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APPROACH TO ROUTEING GRID INFRASTRUCTURE IN WALES

FOREWORD

Green Generation Energy Networks Cymru (Green GEN Cymru) is a business in the Bute Energy Group and our aim is to promote, consent and develop new grid infrastructure to distribute green energy in Wales.

There is endless potential for renewable energy in Wales – particularly from the wind that blows across our hills and mountains. The Welsh Government, the Senedd and energy generators have been looking for ways to unlock this potential for a number of years but have faced challenges due to a lack of electricity grid.

Green GEN Cymru is taking action now, to help deliver clean green energy to our homes and businesses through developing the energy network in Wales. This will help tackle both the energy crisis and the climate crisis as well provide local communities with funds via a Community Benefit Scheme.

This document embraces this ambition with specific regard to the routeing, environmental assessment and the consent of the proposed 132kV grid connections and associated infrastructure to reduce impacts on communities and the environment, to realise sustainable long-term benefits for Wales.

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1. INTRODUCTION

INTRODUCTION

1.1 WHY IS GREEN GEN CYMRU DEVELOPING GRID CONNECTIONS IN WALES?

Green GEN Cymru intends to develop, own and operate a 132kV independent distribution network to connect Welsh renewable energy generation to the existing grid network. Green GEN Cymru has applied to Ofgem for an Independent Distribution Network Operators (IDNO) licence to undertake these proposed developments.

Statutory duties require IDNO licence holders under the Electricity Act 1989 to develop a grid network which balances technical, economic, and environmental factors whilst ensuring the least disturbance upon the environment and the people who live, work and enjoy recreation within it.

If approved as an IDNO, Green GEN Cymru would be obliged to offer connections to third party developments in line with the above licence conditions.

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1.2 PURPOSE OF THIS DOCUMENT

This document has been prepared to ensure a consistent approach is adopted for the routeing[1] and environmental impact assessment (EIA) of all Green GEN Cymru's grid connection projects.

The guidance in this document presents the process for the identification and appraisal of route options, and assessment of environmental effects adopted by Green GEN Cymru. The aim is to ensure transparency and consistency and to assist consultees and stakeholders understand the project development process.

This document relates to grid connections which are defined, for the purposes of this guidance, as any conductor or cable which is operating at a maximum nominal voltage of 132 kilovolts (kV). The guidance also encompasses related grid connection infrastructure such as substations.

This document is specifically focused on projects in Wales and the associated legislation. All Green GEN Cymru developments will be undertaken in line with best practice to ensure all environmental requirements are met, including biodiversity enhancement, and positive outcomes are secured both for the project, Welsh communities, and the wider environment.

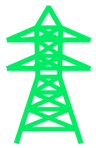
[1] Or 'siting' with reference to associated grid connection infrastructure such as substations.

1.3 STRUCTURE

The document is set out in the following sections:

2.

OVERVIEW OF LEGISLATION AND CONSENT PROCEDURE - covering statutory duties under the Electricity Act, EIA requirements and an overview of the consenting process.



3.

GRID CONNECTIONS DEVELOPMENT – an overview of proposed grid connection development components including associated infrastructure.

4.

THE ROUTEING AND SITING PROCESS – a description of the approach adopted by Green GEN Cymru which balances technical, economic, and environmental factors associated with proposed grid connection development.

5.

CONSULTATION – an outline of the stakeholder and landowner engagement associated with proposed grid connection development routeing, siting, and application consent process.

THIS IS SUPPORTED BY THE FOLLOWING APPENDICES:

- **APPENDIX 1** sets out the Holford Rules for routeing overhead lines and clarifications.
- **APPENDIX 2** provides the Horlock guidelines for the siting and design of substations.
- **APPENDIX 3** provides an indicative constraints checklist.

2. OVERVIEW OF LEGISLATION AND CONSENT PROCEDURE IN WALES

OVERVIEW OF LEGISLATION AND CONSENT PROCEDURE IN WALES

2.1 THE ELECTRICITY ACT 1989

Under Part 1, section 6(1)(c) of the Electricity Act 1989, a licence is needed to generate, distribute or supply electricity, unless a relevant exemption applies. Green GEN Cymru intends to develop, own, and operate a 132kV distribution network under an Independent Distribution Network Operators (IDNO) licence. This licence permits the distribution of electricity for grid connections of 132kV and under.

The statutory duty of an electricity distributor under Part 1, Section 9 (1)(a) of the Electricity Act 1989 to

> *"develop and maintain an efficient, co-ordinated and economical system of electricity distribution".*

Under Section 38, Schedule 9, 1 (1)(a), as a licence holder, Green GEN Cymru must

> *"have regard to the desirability of preserving the natural beauty, of conserving flora, fauna and geological and physiographical features of special interest and protecting sites, buildings and objects of architectural, historic or archaeological interest; and*
>
> *b) shall do what [they] 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".*

Wherever appropriate, Green GEN Cymru will adopt a starting presumption of an overhead line approach when planning and designing grid connection projects. There are however certain circumstances when undergrounding could be appropriate. In such circumstances the approach will be to reduce the required length of underground cable, consistent with seeking a balance between technical and environmental considerations and economic viability.

2.2 DEVELOPMENTS OF NATIONAL SIGNIFICANCE

In Wales, certain types of projects are as classified as a Development of National Significance (DNS) under the Developments of National Significance (Wales) Regulations 2016 (as amended). The statutory basis for the DNS regime is provided by the Planning (Wales) Act 2015 (which amends the Town and County Planning Act 1990). The purpose of the DNS process is

> *"to ensure timely decisions are made on those planning applications that are of the greatest significance to Wales, because of their potential benefits and impacts[2]".*

Applications for DNS projects are submitted to the Planning Inspectorate Wales (Planning and Environment Decisions Wales[3] (PEDW)) for consideration and 'Examination' by an appointed Planning Inspector. Evidence in the decision-making process is considered from the applicant, the Local Planning Authority (LPA) and other statutory consultees and interested parties. Following Examination, a recommendation is made to Welsh Ministers based on the planning merits of the individual scheme and national priorities.

For a projects to qualify as a DNS, certain thresholds and criteria apply. Proposed 132kV overhead line projects in Wales, which are associated with the construction of a devolved Welsh generating station, such as a wind farm, are classified as projects which should be considered under the DNS regime.

[2] Planning inspectorate (2019) DNS Procedural Guidance para 1.2 p4
[3] Planning appeals and other casework was transferred from the Planning Inspectorate Wales to PEDW in 2021.

2.3 NATIONAL DEVELOPMENT FRAMEWORK 2021

In 2021 the Welsh Government adopted the National Development Framework (NDF)[4] . This policy statement creates a positive planning framework for renewable energy and associated grid infrastructure.

The requirement for new grid infrastructure development to assist in the delivery of renewable energy projects has been acknowledged by the Welsh Government in the NDF.

Under an Independent Distribution Network Operators (IDNO) licence, Green GEN Cymru will deliver, own, and operate a proprietary 132kV distribution network.

2.4 ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

Given the nature and scale of proposed 132kV grid connections and associated infrastructure an Environmental Impact Assessment (EIA) is likely to be required under The Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017 (as amended) (the '2017 EIA Regulations').

The EIA process allows for the early identification of the potentially adverse environmental effects of a proposed development and the incorporation of appropriate mitigation measures into the design to avoid, reduce and, if possible, remedy such effects.

The EIA process commences with preparation of a Scoping Report which sets out the proposed scope of the EIA. The Scoping Report is submitted along with a request for a Scoping Direction to Welsh Ministers. The Scoping Report will set out the extent and detail of information to be provided in the Environmental Statement (ES) to ensure that all relevant issues and concerns of external stakeholders are considered through the EIA process.

The findings of the EIA are presented in an Environmental Statement, submitted with the DNS application.

2.5 CONSENT FOR DEVELOPMENTS OF NATIONAL SIGNIFICANCE

Green GEN Cymru will apply to the Planning inspectorate for Wales (PEDW) and ultimately Welsh Ministers for consent for its proposed grid connection projects, including any associated infrastructure development, under the Developments of National Significance (Wales) Regulations 2016 (as amended).

The DNS process sets out a number of stages with requirements that need to be adhered to and fixed timescales to work within.

The DNS process is summarised in **Figure 1.** Further guidance on the DNS process is provided by Welsh Government in its document 'Developments of National Significance: Procedural Guidance (October 2019)'[5] .

[4] National Development Framework Future Wales: The National Plan 2040.
[5] https://www.gov.wales/sites/default/files/publications/2019-11/developments-of-national-significance-dns-procedural-guidance.pdf

DEVELOPMENTS OF NATIONAL SIGNIFICANCE

FIGURE 1: STAGES OF A DNS APPLICATION

01: PRE-APPLICATION ENGAGEMENT & CONSULTATION

- Inception Meetings and Pre-Application Advice.
- The developer publicises draft proposals, engages the local planning authority, affected communities and statutory undertakers to identify issues and exchange views.

- The developer submits notification of intention to submit a DNS.
- Acceptance of notification by the Inspectorate (10 working days).

- Statutory pre-application consultation undertaken by the developer.

02: APPLICATION & CONSULTATION

- Developer submits application with Consultation Report (validation 42 days for EIA cases and 28 days for all others).
- If the application is valid the Inspectorate publicises and consults on the application.
- LPA prepares a Local Impact Report.

- The developer has 10 working days following close of consultation period to decide whether or not to amend the application.

03: EXAMINATION

- An Inspector is appointed to 'examine' the application and determines the procedure.
- Examination will be written representations, hearing or inquiry, or a combination of all three.

- The appointed Inspector must consider all representations and any matters raised and writes a report to the Welsh Minister recommending whether planning permission should be granted or refused.

04: DECISION

- Application is determined by Welsh Ministers and a decision issued.

3. DEVELOPING A GRID CONNECTION

DEVELOPING A GRID CONNECTION

3.1 INTRODUCTION

This section provides an overview of the key components of a grid connection project.

3.2 OVERHEAD LINES

An overhead electricity line comprises of conductors (or wires) which are suspended at a specified height above ground and supported by either wooden poles or lattice steel pylons. Conductors can be made of aluminium or copper, often with a steel core to prevent line sagging.

Most wood pole overhead lines at 132kV carry one circuit, with 3 wires suspended from each pole (or double pole).

Most steel lattice overhead lines at 132kV and above carry two circuits, with one circuit strung on each side of each pylon. An earth wire may also be required to provide protection from lightening strikes.

3.3 PYLON TYPE, HEIGHT AND SPAN LENGTH

Pylons are generally of galvanised steel lattice construction which is assembled using galvanised steel bolts with nuts and locking devices.

Pylons are used to achieve the statutory safety clearances of conductors from surrounding features, the height of the conductors being determined by the electricity voltage and material. The average height of 132 kV pylons ranges between approximately 20 and 30 metres.

The section of overhead line between pylons is known as the “span” and the distance between pylons ‘the span length’. Span lengths between 132kV pylons average between 200 metres and 250 metres.

Pylons are expected to have a life span of around 80 years.

3.4 WOOD POLES, TYPE, HEIGHT AND SPAN LENGTH

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

The wood pole top cross-arms are galvanised steel and support the aluminium conductors on stacks of insulator discs. Both the steelwork and aluminium weather and darken over time.

The average height of a wood pole overhead line ranges between 14 to 16 m. Span lengths between wood poles average between 80 m and 100 m but can increase to 120 metres.

Wood poles are expected to have a life span of around 40 years.

3.5 UNDERGROUND CABLES

Underground cables may be used as mitigation where appropriate.

With an underground cable the conductors are encased in an insulating material and buried in a back filled trench of suitable depth and width. For a 132 kV underground cable the depth is approximately 1.3m and the trench width typically 1.5 to 2 metres. The overall width of the trench may be further increased due to other factors such as: environmental issues; ground conditions; and access requirements during construction. Where connected to an overhead line, an underground cable may also involve the siting of above ground terminal supports and a sealing end compound or platform.

FIGURE 2: INDICATIVE IMAGE OF UNDERGROUND CABLES

3.6 SUBSTATIONS

New substations may be required to connect new generation the grid network.

Substations generally contain switching, protection and control equipment, and transformers which are used to increase or decrease the voltage of electricity. The electrical equipment and control building is contained within a fenced compound. The size of the substation will depend on a range of factors, including the voltage of the electricity being transformed.

FIGURE 3: INDICATIVE IMAGE OF A SUBSTATION

3.7 CONSTRUCTION, OPERATION AND DECOMMISSIONING ACTIVITIES

Overhead line construction, and maintenance during operation, follows a standard sequence of activities as summarised below.

Routeing needs to consider the requirements of construction and maintenance as well as the long term operation of the assets.

TYPICAL CONSTRUCTION ACTIVITIES

- Construct any new temporary access routes.
- Excavation and installation of the pylon foundations or pole hole.
- Delivery of the pylon steelwork or wood pole.
- Erection of the pylon or wood pole.
- Delivery of conductor drums and stringing equipment.
- Insulator and conductor erection and stringing.
- Completion of works, check and commissioning of the overhead line.
- Reinstatement of construction sites and restoration of any temporary access routes.

TYPICAL MAINTENANCE ACTIVITIES DURING OPERATION

132kV overhead lines usually require refurbishment after around 40 years.

Typical activities include:

- Periodic maintenance of the pylon steelwork or wood poles as required.
- Regular inspection of exposed elements which may suffer from corrosion and deterioration.
- Maintenance of a high level of security and safety on all components in accordance with Electricity Supply Regulations.

DECOMMISSIONING

Should decommissioning of an overhead line be required:

- Pylons and wood poles are carefully dismantled for reuse or disposal.
- Foundations removed to a minimum depth of 1 metre below ground level and the ground fully reinstated.

4. THE ROUTEING AND SITING PROCESS

THE ROUTEING AND SITING PROCESS

4.1 OVERVIEW

In compliance with the legal duties imposed on all licence holders under the Electricity Act 1989, all proposed grid connections must be 'efficient, coordinated and economical'. In economic terms, this is considered to comprise a route being as direct as possible after considering technical and environmental conditions.

In addition, proposed grid developments should seek to preserve features of natural and cultural heritage interest, and to mitigate where possible, environmental effects. Many effects can be avoided or limited through careful routeing of new grid connections or siting of associated infrastructure such as substations. Where this is not possible, localised effects can be mitigated through deviations of the route, sections of underground cables, the refining of pylon or wood pole locations and/or specific construction practices.

4.2 ROUTEING/SITING PROCESS

The routeing/siting process is iterative in nature where each stage can be revisited several times, if required, to confirm the outcome of a previous stage remains valid.

Figure 4 presents a summary diagram of the routeing process. The outcome of each stage in the process is subject to technical review and, where appropriate, consultation with key stakeholders such as statutory and non-statutory consultees and the public.

It is generally accepted across the electricity industry that the guidelines developed by Lord Holford in 1959, 'The Holford Rules'[6], should continue to be used as the basis for routeing high voltage overhead lines.

READ HOLFORD RULE NOTES HERE

Further details on the Holford Rules and clarification notes are presented in **Appendix 1.**

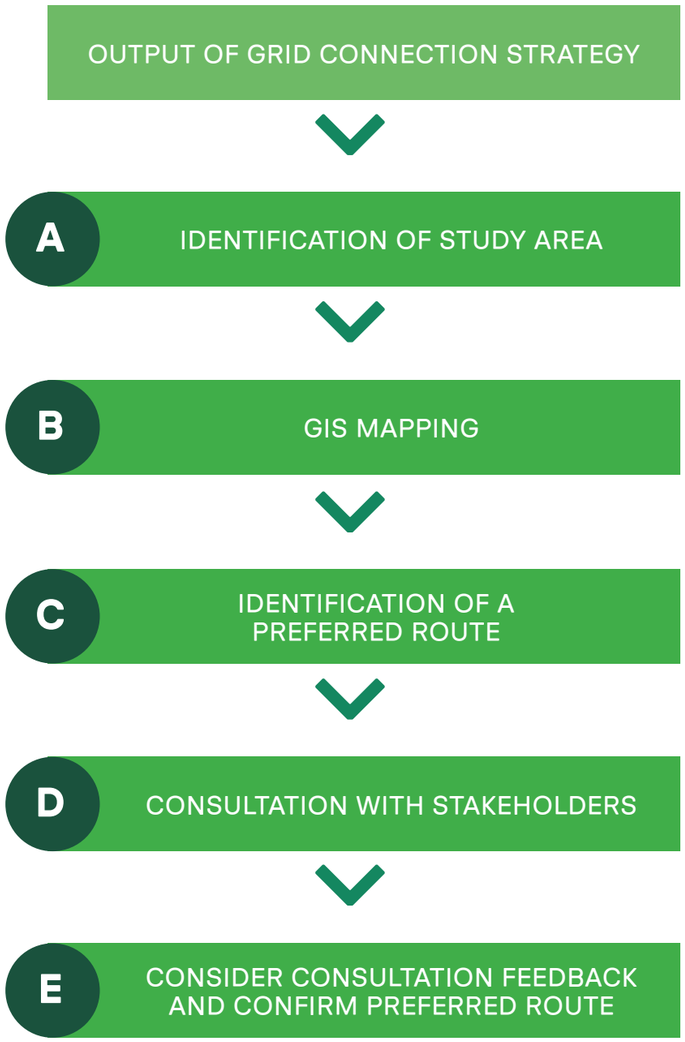
READ HORLOCK RULE NOTES HERE

Additional guidance on the siting and design of substations is provided by the Horlock Rules as outlined in **Appendix 2.**

[6] A review of the Holford Rules was undertaken by National Grid Company (NGC) Plc. (now National Grid Transmission (NGT)) as owner and operator of the electricity transmission network in England and Wales. This review resulted in some clarification notes to the Holford Rules.

SUMMARY DIAGRAM OF THE ROUTEING PROCESS

FIGURE 4: DIAGRAM OF THE ROUTEING PROCESS



4.3 ROUTEING CONSIDERATIONS

The overall approach to routeing considers that visual effects are one of the major environmental effects of overhead lines. Visual effects can, for example, be reduced by seeking to use existing landform and trees for screening and back-clothing. Visual effects are not however the only consideration in the routeing process, other environmental, technical and economic factors are taken into consideration in the identification of a proposed overhead line routes.

These could include:

TECHNICAL CONSIDERATIONS:

- the capacity and voltage of the overhead line which will dictate the choice of pylon/pole structures, and associated span lengths.
- topography.
- physical infrastructure such as roads, railways, rivers, residential areas, pipelines and existing overhead lines.
- ground conditions.
- construction requirements including site access.

ENVIRONMENTAL CONSIDERATIONS:

These relate to the physical, natural, and built environment features (as referred to in Schedule 9 of the Electricity Act 1989) and to features of amenity, as referred to in the Holford Rules). These include:

- designations (from international, national, regional to local level) which protect physical, natural or built environment features, such as: National Parks, Areas of Outstanding Natural Beauty, Special Protection Areas, Special Areas of Conservation, Sites of Special Scientific Interest (SSSIs), Scheduled Monuments, and Listed Buildings. Holford Rule 1 sets out those features which routeing should seek to avoid.
- areas of natural habitat which support protected species or functions.
- towns, villages and smaller scattered settlements, individual properties, and associated amenity.
- land use including farming practices, wind farms, other commercial land uses and any proposed development in the planning process.

ECONOMIC CONSIDERATIONS:

The cost of a project is directly related to the length of the proposed route alignment and the associated infrastructure required to deliver the project (e.g. support structures, access tracks, construction compounds). The cost of a project can also be affected by accessibility and the ground conditions where infrastructure is proposed to be located e.g. this could affect the construction methods, foundations required and access for maintenance.

The above factors all contribute to routeing process, with their level of influence varying throughout the different routeing stages as outlined below.

4.4 ROUTEING STAGES

The routeing process is iterative, with the findings of each stage being subject to review and consultation to inform the next stage. This enables assumptions to be confirmed and ensures confidence in the findings, prior to the commencement of subsequent stages. This staged process leads to the eventual identification of a route alignment upon which the EIA is undertaken.

The principal **routeing stages** are as follows:

Stage 1

Grid Connection Strategy – review of the Project Needs case and identification and high-level review of grid connection options (primarily the points of connection, design solution and type of structure).

Stage 2

Identification of Route Corridors and Options – identification of a study area and appraisal of (a) route corridors and (b) route options informed by the individual project requirements and taking into account the characteristics of the study area. The outcome of this stage is a preferred route option.

Stage 3

Detailed Design/Alignment and Environmental Assessment - collation of stakeholder and other feedback, more detailed technical and environmental information, gathered through the EIA process, to inform the detailed design of the route alignment (i.e. pylon/ pole locations) and associated infrastructure.

Stage 4

Preparation and Submission of the Application for Consent – assessment of the environmental effects of the construction and operation of the route alignment and/or associated infrastructure. The findings are presented in an ES, which with other documents is submitted to PEDW as part of the DNS application.

More detail on the approach during each stage is set out below.

Stage 1

4.5 STAGE 1: GRID CONNECTION STRATEGY

The identification and review of the Grid Connection Strategy first considers the **project need.**

When a need for new grid infrastructure is identified, for example when a new generation site requires a connection, a review of grid connection options would be undertaken. This would include consideration of the following:

- The most suitable geographic location for the point of connection to the existing electricity network.
- The type of infrastructure required to transfer the electricity i.e., pylon or wood pole (or other design).

A number of grid connection options would be identified and for each a high-level review including technical, environmental, and economic considerations would be undertaken.

At this stage Green GEN Cymru will consider the undergrounding of a 132kV overhead line within a designated landscape such as a National Park or Area of Outstanding Natural Beauty. Consideration of undergrounding in other areas will be determined on a specific project basis and will be considered in later stages of the process.

The outcome of this stage would be a **preferred grid connection option.**

The outcome of the review is presented in a **Grid Connections Strategy** document which would set out the project need case, project parameters and the findings of the high level options review.

Stage
2a

4.6 STAGE 2: IDENTIFICATION OF ROUTE CORRIDORS AND OPTIONS

STAGE 2A CORRIDOR IDENTIFICATION AND SELECTION

The following steps are undertaken for corridor selection:

- Identification of a study area which would accommodate corridors between the connection points identified as the preferred grid connection option.
- Identification of possible constraints within the study area:
    - Engineering and economic constraints – these could include existing infrastructure (e.g., overhead lines, roads, railways, roads, pipelines, built or planned developments), environmental design considerations (e.g. topography, flooding), ground conditions (e.g. terrain, geology), and length of required infrastructure.
    - Environmental constraints as outlined in the Holford and Horlock Rules (see Appendices 1 & 2), specifically Holford Rule 1, such as: National Parks, natural and cultural heritage designations. An indicative list is set out in **Appendix 3**.
- Identification of corridor options - the corridor width and length can vary, corridors can be several kilometres in width, and potential corridors may intersect with other corridor options.
- Appraisal of corridor options.

The outcome of this process is the confirmation of a **proposed corridor** that is taken forward to Stage 2b: Route Selection.

It should be noted that corridor selection may not be required if the project is short in distance, or because of earlier strategic documented decisions for a previous project that remain valid. In project specific circumstances the routeing process can commences at Stage 2b: Route Selection. The requirement for this corridor routeing phase will be identified on a case-by-case basis considering a range of factors such as the geographic size and scale of area between the points of connection.

Stage
2b

STAGE 2B: ROUTE IDENTIFICATION AND SELECTION

The aim of this stage is to identify route options and select a preferred route for further appraisal. If the project has been through Stage 2a, then the process is refined further by identifying potential route options (within the proposed corridor) and selecting a preferred route for further appraisal.

Corridor options cover a broader geographical area than route options therefore the information gathered for route selection would be more detailed than the previous stage.

The key steps of Stage 2b are as follows:

- Identification of a study area (if Stage 2a has been undertaken then the study area will comprise the preferred corridor).
- Identification of possible constraints within the study area which are likely to include:
    - Engineering and economic constraints could include for example route length, slope angle and existing infrastructure.
    - Environmental constraints such as natural heritage designations, landscape designations, cultural heritage assets, landuse (e.g., recreation, forestry). An indicative list is set out in **Appendix 3**.
- Identification of route options of approximately 200m width[7] .
- Appraisal of route options to identify a **preferred route** where the environmental requirements have been balanced with the technical feasibility and economic viability of the project. This may be a variant or a combination of two or more options. Professional judgement is a key part of the appraisal and is used to determine the optimum balance between technical, environmental, and economic considerations.

A **Routeing and Consultation Document (RCD)** will be prepared which sets out the routeing process, how the route options have been considered and how the preferred route has been identified. The RCD will form part of the information for a non-statutory, sometimes referred to as an informal, consultation where feedback is invited from statutory and non-statutory stakeholders, local communities and members of the public.

A similar approach would be adopted for substation site selection. A study area would be identified with reference to engineering, environmental and economic constraints, alternative sites identified and then a comparative appraisal undertaken to identify a preferred location. Guidance as to environmental considerations is provided in the Horlock Rules (see **Appendix 2**).

Consultation feedback is assessed and analysed, and any necessary modifications made. The conclusion of this Stage is a proposed route which is taken forward into Stage 3.

[7] The route width is not prescriptive, and it could be narrower or wider at selected locations in response to identified pinch points/constraints.

Stage
3

4.7 STAGE 3: DETAILED DESIGN/ ALIGNMENT AND ENVIRONMENTAL ASSESSMENT

This stage provides further refinement of the proposed route, with the identification of a **route alignment** to be taken forward to Stage 4: 'Preparation and Submission of the Application for Consent'.

Following confirmation of the **proposed route** Stage 3 commences with the preparation of an EIA Scoping Report. The EIA Scoping Report would be prepared under the requirements of The Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017 (as amended) (the '2017 EIA Regulations').

The Scoping Report would present a description of the proposed route, identify the key environmental issues based on a review of baseline environmental information (gathered as part of the routeing process) and describe the likely significant effects. It should also set out the proposed methodologies for gathering of additional baseline data gathering (e.g. site surveys) and assessment in order that the approach can be agreed.

It should be noted that not all projects require EIA, and this will be determined on a case-by-case basis depending on the scale of the development and the sensitivity of the environment in which it is located.

The Scoping Report would be submitted to PEDW along with a formal request for a Scoping Direction. In line with good practice informal engagement with environmental stakeholders will be undertaken prior to the submission of the Scoping Report.

PEDW would issue a Scoping Direction which provides feedback from the statutory consultees and confirms the scope of the EIA (i.e. assessment of which likely significant effects) and required desk-based and field survey work.

Following receipt and review of the Scoping Direction, detailed baseline information will be collected for the environmental topics, as set out in the Scoping Report. Most of the available desk-based constraints information will have been mapped during the preceding stages. This stage therefore includes the collection of supplementary baseline information from site visits/field surveys e.g., habitat surveys, protected species surveys, ornithology surveys and ground condition surveys if required.

The further baseline data will be used to inform the **route alignment.**

The route alignment includes the identification of locations for pylons or wood poles and also any associated temporary ancillary development required for construction, e.g., access tracks, lay down areas and site compounds.

At this stage, the design will also:

- confirm the distance to either side of the route alignment, to provide a micro siting allowance for pylons/wood pole structures and other infrastructure. This allowance ensures that the final infrastructure is not varied to such a degree as to cause an increase in environmental impacts; and
- determine the construction access strategy e.g., indicative location and extent of temporary access tracks and laydown areas, abnormal load routes, and any required road improvements, construction compounds.

As part of the design process, emerging survey findings are used together with technical and landowner requirements to develop and further refine a detailed route alignment and areas for the ancillary development, such as access tracks and construction areas. There may be several iterations of the design.

The alignment will be determined by a range of technical factors, such as support structure locations e.g., terminal and angle pylons/wood poles, slope/gradient and span lengths and site-specific environmental considerations, such as residential properties, ground conditions, habitat types and presence of cultural heritage assets.

The outcome of this stage of refinement is the route alignment and associated temporary ancillary development.

Stage
4

4.8 STAGE 4: PREPARATION AND SUBMISSION OF THE APPLICATION FOR CONSENT

During this stage the application for consent under the Developments of National Significance (Wales) Regulations 2016 (as amended) will be prepared.

The route alignment and associated temporary ancillary development will be assessed, via the EIA, the findings of which are presented in the Environmental Statement (ES). The ES will take account of the information provided in the Scoping Direction.

The ES presents a description and assessment of the proposed development and its likely significant effects on the environment, including the proposed mitigation measures. The requirements for the content of an ES are outlined in the EIA Regulations 2017[8]. During the preparation of the ES there will be continuing engagement with stakeholders.

The Developments of National Significance (DNS) process has required notification and consultation stages to be adhered to and fixed timescales.

At the outset, early engagement is encouraged in the DNS process. This includes general dialogue with the PEDW and an inception meeting with the Applicant. This stage is not prescribed and the applicant can determine how much consultation is undertaken during the pre-application stage.

Once the applicant has notified PEDW of their intention to submit a DNS, a 12-month period is triggered within which the application must be submitted.

During this period the applicant must undertake statutory consultation on the route alignment and the draft ES. Green GEN Cymru will review this feedback and consider whether any revisions are required to the proposed application. It may be necessary to make changes to the proposed alignment and ES prior to submission of the application.

The final ES is submitted to PEDW with the application for consent.

A summary of the stages in the DNS process is included in Section 2 above.

[8] https://www.legislation.gov.uk/wsi/2017/567/contents/made

5. CONSULTATION

CONSULTATION

5.1 AIM

Green GEN Cymru is committed to effective and timely community engagement with those that have an interest in its projects. Engagement at the early stages of a project enables meaningful discussions to be held to ensure that the views of stakeholders are considered throughout the lifetime of the project. Green GEN Cymru is committed to effective and timely community engagement with all those that have an interest in its projects.

5.2 STAKEHOLDERS

Key stakeholders include the following organisations: Planning Environment Decisions Wales (PEDW), Natural Resources Wales (NRW), Cadw and the Local Planning Authorities. Ongoing engagement throughout a project's development is good practice and would ensure that Green GEN Cymru is able to gather a good understanding of local considerations and identify any areas of key concern to be addressed throughout the routeing process.

As the project progress the list of consultees will be expanded. Non-statutory stakeholders often hold useful environmental information which can be used to inform more detailed routeing, for example, Wildlife Trusts and Royal Society for the Protection of Birds (RSPB).

Informal consultation at early stages of project development allows the views of members of the public to influence the proposals.

Once the proposed route is confirmed, formal consultation is undertaken as part of the EIA Scoping and as a statutory requirement of the DNS process.

5.3 CONSULTATION STAGES

Information and the views of the public, landowners and other stakeholders, will be gathered at key stages through the routeing process as indicated in **Figure 4**.

Consultation will be undertaken at all stages of a project's development:

GRID CONNECTION STRATEGY, IDENTIFICATION OF ROUTE CORRIDORS AND ROUTE OPTIONS

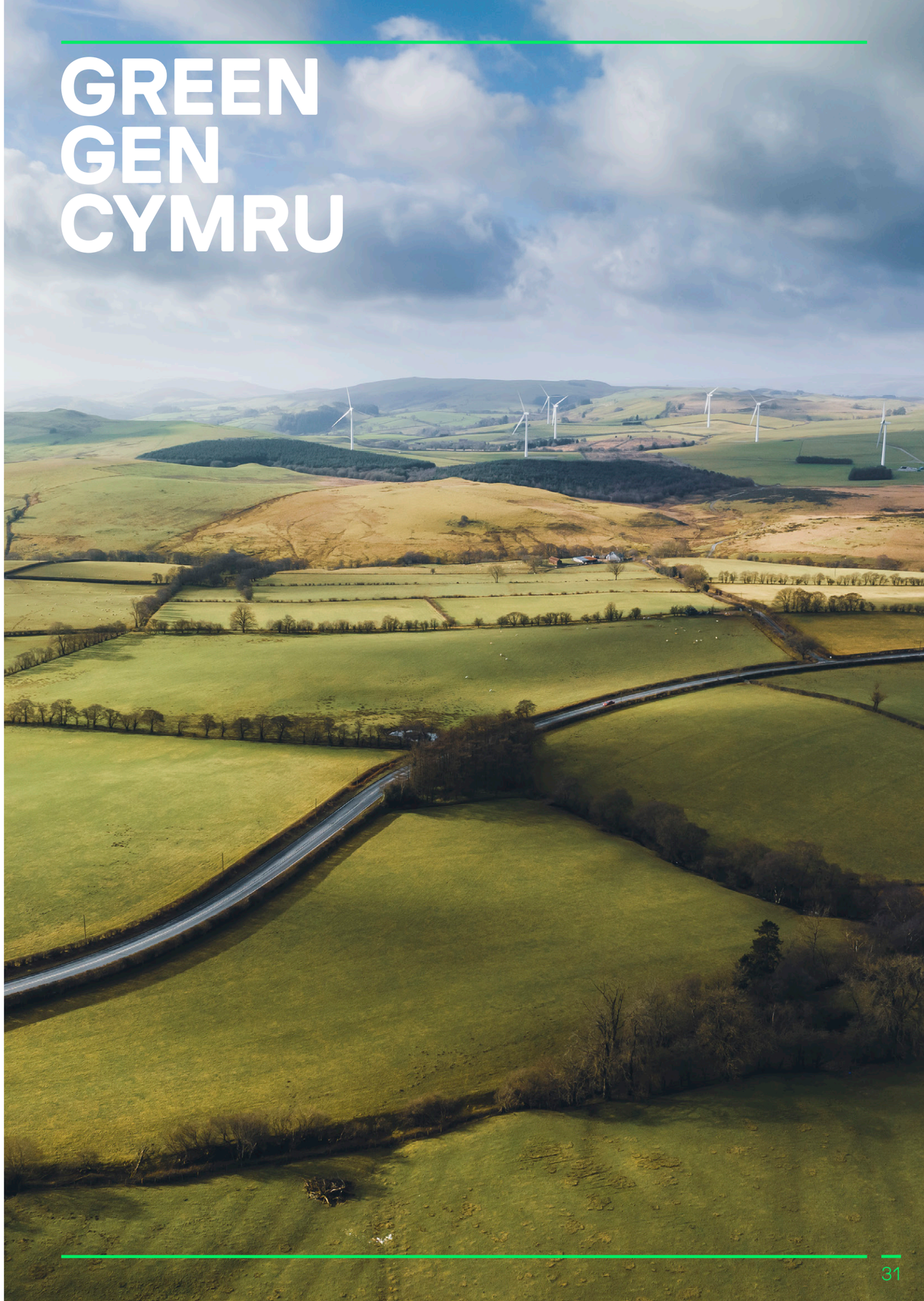
- Environmental information gathering
- Informal stakeholder and public engagement to obtain feedback on the preferred route or siting of associated infrastructure and draft Scoping Report.
- Engagement with landowners
- Formal consultation with PEDW on the Scoping Report to identify EIA requirements

DETAILED DESIGN / ROUTE ALIGNMENT AND ENVIRONMENTAL ASSESSMENT

- Informal stakeholder engagement with community bodies and local representatives
- Engagement with key stakeholders on draft ES
- Engagement with landowners
- Project notification

REPARATION AND SUBMISSION OF THE APPLICATION FOR CONSENT

- Statutory consultation as required by the Developments of National Significance (Wales) Regulations 2016 (as amended)
- Continuing engagement with key stakeholders, community bodies and local representatives to advise them of progress with the application



APPENDICES

APPENDIX 1

HOLFORD RULES AND CLARIFICATIONS

The original Rules and added notes of clarification by National Grid are set out below.

The National Grid Company notes:

> *"Since the formulation of the original Rules, formal requirements for environmental assessment have been introduced. Whilst environmental assessment for overhead lines addresses wider topics than the visual amenity issue on which the Rules concentrate, they remain a valuable tool in the selecting and assessing potential route options as part of the environmental assessment process."*

GUIDELINES FOR THE ROUTEING OF NEW HIGH VOLTAGE OVERHEAD TRANSMISSION LINES

Rule 1

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

Note on Rule 1

Investigate the possibility of alternative routes, avoiding if possible the areas of the highest amenity value. The consideration of alternative routes must be an integral feature of environmental statements. Areas of highest amenity value include:

- Areas of Outstanding Natural Beauty
- National Parks
- Heritage Coasts
- World Heritage Sites

Rule 2

Avoid smaller areas of high amenity value, or scientific interests 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

Some areas (e.g. Site of Special Scientific Interest) may require special consideration for potential effects on ecology (e.g. to their flora and fauna).

Where possible choose routes which minimise the effects on the setting of areas of architectural, historic and archaeological interest including Conservation Areas, Listed Buildings, Listed Parks and Gardens and Ancient Monuments.

Rule 3

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

Note on Rule 3

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

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.

Note on Rules 4 & 5

Utilise background and foreground features to reduce the apparent height and domination of towers from pan viewpoints.

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

Where possible avoiding cutting extensive swathes through woodland blocks and consider opportunities for skirting edges of copses and woods.

Protecting 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 concentration or 'wirescape'.

Note on Rule 6:

In all locations minimise confusing appearance.

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

Rule 7

Approach urban area 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 the undergrounding, for lines other than those of the highest voltage.

Note on Rule 7

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

Alignments should be chosen after consideration of effects on the amenity of existing development and on proposals for new development.

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

SUPPLEMENTARY NOTES

RESIDENTIAL AREAS

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

DESIGNATIONS OF COUNTY, DISTRICT AND LOCAL VALUE

Where possible choose routes which minimise the effect on Special Landscape Areas, areas of Great Landscape Value and other similar designations of County, District or Local value.

ALTERNATIVE TOWER DESIGNS

In additional to adopting appropriate routeing, evaluate where appropriate the use of alternative tower designs now available where these would be advantageous visually, and where the extra cost can be justified.

APPENDIX 2

HORLOCK GUIDELINES FOR THE SITING AND DESIGN OF SUBSTATIONS

OVERALL SYSTEM OPTIONS AND SITE SELECTION

1. In the development of system options including new substations, consideration must be given to environmental issues from the earliest stage to balance the technical benefits and capital cost requirements for new developments against the consequential environmental effects in order to keep adverse effects to a reasonably practicable minimum.

AMENITY, CULTURAL OR SCIENTIFIC VALUE OF SITES

2. The siting of new NGC substations, sealing end compounds and line entries should as far as reasonably practicable seek to avoid altogether internationally and nationally designated areas of the highest amenity, cultural or scientific value by the overall planning of the system connections.

Notes:

- Internationally and nationally designated areas of highest amenity, cultural or scientific value are:
  - National Parks;
  - Areas of Outstanding Natural Beauty;
  - Heritage Coasts;
  - World Heritage Sites;
  - Ramsar Sites;
  - Sites of Special Scientific Interest;
  - National Nature Reserves;
  - Special Protection Areas;
  - Special Areas of Conservation.
- Care should be taken in relation to all historic sites with statutory protection e.g Ancient Monuments, Battlefields and Listed Buildings.
- Account should be taken of Government Planning Policy Guidance and established codes of practice.
- Account should be taken of any development plan policies relevant to the siting or design of substations.

3. Areas of local amenity value, important existing habitats and landscape features including ancient woodland, historic hedgerows, surface and ground water sources and nature conservation areas should be protected as far as reasonably practicable.

LOCAL CONTEXT, LAND USE AND SITE PLANNING

4. The siting of substations, extensions and associated proposals should take advantage of the screening provided by land form and existing features and the potential use of site layout and levels to keep intrusion into surrounding areas to a reasonably practicable minimum.

Notes:

- A preliminary study should be undertaken to identify the extent of land required to meet both operational and environmental needs.
- In some instances it may be possible to site a substation partially or fully enclosed by existing woodlands.
- Topographical information should be obtained at an early stage. In some cases a geotechnical survey may be required.

5. The proposals should keep the visual, noise and other environmental effects to a reasonably practicable minimum.

Notes:

- Allow sufficient space for screening of views by mounding or planting.
- Consider appropriate noise attenuation measures where necessary.
- Use security measures which minimise visual intrusion from lighting.
- Consider appropriate on-site water pollution prevention measures.
- Consider adjoining uses and the amenity of local inhabitants.

6. The land use effects of the proposal should be considered when planning the siting of substations or extensions.

Notes:

- Issues for consideration include potential sterilisation of nationally important land, eg Grade 1 agricultural land and sites of nationally scarce minerals.
- Effects on land drainage.

DESIGN

7. In the design of new substations or line entries, early consideration should be given to the options available for terminal towers, equipment, buildings and ancillary development appropriate to individual locations, seeking to keep effects to a reasonably practicable minimum.

Notes:

- With outdoor equipment, a preference should be given normally to a low profile design with low height structures and silhouettes appropriate to the background.
- Use lightweight narrow section materials for taller structures especially for gantries over about 6 metres in height.
- Commission exterior design and colours appropriate to the surroundings.
- Materials and colours for buildings, equipment and fencing should be chosen to harmonise with local surroundings.
- Where possible avoid the use of prominent insulators by consideration of available colours appropriate to the background.
- Where possible site buildings to act as visual screens for switchgear.
- Ensure that the design of high voltage and low voltage substations is co-ordinated by early consultation between NGC and its customers.
- Where there are particular technical or environmental constraints, it may be appropriate to consider the use of Gas Insulated Switchgear (GIS) equipment which occupies less space and is usually enclosed within a building.
- Early consideration should be given to the routeing of utility service connections.

8. Space should be used effectively to limit the area required for development consistent with appropriate mitigation measures and to minimise the adverse effects on existing land use and rights of way, whilst also having regard to future extension of the substation.

Notes:

- Assess the benefit of removing redundant substation equipment from existing sites where this would improve their appearance.

9. The design of access roads, perimeter fencing, earthshaping, planting and ancillary development should form an integral part of the site layout and design to fit in with the surroundings.

LINE ENTRIES

10. In open landscape especially, high voltage line entries should be kept, as far as possible, visually separate from low voltage lines and other overhead lines so as to avoid a confusing appearance.

11. The inter-relationship between towers and substation structures and background and foreground features should be studied to reduce the prominence of structures from main viewpoints. Where practicable the exposure of terminal towers on prominent ridges should be minimised by siting towers against a background of trees rather than open skylines.

APPENDIX 3

INDICATIVE CONSTRAINTS CHECKLIST

TECHNICAL AND ENVIRONMENTAL CONSTRAINTS

The mapped constraints reflect the Holford Rules and will reflect the characteristics of the study area.

Constraints data are divided into two groups to inform the identification of options:

Level 1

COMPRISING AREAS OR RECEPTORS WHERE THE OBJECTIVE WAS TO AIM TO AVOID DIRECT IMPACTS; AND

Level 2

COMPRISING THOSE WHERE DIRECT IMPACTS WERE TO BE AVOIDED WHERE POSSIBLE.

LEVEL 1 CONSTRAINTS

Level 1

Level 1 constraints primarily include 'areas of highest amenity value' (see Holford Rule 1). They also include key technical considerations that would affect the viability of routeing,

CONSTRAINT	OBJECTIVES	ROUTEING CONSIDERATION
ENVIRONMENTAL CONSTRAINT		
Special Protection Area (SPA)	To seek to avoid/reduce, as far as practical, effects on the qualifying features of designated sites of ecological and ornithological conservation importance.	Avoid crossing the designated area where possible.
Special Area of Conservation (SAC)		Avoid crossing the designated area, unless it is a narrow feature that can be spanned across (e.g. a river).
Ramsar Site (R)		Avoid crossing the designated area where possible.
Site of Special Scientific Interest (SSSI)		Avoid crossing the designated area where possible, unless it is a narrow feature that can be spanned across (e.g. a river).
National Nature Reserve (NNR)		Avoid crossing the designated area where possible.
Local Nature Reserve (LNR)		Avoid crossing the designated area where possible.
Local Wildlife Site (LWS) / Sites of Importance for Nature Conservation (SINC)		Avoid crossing the designated area where possible.
Scheduled Monument (SM)	To seek to avoid/reduce, as far as practical, direct physical change on designated features of cultural heritage interest ('historic assets') or change in their settings which would harm their significance or perception.	Avoid crossing the designated area where possible, noting the geographic size/scale of the SM.
Historic Park and Garden / Registered Park and Garden		Avoid crossing where possible, noting the geographic size/scale of the feature.
Conservation Areas		Avoid crossing where possible, noting the geographic size/scale of the Conservation Area.

CONSTRAINT	OBJECTIVES	ROUTEING CONSIDERATION
National Park and AONB	Avoidance/reduction, as far as practical, effects on the special qualities of designated landscapes.	Avoid where possible.
Ancient Woodland	Avoid/reduce, as far as practical, effects on woodland/forest, particularly areas of ancient woodland.	Avoid where possible.
Committed development	Avoid/reduce, as far as practical, the crossings of or encroachment on infrastructure (including any 400kV, 275kV, 132kV, 66kV and 33kV overhead lines, high pressure gas pipelines, 'A'/trunk roads and rail infrastructure. Avoid, where possible, land use conflict with committed development including consented and undetermined planning applications and land allocated within an LDP.	Consented residential development to be treated as existing properties.
TECHNICAL CONSTRAINTS		
Historic and active mining and landfill sites	To seek to avoid, as far as is practical, other features that may adversely affect overhead line construction.	Avoid crossing these sites where possible.
Operational / restored mineral extraction sites		Avoid crossing these areas where possible.
Large areas of potential ground instability)		Avoid crossing these sites where possible.

LEVEL 2 CONSTRAINTS

Level 2

Level 2 constraints primarily include constraints of more regional/local importance (see Holford Rule 2) and areas of highest amenity value which are smaller in scale.

CONSTRAINT	OBJECTIVE	ROUTEING CONSIDERATION
Geological Conservation Review Sites	To seek to avoid, as far as practical, effects on GCRs.	Avoid crossing where possible, noting the geographic size/scale of the Site.
Peaty soils	To seek to avoid/reduce loss of peatlands in accordance with Welsh Planning and other Policy and using available resources such as the National Peatlands Action Programme.	Avoid crossing where possible, noting the geographic size/scale of the peatland.
Other woodland	Seek to avoid where possible: if unavoidable, prefer routeing through forestry plantation over broadleaf or native woodlands.	Avoid crossing where possible, noting the geographic size/scale of the woodland area.
RSPB Reserves	To seek to avoid/reduce, as far as practical, effects on the qualifying features of designated sites of ecological and ornithological conservation importance.	Avoid crossing where possible, noting the geographic size/scale of the reserve.
Registered Historic Landscapes	To seek to avoid/reduce, as far as practical, direct physical change on designated features of cultural heritage interest ('historic assets') or change in their settings which would harm their significance or perception.	Avoidance/reduction, as far as practical, effects on the special qualities of designated landscapes.
Historic Environment Record		Avoid crossing where possible, unless it is a narrow feature that can be spanned.
Special Landscape Areas (SLA)	Avoidance/reduction, as far as practical, effects on the special qualities of the landscapes.	Avoidance/reduction, as far as practical, effects on the special qualities of the landscapes.
Common Land	Avoid where possible, or reduce length of overhead within area of Common Land.	Avoid crossing where possible, noting the geographic size/scale of the area of land.
Existing overhead lines	Seek to avoid routeing in proximity to avoid creating a 'wirescape' (Holford Rule 6).	Avoid crossing or routeing in proximity where possible.

OTHER CONSIDERATIONS

Other features to consider include at later stages of routeing and alignment include:

- Recreational routes, including the National Cycle Network, long-distance routes, public rights of way
- Other formal recreational and tourist sites were also considered, including for example canals, caravan parks, golf courses or promoted viewpoints.
- Watercourses with flood risk

Where possible, routeing seeks to avoid passing through or directly over these features.

REFERENCES

Climate Change Committee (2020) Advice Report: The Path to a Net Zero Wales.

Holford, W (1959) Power Production and Transmission in the Countryside: Preserving Amenities. Paper presented to Royal Society of Arts, 25 November, London.

National Grid (1992) Holford Rules & Clarification Notes

National Grid (-) Horlock Rules. NGC Substations and the environment: Guidelines on Siting and Design.

SHETL (2004) The Holford Rules: Guidelines for the Routeing of New High Voltage Overhead Transmission Lines with NGC 1992 and SHETL 2003 Notes.

The Planning Inspectorate (2019) Development of National Significance. Procedural Guidance.

SUMMARY OF RELEVANT LEGISLATION AND POLICY

Developments of National Significance (Specified Criteria and Prescribed Secondary Consents (Wales) Regulations 2016 (as amended).

Planning (Wales) Act 2015 (amends the Town and County Planning Act 1990)

The Electricity Act 1989

The Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017

Wales Act 2017

Welsh Government (2021) National Development Framework (NDF) -Future Wales: The National Plan 2040.

Well-being of Future Generations Act 2015

Welsh Government (2021) Planning Policy Wales (PPW) 11.

GLOSSARY OF TERMS

TERM	EXPLANATION
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 (SHETL, 2004).
Backclothing	Careful use of topography and surrounding context in the routeing process to reduce the visibility of an overhead line.
Biodiversity Net Gain (BNG)	An approach to development, and/or land management, that aims to leave the natural environment in a measurably better state than it was beforehand. The Environment Act (2021) sets a minimum of 10% net gain is acceptable for developments in England, this is calculated using the Defra Biodiversity Metric. In Wales, Biodiversity Enhancement is a requirement, but there is no threshold or metric.
Corridor	Strategic area of land between two points of connection within which potential route options can be identified for comparative environmental appraisal.
Design Freeze	Hold point in design process to allow an assessment of environmental effects to be undertaken for the proposed development.
Development of National Significance	Consent of energy development under 350MW is a devolved matter under the Development of National Significance (DNS) consent procedures of the Wales Act 2017.
Environmental Impact Assessment (EIA)	The process used for describing, analysing and evaluating the range of environmental effects that are caused by a proposed development.
Environmental Statement (ES)	The document that sets out the findings of the EIA.
Grid Connection	Either an overhead line or an underground cable used to transmit electricity.
Holford Rules	Established practice for routeing overhead lines in the UK.
kV	Kilovolt (one thousand volts)
Mitigation	Measures, including any process, activity or design to avoid, reduce or remedy adverse effects of a proposed development.

TERM	EXPLANATION
National Grid Electricity Transmission (NGET)	The electricity transmission system in the UK.
Overhead Line	An electric line installed above ground supported by lattice steel pylons or wooden poles.
Planning and Environment Decisions Wales (PEDW)	Planning Inspectorate Wales which consider Applications for Development of National Significance (DNS) which report to Welsh Ministers for decision.
Preferred Route	Following a comparative environmental review of Route Options, the route following technical evaluation which is taken forward to initial consultations.
Proposed Route	Following consultation regarding the Preferred Route, the route taken forward for environmental impact assessment.
Route Alignment	The Proposed Route as detailed and refined during the environmental impact assessment and technical engineering review process and submitted for development consent.
Route Options	Potential connection routes identified withing the strategic Corridors for comparative environmental appraisal to determine the Preferred Route.
Sealing End Compound	The compound area surrounding the terminal pylon, where an overhead line converts to an underground cable when for example entering a Substation.
Study Area	The area encompassing all potential strategic Corridors between two points of connection within which the routing process takes place.
Substation	Controls the voltage and direction of electricity. Transforming stations are used to increase the supply of electricity to 275kV or 400kV into the national grid system for transmission, and to reduce the voltage to lower levels to 132kV for distribution. Switching, controls the direction of electricity and ensures fault protection.
Wayleave	An agreement granted by the owner or occupier of land whereby transmission equipment is permitted to be installed on, over or under the land so owned or occupied in return for annual payments.

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APPROACH TO ROUTEING GRID INFRASTRUCTURE IN WALES