, through its Land and Planning team, may determine that some level of Environmental Appraisal will be required, although the development itself may not constitute an 'EIA Development'.

Land Rights

Rights Over Land

To permit the construction, operation and maintenance of overhead lines, suitable rights over land (wayleaves, servitudes and easements) need to be secured through agreement with every owner or other party holding a relevant interest in the land crossed by a proposed major electrical infrastructure project. SPEN hopes that the necessary rights can be granted to them voluntarily following negotiation, but if this cannot be achieved, the Company can apply to the appropriate body[7] for any necessary wayleaves.

Land Acquisition

To build a major electrical infrastructure project, the acquisition of land, or rights, will usually be required. In the first instance, SPEN seeks to achieve a voluntary agreement to purchase the land required or rights, but in the event that this is not forthcoming, then the use of compulsory powers may be considered.

Arrangements for Access, Construction and Implementation of Mitigation Measures

In addition to the installation of permanent infrastructure, including overhead line towers, any underground cable sections of lines and substations, access routes are required to be used during the construction period. These may require widening of gateways, removal (and subsequent replacement) of hedges and fences, and the provision of temporary plain and stockproof fences. In negotiation of these arrangements, due regard is made to minimising damage to the landholder's interests. Once a line or associated infrastructure has been constructed, a right of access is required periodically for routine maintenance and occasionally for emergency repairs.

Land for temporary set-down areas and other construction activities may also be required from landowners. Proposals for mitigation measures such as tree planting or woodland management may require the co-operation of the relevant landowner.

SPEN's Land Officers seek to reach agreement on mutually acceptable arrangements for the above with landowners and/or any other relevant interested parties.

[7] In Scotland, this is the Scottish Ministers. In England & Wales (if not part of a DCO application) applications are made to the Department of Business, Energy and Industrial Strategy, with the final decision coming from the Secretary of State for Business, Energy and Industrial Strategy.

PREVIOUS PAGE

Appendix 3

Infrastructure Types

Introduction

Electricity is transmitted at 132kV[8], 275kV or 400kV from the point of generation (such as a power station or wind farm) to an electricity substation. Electricity is transmitted in an alternating current (AC) system along either overhead lines or underground cables. At the electricity substation, the power is either transmitted on to another substation, or transformed to a lower voltage and distributed through the distribution network to customers.

Overhead Lines

With an overhead line, conductors (or wires) are suspended at a specified height above ground and supported by wooden poles or lattice steel towers, spaced at intervals. Conductors can be made either of aluminium or steel strands. Most overhead lines on towers at 132kV and above carry two 3-phase circuits (i.e. six conductors), with one circuit strung on each side of a tower. An earth wire may be required to provide lightning protection. Single circuit lines are used on occasion, and at 132kV, these lines can be supported on wooden poles.

Conductors are strung from insulators. Insulators are attached to the lower cross-arms or pole steel work and prevent the electric current from crossing to the tower or pole body.

Lattice Steel Towers

Towers can be used to carry conductors at 132kV and above. These are generally of a steel lattice construction fabricated from high tensile steel which is assembled using galvanised high tensile steel bolts with nuts and locking devices.

Tower Types

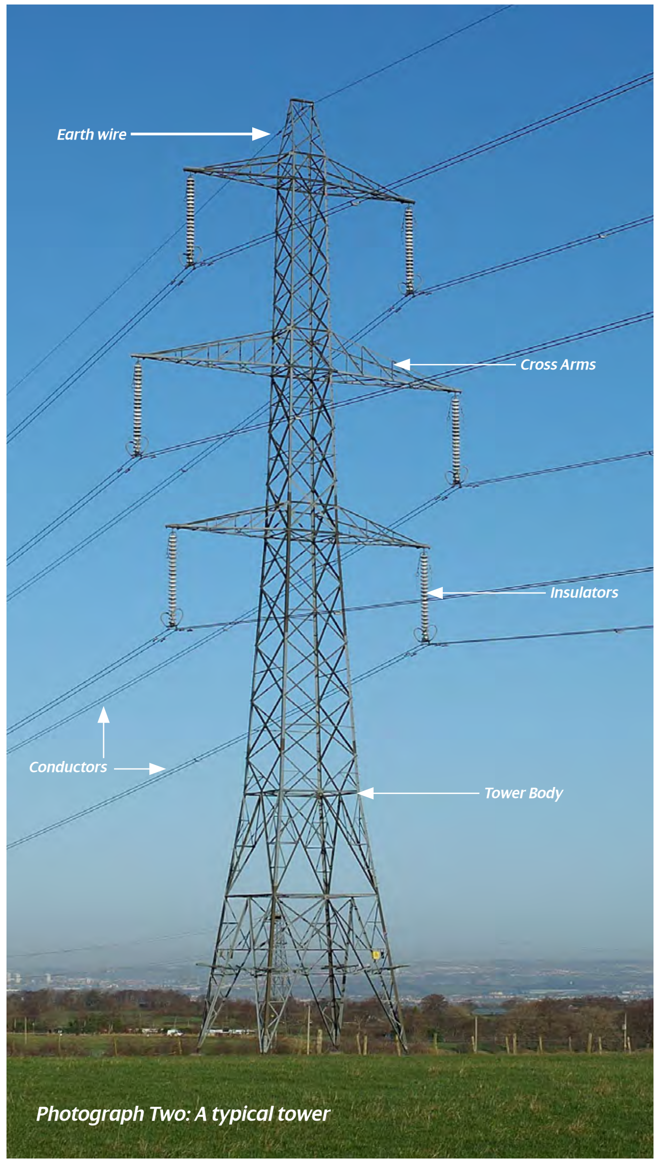
There are three types of tower:

- Suspension or Line: where the tower is part of a straight line section.
- Tension or Angle: where there is a horizontal or vertical deviation in line direction of a specified number of degrees. There are three main types of angle tower 30o, 60o and 90o.
- Terminal: where the overhead line terminates into a substation or on to an underground cable section via a separate cable sealing end compound or platform.

Tower Heights and Span Lengths

The section of overhead line between towers is known as the 'span', with the distance between them known as the 'span length'. Span lengths between towers average between 250m and 350m but can go up to 400m if there is a requirement to span something such as a river or a loch.

Towers are used to maintain safe electrical clearances, which is determined by the voltage of the overhead line (the higher the voltage, the greater the safety clearance that will be required) and the span length required between towers[9]. The average height for 132kV towers ranges between 20m and 30m. At 275kV and 400kV voltages, average tower heights range between 41m and 46m.



Photograph Two: A typical tower

[8] In England and Wales, 132kV is treated as a distribution voltage.
[9] Statutory safety clearances are prescribed in Energy Networks Association - Technical Specification 43-8 "Overhead Line Clearances" (2004)

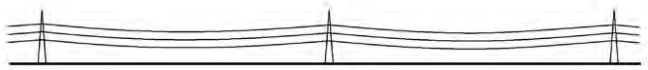
Tower Colour

Colouring towers to camouflage them/reduce their visibility is difficult due to changing lighting conditions and different landscape contexts (and seasonal changes) that towers are seen against when viewed from different directions and elevations (when seen from higher elevations backclothed against the underlying landscape). Over time, the galvanised steel will dull in colour, which can help them to recede in the view in certain viewing contexts.

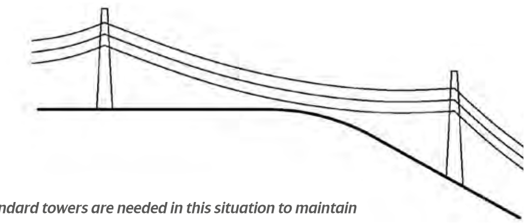
Tower Perceptibility

At 275kV and 400kV voltages, towers are generally perceptible up to 10km when seen against the sky but generally not perceptible beyond 2km if landform and/or vegetation provide an effective backcloth. At a voltage of 132kV, perceptibility may be reduced.

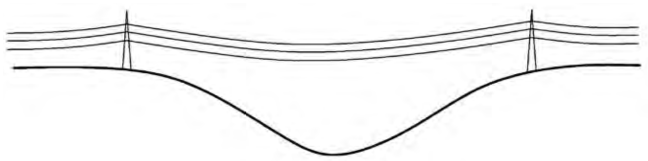
Illustration Five: Span lengths and safety clearances



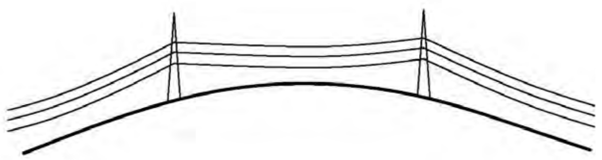
Spans normally vary from approximately 250 to 400 metres. Minimum safely clearances must be maintained under the conductors. The clearances are greater over roads.



Taller than standard towers are needed in this situation to maintain clearances.

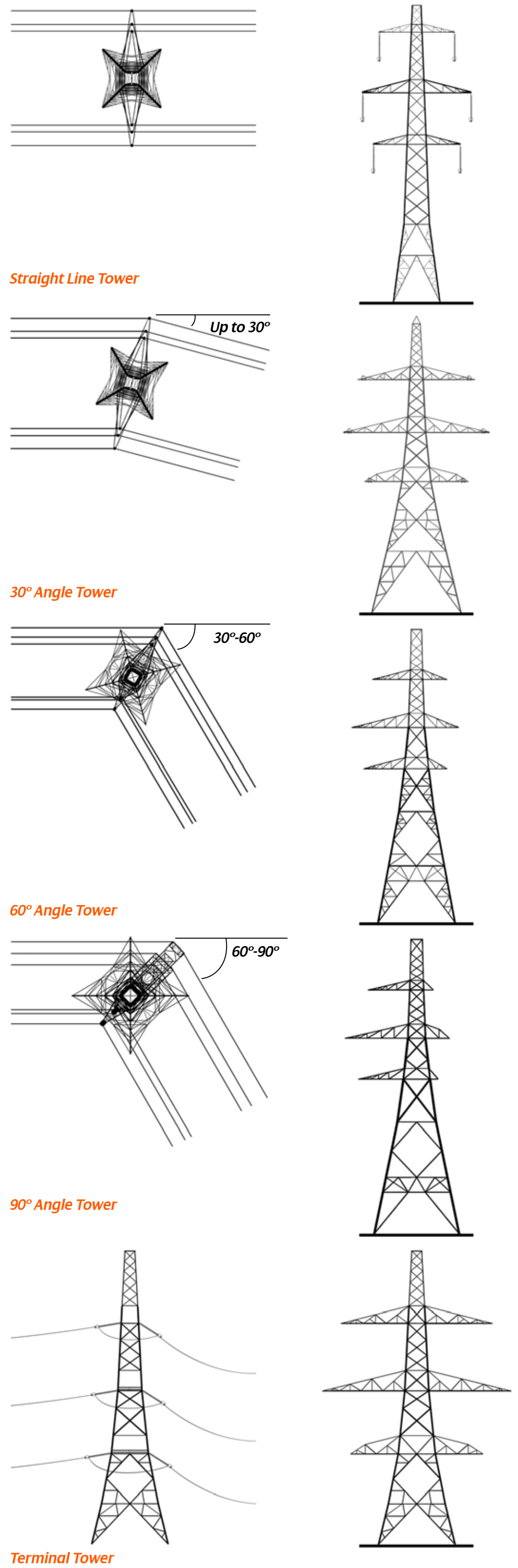


Valleys allow the use of long spans but excessive spans may require the use of 30° angle towers at either end.



A short span at a hilltop keeps tower height down while maintaining clearances. A tower is only used on a summit where unavoidable.

Illustration Six: Typical Tower Types



Photograph Three: A typical pole

Towers tend to appear relatively bright in colour when new (or newly painted), contrasting particularly with darker backdrops. After a number of years, towers tend to weather to a duller colour, and this helps them to blend in better with their background, except when silhouetted against the sky. Towers tend to stand out less against backdrops of mixed colour (such as moorland or broadleaf woodland) than against backdrops of one colour (such as conifer plantations). Glass insulators often result in substantial glare in certain conditions, which reduces substantially as they dull over time.

Wood Poles

Wood poles can be used for single circuit lines operating at 132kV. Wood poles are fabricated from pressure impregnated softwood, treated with a preservative to prevent damage to structural integrity.

Wood poles can consist single poles or, in certain circumstances, double 'H' poles which consist of two wooden poles joined by steel cross bracing both above and below ground. H poles are generally used for greater changes in direction or above certain altitudes.

Pole Types

There are three types of pole:

- Intermediate: where the pole is part of a straight line section.
- Angle: there is only one type of angle pole which can support changes in direction up to a maximum of 300. All angle structures will require to be back stayed.
- Terminal: where the overhead line terminates into a substation or on to an underground cable section via a cable sealing end.

Pole Heights and Span Lengths

Span lengths between poles average between 80m and 100m but can go up to 120m. The average height for poles varies from 14m to 16m.

Pole Colour

New wood poles are dark brown in colour and weather over the years to a light grey.

Pole Perceptibility

Poles are generally perceptible up to 6km when seen against the sky but generally not perceptible beyond 1.5km if landform and/or vegetation provide an effective backcloth.

Photograph Four: A low height tower at Kilmacolm (Source: Mark Turnbull)

Alternative Tower Designs

Reduced (or 'Low') Height Lattice Steel Towers

Most towers carry two three-phase circuits, one circuit each side of the tower with three cross arms each carrying one phase. In special cases where reduction in tower height is visually important, towers with two rather than three cross arms can be considered. These towers, known as Reduced (or 'Low') Height Towers, have long lower cross arms carrying two phases on each side of the tower.

Whilst tree and hill backgrounds should be chosen in preference to sky backgrounds (see Appendix 4), towers may be visible when there is a need to cross a ridge line or line of hills. In such instances, the preferred approach is to cross obliquely at the lowest point and avoid routeing over the highest ground wherever possible. In such instances, the use of reduced (low) height towers may be considered where this would reduce the impact on certain receptors, for example a well visited public viewpoint, or to reduce excessive skylining. In such instances, the benefit of reducing the height in structure must be weighed against the different characteristics of reduced (low) height towers, given that their attributes, as explained below (bulk, density, width), may make them more visible in other senses. The use of low height towers will be considered on a case by case basis depending on landscape, topography and safety considerations.

The overall height of reduced (low) height towers still makes them taller than mature trees and increases the width of the required wayleave due to the length of the bottom cross arms. In flat or gently undulating landscapes they may result in a potential reduction in visual effects, in relation to more distant views, partly due to a reduction in vertical height and partly because the extended horizontal cross arms of reduced (low) height towers may relate more closely to the underlying landscape/ landform. However, in closer views, reduced (low) height towers may potentially lead to increased visual effects where the increased density and horizontal extents of the structures can be appreciated in the view. Importantly, the location of the transition between reduced (low) height and standard height towers is crucial and can offset this any advantage by attracting the eye.

Photograph Five :Terminal tower and cable sealing end platform

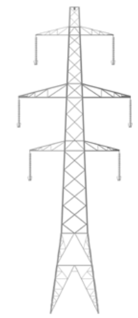
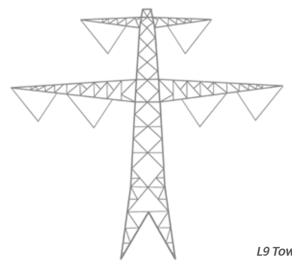
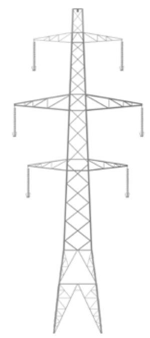
In comparison to towers with three cross arms, the bulk of low height towers, the reduced transparency as a result of their structure, the way in which the eye is drawn by the horizontal appearance of the towers and if they are seen on the apparent skyline can often outweigh any visual benefit of the reduction in height.

New and Emerging Tower Designs

At the time of writing this document, there are a number of existing and emerging towers being designed and tested by both the UK and international electricity industries.

SPEN will continue to monitor, and contribute to, developments in the industry and make decisions on where new and appropriate designs might be utilised as part of the development of any major electrical infrastructure proposals.

Illustration Seven: Comparison of tower types

Tower type	Voltage	Description	Standard design height (approx)	Illustration
L7	132kV	Double circuit with six cross arms (three on each side)	27m	 L7 Tower
L8	275kV	Double circuit with six cross arms (three on each side)	46.4m	 L8 Tower
L9	275kV /400kV	Double circuit with four cross arms (two on each side)	32m	 L9 Tower
L12	275kV /400kV	Double circuit with six cross arms (three on each side)	46.5m	 L12 Tower

Underground Cables

With an underground cable, the conductors are encased in insulated material and buried in a backfilled trench of suitable depth and width. The number of cables, and the depth and width of the trench, depends on a range of factors including voltage, number of circuits and the 'rating' of the cables to be installed, for example, higher ratings may lead to a requirement for more than one cable per phase, which will require wider swathes of land for installation and maintenance. For example, at 132kV voltage, where the cable rating is such that two cables per phase are required for a single circuit, this would require two cables (making one circuit) grouped together in a single trench. If this were a double circuit, then these trenches would require to be separated to ensure cables do not become too hot. The greater the voltage and higher the rating, the greater the separation distance required.

Where connected to an overhead line, an underground cable may also involve the siting of terminal supports and sealing end compounds above ground. These require their own siting appraisal which should normally be undertaken in conjunction with the overhead line/ underground cable routeing.

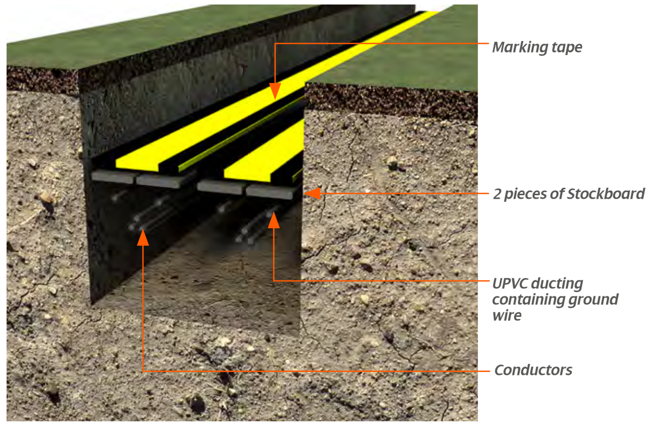


Illustration Eight: Typical 132kV Cable Arrangement (Double Circuit)

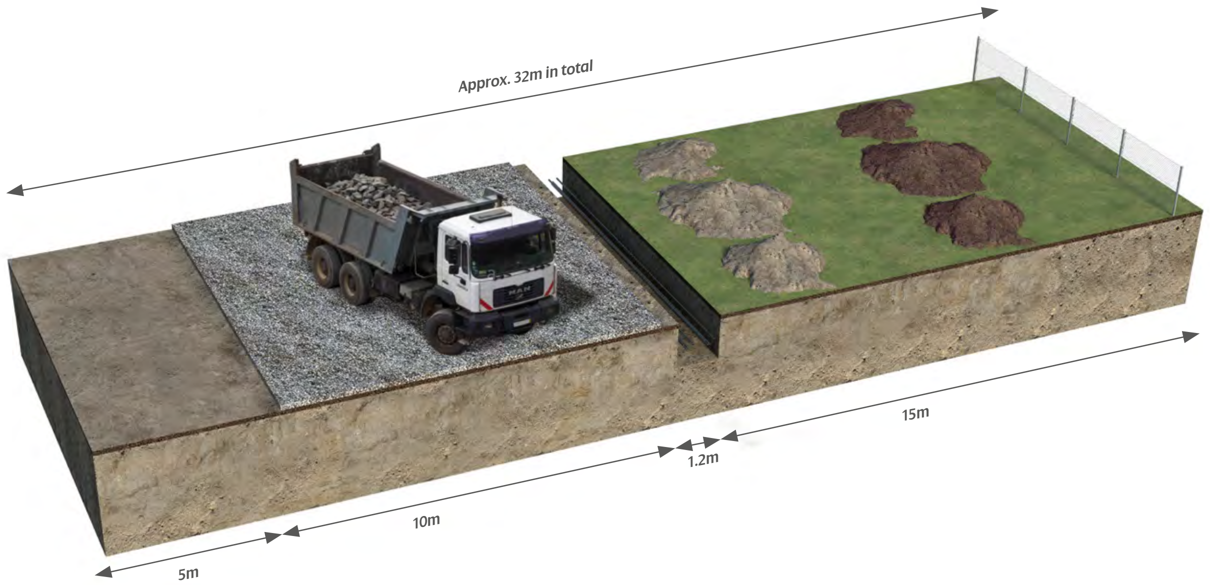


Illustration Nine: Typical Cable Landtake for a 132kV Cable (Double Circuit)

Photograph Six: 275kV Substation at Gretna

Photograph Seven: An alternative substation design (St. Vincent Crescent, Glasgow. Source: David Cadzow and NORR Architects).

Substations

Substations generally contain switching, protection and control equipment and 'transformers' which are used to increase or decrease the voltage of electricity. Equipment is commonly located both within a purpose built building and outside the building in a fenced enclosure or 'compound'. The size of the substation depends on the voltage of the electricity being transformed.

Construction, Maintenance and Dismantling/ Decommissioning Activities

Introduction

The construction of overhead lines, underground cables and substations requires additional temporary infrastructure such as temporary accesses to tower/ pole locations and to cable trenches and construction compounds to store materials. All have limited maintenance requirements and all are subject to well-established procedures for dismantling/decommissioning.

Overhead Lines

Line construction, maintenance and decommissioning usually follow a standard sequence of activities. The duration of these activities for wood pole lines is normally less than for lattice steel tower lines.

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 the construction of wood pole lines is normally less than for tower lines.

Prior to constructing the overhead line, 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 overhead line, all equipment and temporary access of construction areas will be removed with the land being reinstated to its previous condition.

The majority of overhead line components are maintenance free, although periodic painting of the tower steelwork may be required and components are regularly inspected for corrosion, wear and deterioration. There is also an ongoing requirement to ensure that any trees within the wayleave corridor do not impact on safety clearances.

The condition of tower steelwork and foundations is monitored regularly. Towers which have deteriorated significantly may be dismantled carefully and replaced. If a line is decommissioned, towers will be removed with components re-used where possible. Foundations are removed to a minimum depth of one metre below ground level, the area cleared and the ground reinstated.

Underground Cables

Open cut trenching is the most frequently used construction method for cable installation. However, in crossing under watercourses or motorways for example, a trenchless technique such as directional drilling may be used. Works at each section commonly consist of the construction of a haul road, the excavation of the cable trench by mechanical excavators, the storage of excavated material cable laying, the backfilling of the trench with sand and native material and surface reinstatement. A typical cable installation rate is up to 160m per week, depending on the terrain, a temporary construction compound is also required and again this is generally located close to the midpoint of the cable route.

Sections of cable are joined together at cable jointing pits, with the location of these dictated by a number of factors including cable size/length and ongoing access requirements. Manhole covers above jointing pits enable access just below the surface for routine maintenance. Underground cables are marked on services maps provided to other utilities and are installed with surface marker tape to warn of their presence below the ground.

Annual maintenance checks on foot are commonly required during operation. The cable route will also be kept clear of all but low growing vegetation. In the unlikely event that there is a fault along the cable, the area around the fault is excavated and the fault repaired or a new section of cable inserted as a replacement.

If lines are decommissioned, cables can either be left in situ or removed carefully by opening up the ground.

Substations

To construct a substation, an additional temporary area is commonly needed for off-loading and storing materials, parking and welfare facilities. The first stages of standard construction procedures involve removing the top ground surface layer, levelling and consolidating the ground, establishing a copper earthing mat and equipment foundations, compacting, surfacing and establishing drainage systems. Cable routes and internal access routes are then established, followed by the construction of necessary control buildings, additional external and internal components and finally cable installation.

Following testing and commissioning works, reinstatement and landscaping works will be carried out as necessary. A security fence will also be erected around the perimeter of the site and appropriate safety warning signs posted.

Substations are not permanently manned or lit but inspection visits are undertaken regularly.

Substation decommissioning works involve the removal of above ground infrastructure and hardstanding for recycling/disposal off site. As required, the site will then be re-profiled to the level existing prior to construction.

Substations are not permanently manned or lit but inspection visits are undertaken regularly.

Substation decommissioning works involve the removal of above ground infrastructure and hardstanding for recycling/disposal off site. As required, the site will then be re-profiled to the level existing prior to construction.

Photograph Eight: Tower under construction, South West Scotland Connection Project

Appendix 4

The Holford Rules

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

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

A subsequent review of the Holford Rules (and NGC clarification notes) was undertaken by Scottish Hydro Electric Transmission Limited (SHETL) in 2003 to reflect Scottish circumstances.

The Holford Rules are detailed below[10].

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, English and Welsh planning policies, Circulars and Planning Advice and the spatial extent of areas identified.

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

- Special Areas of Conservation (SACs)
- Special Protection Areas (SPAs)
- Ramsar Sites
- National Scenic Areas (NSAs) (Scotland)
- Areas of Outstanding Natural Beauty (ANOBs) (England and Wales)
- National Parks
- Wild Land Areas
- National Nature Reserves (NNRs)
- Sites of Special Scientific Interest (SSSIs)
- Scheduled Monuments
- Listed Buildings
- Conservation Areas
- World Heritage Sites (a non-statutory designation)
- Gardens and Designed Landscapes (a non-statutory designation)
- Historic Battlefields
- Heritage Coasts

[10] This Appendix also includes updated references to planning policy (as of February 2020). This includes Scottish Planning Policy (SPP) (2014), The National Planning Policy Framework (NPPF) for England (2019) and Planning Policy Wales (2018) Edition 10.

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.

(c) If there is an existing transmission line through an area of high amenity value and the surrounding landuses have to some extent adjusted to its presence, particularly in the case of commercial forestry, then the effect of remaining on this line must be considered in terms of the effect of a new route deviating around the area.

Rule 3

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

Note on Rule 3

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

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

Rule 4

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

Note on Rule 4

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

Rule 5

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

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

Notes on Rules 4 and 5

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

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

(c) Where possible follow open space and run alongside, not through woodland or commercial forestry, and consider opportunities for skirting edges of copses and woods. Where there is no reasonable alternative to cutting through woodland or commercial forestry, discussions should be undertaken with the relevant forestry regulator.

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

Rule 6

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

Note on Rule 6

(a) In all locations minimise confusing appearance.

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

Rule 7

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

Note on Rule 7

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

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

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

Explanatory Note on Rule 7

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

Supplementary Notes

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

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

(c) Alternative Lattice Steel Tower Designs

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

Further Notes on Clarification to The Holford Rules

Line Routeing and People

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

The following notes are intended to reflect this.

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

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

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

Supplementary Notes on the Siting of Substations

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

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

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

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

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

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

PREVIOUS PAGE

Appendix A

Holford Rules

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

1 Interpretation of The Holford Rules1 and 2

1.1 Introduction

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

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

1.2 Designations

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

1.3 Amenity

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

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

1.4 Hierarchy of Amenity Value

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

Schedule 9 to the Act gives no indication of hierarchy of value and there is no suggestion of a hierarchy of value in Scottish, English or Welsh planning policy. Nevertheless, designations give an indication of the level of importance of the interest to be safeguarded.

1.5 Major and Smaller Areas

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

1.6 Conclusion

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

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

The NGC note to Rule 2 refers to the setting of historic buildings and other cultural heritage features. Scottish Planning Policy (SPP) and the National Planning Policy Framework for England (NPPF) include definitions of the setting of historic assets.

Appendix B

Holford Rules

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

Major Areas of Highest Amenity Value

1 Relevant national, European or international designations for major areas of highest amenity value include the following:

Special Areas of Conservation

Special Protection Areas

Ramsar Sites

National Scenic Areas (Scotland)

Areas of Outstanding Natural Beauty (England and Wales)

National Parks

Wild Land Areas

National Nature Reserves

Sites of Special Scientific Interest

Scheduled Monuments

Listed Buildings

Conservation Areas

World Heritage Sites

Gardens and Designed Landscapes

Historic Battlefields

Heritage Coasts

Other Smaller Areas of High Amenity Value

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

Areas of Great Landscape Value

Regional Scenic Areas

Regional Parks

Country Parks

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

Flora and Fauna

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

Area of Historic, Archaeological or Architectural Value

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

Scheduled Monuments

Listed Buildings, especially Grade A and Grade B

Conservation Areas

Gardens and Designed Landscapes

Registered Historic Landscapes

Green Belts

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

PREVIOUS PAGE

Appendix 5

Biodiversity Net Gain

The Routeing Stage

The routeing stage will seek to identify a route which contributes to the business targets for biodiversity through the stages outlined below:

During these stages, reference will be made, as appropriate, to the latest version of Defra's 'Biodiversity Metric'. This is a tool to enable developers, planners, land managers and others to better understand and quantify the current value of a place for nature and how proposed changes to that site, either from development or land management practice, will impact on that value. This enables developers and land managers to see how they might be able to design a site or implement a land management change in a way that increases its value to nature over time.

1) Routeing Objective

The overall approach to Biodiversity Net Gain (BNG) will be stated in the Routeing Objective, reflecting business targets.

2) Routeing Considerations: Mapping of BNG Constraints and Opportunities

Baseline mapping of habitats will be used to identify any high level constraints or opportunities, further informed by initial stakeholder consultation. The level of detail at this stage will be sufficient to inform the Routeing Strategy and identification of route options.

As the project progresses through subsequent stages, baseline mapping will be supplemented with greater detail to inform each stage of assessment.

3) Routeing Strategy

The approach to BNG will be reflected in the Routeing Strategy, to provide further clarity for the project in question, reflecting the priorities agreed with stakeholders during initial consultations (see example in Chapter 6).

4) Development and Appraisal of Route Options

Using mapped opportunities/constraints, route options will be developed and appraised, considering BNG priorities alongside other environmental and technical considerations to arrive at a preferred route.

If subsequent consultation on the preferred route results in changes which significantly alter the consideration of BNG priorities, such that other constraints and opportunities should be considered, the route appraisal will be revisited. Should this demonstrate that the route would no longer satisfy the requirements of the Routeing Strategy, this would require a return to earlier steps in the routeing stage to consider other route options or, ultimately, revisit the Routeing Strategy.

5) Design Freeze

Once the routeing process has been completed, the proposed route is considered in detail and locations of permanent and temporary infrastructure established through a detailed design process. At this stage, environmental surveys are undertaken on site to inform the eventual assessment of effects in the EIA. As part of this, a 'pre development' baseline will be established to confirm the number of Biodiversity Units for the route alignment and any ancillary development related to it such as access tracks, construction compounds and temporary laydown areas. Once the final design for the infrastructure and ancillary development has been confirmed ('design freeze') for progression to assessment through the EIA process, the number of 'post-design' Biodiversity Units will be calculated. The post-design Biodiversity Units will then be compared with those from the pre-development stage to give an initial indication of whether the project is on target to satisfy the project specific target for biodiversity (as set out within the Routeing Strategy).

The Environmental Impact Assessment

Opportunities to create or enhance on/offsite habitat will be identified and developed through the EIA process.

A subsequent BNG assessment will be prepared to accompany the EIA and application for consent, based on the final design and including all mitigation measures proposed. This assessment will consider both committed mitigation measures, within the operational wayleave, and non-committed mitigation measures.

The assessment will compare pre-development Biodiversity Units to post-development Biodiversity Units to establish whether the target set out in the Project Strategy has been achieved.

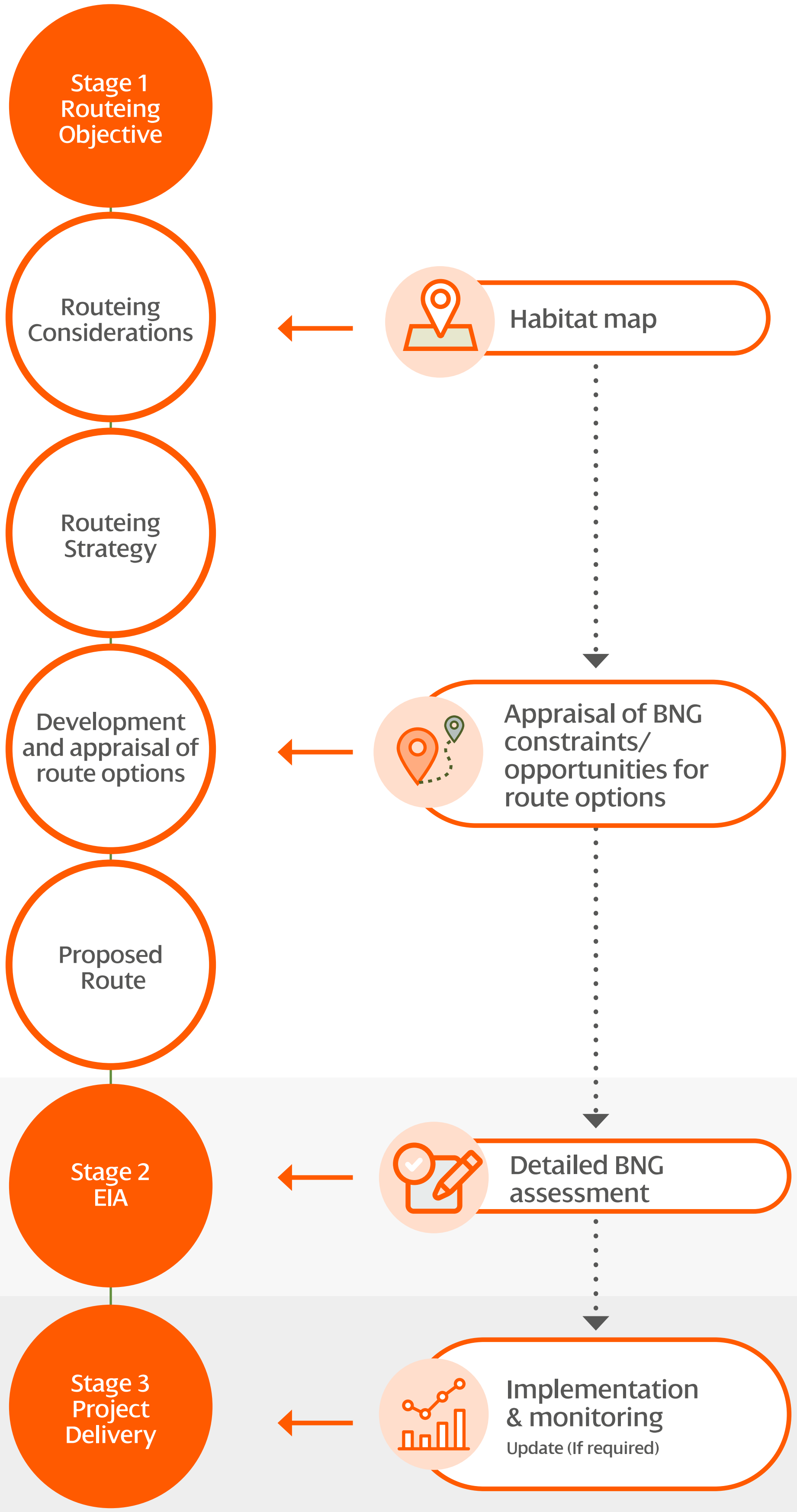
Project Delivery

Further scoring and assessment will be undertaken following the implementation and monitoring of both committed and non-committed mitigation measures.

Further assessment will be undertaken during an implementation and monitoring period to measure whether mitigation measures have achieved the target set out in the Project Strategy. If necessary, the project assessment will be updated to reflect any changes required to mitigation, for example if a proposed enhancement to habitat is not established successfully.

Illustration Nine:

Biodiversity Net Gain Flow Chart



PREVIOUS PAGE

Appendix 6

Glossary of Terms

Angle or Tension Pole/Tower: a tower or pole erected to allow for a change in direction of the line.

Backclothing: The act of reducing the visibility of an overhead line in the landscape by fitting the alignment with topography and the surrounding context so as to blend in as much as possible.

Biodiversity Net Gain: An approach to development or land management that leaves biodiversity in a better state than before the development/land management initiative is implemented.

Biodiversity Units: Biodiversity unit calculations are based on habitat distinctiveness, condition and area (or length for linear habitats). To calculate baseline biodiversity units (i.e. before development), distinctiveness and condition are given numerical 'scores' which are then multiplied, together with hectares or kilometres of habitat.

Biodiversity: The variety of plant and animal life in the world or in a particular habitat, a high level of which is usually considered to be important and desirable.

Circuit: a combination of conductors (commonly three conductors) along which electricity is transmitted or distributed.

Conductor: a metallic wire strung from tower to tower or pole to pole, to carry electric current.

Corridors: Strategic passages between two points of connection within the routeing study area, which are used to guide the identification of potential route options for appraisal.

Design Freeze: The point at which the design process is effectively 'frozen' to allow an assessment of likely significant environment effects to be undertaken.

Earth Wire: a wire erected above the topmost conductor at the tower peak or under slung on a wood pole. These are used for protection against lightning strikes but can also contain fibre optic cores for communication purposes.

EIA Report/Environmental Statement: the document which reports the findings of an EIA.

Environmental Impact Assessment (EIA): a formal process used to identify, predict and assess the likely environmental effects of a proposed development.

Holford Rules: accepted guidance for routeing overhead lines in the UK.

Insulators: articulated strings made of either glass or polymeric compound. These are required to prevent electric current crossing to a tower or pole body.

Kilovolt (kV): One thousand (1000) volts.

LANDMAP: An information system used in Wales for developing landscape policy and assessing the landscape impact of development schemes.

Major Electrical Infrastructure Project: a development of overhead lines, underground cables and substations at 132kV and above.

Nationally Significant Infrastructure Project (NSIP): a major infrastructure development in England and Wales, defined in The Planning Act, 2008.

Overhead Line: an electric line installed above ground, usually supported by lattice steel towers or wooden poles.

Perceptibility: The extent to which towers or poles are visible within the landscape. Perceptibility depends on the position of towers or poles relative to the sky line and/or surrounding built elements and vegetation.

Preferred Route: a route taken forward to stakeholder consultation following a comparative review of route options.

Proposed Route: a route taken forward to the EIA stage following stakeholder consultation.

Route Alignment: the alignment of the route which forms the basis of the application for consent.

Route Options: a number of routes between the start and end connection points, may be several hundred metres wide.

SP Energy Networks (SPEN): part of the ScottishPower Group of companies. SPEN transmits and distributes electricity to around 3.5 million customers in the South of Scotland, Cheshire, Merseyside, North Shropshire and North Wales.

Span: the section of overhead line between two towers or two wood poles.

Study Area: the area within which the routeing study takes place.

Substation: controls the flow and voltage of electricity by means of transformers and switchgear, with facilities for control, fault protection and communications.

Terminal Pole/Tower: a tower or pole required where the line terminates either at a substation or at the end of an underground cable.

The National Grid: the electricity transmission network in the UK.

Transformers: Substation components used to increase or decrease the voltage of electricity.

Volts: the international system unit of electric potential and electromotive force.

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