

GREEN GEN TOWY TEIFI

Consultation January 2024

Routeing and Consultation Document



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1 INTRODUCTION

Purpose of the Document

- 1.1 This Routeing and Consultation Document relates to the identification and appraisal of route options for a new 132 kilovolt overhead line supported on 'L7' steel lattice towers (or similar). This project will be known as the Green GEN Towy Teifi Project (hereafter 'the Project').
- 1.2 The Project will provide a connection between the proposed Lan Fawr Energy Park, which straddles the boundary between the county councils of Ceredigion and Carmarthenshire, and a new 400 kilovolt National Grid substation (known as the Llandyfaelog Substation), via a new 132 kilovolt Green Generation Cymru substation that will be located south of Carmarthen, close to the existing 400 kilovolt overhead line.
- 1.3 As well as connecting the Lan Fawr Energy Park into the wider electricity network, the Project will also provide the necessary infrastructure to connect other, future renewable energy generation schemes to this network.
- 1.4 The existing overhead line network and proposed points of connection are shown in Figure 1.1.
- 1.5 The purpose of this Routeing and Consultation Document is to inform consultees of the proposals, to enable them to provide feedback on the preferred option that has been identified. It presents the methodology used to select a preferred route for the Project and provides an overview of the routeing work completed to date. The preferred route is also described, together with the methods for, and process of consultation, which will be followed to obtain feedback from relevant stakeholders on the preferred route.

Who is Green GEN Cymru?

- 1.6 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.
- 1.7 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 infrastructure.
- 1.8 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.
- 1.9 Our proposals will assist in addressing key national priorities to contribute to decarbonisation and climate-resilience, whilst promoting a vibrant economy and improving the well-being of our communities.
- 1.10 Our approach aligns with the Welsh Government's ambitions for renewables in Wales. We will follow best practice in working with local communities throughout the development

of our proposals, ensuring that communities have a strong voice in the process and derive maximum benefit from environmental, employment, and social opportunities generated by the Project.

- 1.11 On top of this we will invest millions of pounds directly into Welsh communities closest to our projects. Green GEN Cymru is proposing a Community Benefit Fund that will be spent in the local area. The fund will come from the Bute Energy projects that connect to the network and will be based on the amount of generating capacity connected to the lines.
- 1.12 We are keen to work in partnership with the Welsh Government, Local Authorities and private sector to see how others can use our infrastructure to the benefit of local communities in Wales.

Who is Bute Energy?

- 1.13 Bute Energy is set to become a leading developer of onshore renewable energy in the UK and was established to help address the climate crisis by providing low cost, reliable power using proven technologies. Bute Energy's mission is to help unlock Wales's potential for onshore renewable power generation and bring benefits to local communities where energy parks are created.
- 1.14 Bute Energy is seeking to deliver a package of sustainable benefits and clean energy initiatives. Headquartered in and focused on Wales, the aim is to deliver a portfolio of new Energy Parks, using proven technology to deliver onshore renewable power generation in Wales.
- 1.15 Bute Energy is committed to building Energy Parks swiftly and at scale, helping to bring down energy costs and contribute towards achieving net zero. A portfolio of sites has been assembled that would be capable of providing over 2GW of onshore wind and solar power and co-located battery energy storage systems, deploying the latest generation of reliable and proven technologies.
- 1.16 Bute Energy Group is also committed to designing projects to a high standard, working within the framework of latest industry guidance and following best practice as set out in the Welsh national spatial strategy - Future Wales.

Background and Needs Case

- 1.17 The [2008 Climate Change Act](#)¹, which was amended in 2019, requires the Secretary of State to ensure that the net United Kingdom carbon account for 2050 is at least 100 percent lower than the 1990 baseline (Section 1). This is often referred to as the net zero target.
- 1.18 The 2008 Act also requires the Secretary of State to set legally binding carbon budgets at five-year intervals beginning in 2008, which place a restriction on the total amount of greenhouse gases the United Kingdom can emit over those five-year periods. The underlying objective of these carbon budgets is to set a trajectory towards the achievement of the net zero target by 2050.

¹ HM Government (2008). *Climate Change Act*. Available at: <https://www.legislation.gov.uk/ukpga/2008/27/contents>

- 1.19 The [sixth carbon budget](#)², which relates to the period 2033-2037, was made in 2021. The United Kingdom Government's October 2021 [Net Zero Strategy](#)³ sets out its policies and proposals for decarbonising all sectors of the United Kingdom economy in order to meet its net zero target by 2050.
- 1.20 [The Environment \(Wales\) Act 2016](#)⁴ also requires the Welsh Government to reduce greenhouse gas emissions in Wales to net zero for the year 2050, with a system of interim emissions targets and carbon budgets. In 2017, the Welsh Government set a target for at least 70 percent of Wales's electricity consumption to be met using renewable generation by 2030.
- 1.21 In April 2019, the Welsh Government declared a climate emergency. As part of its plan to tackle this emergency, the Welsh Government brought forward policies to encourage innovative ways of creating energy that are sustainable, secure and cost effective. This includes [Future Wales](#)⁵ and the eleventh edition of [Planning Policy Wales](#)⁶. As part of these new policies, the Welsh Government has confirmed that *"in determining planning applications for renewable and low carbon energy development, decision makers must give significant weight to the need to meet Wales's international commitments and our target to generate 70 percent of consumed electricity by renewable means by 2030 in order to combat the climate emergency"* (page 95).
- 1.22 The climate change emergency and energy prices rises have brought into focus the need for change and in early 2023, the Welsh Government published a [consultation](#) on a proposed target to meet 100% of Wales's electricity consumption to be met using renewable energy by 2035⁷.
- 1.23 Onshore wind development will play a critical role in assisting the Welsh Government to meet its renewable targets. Central to this are the Pre-assessed Areas for Wind Energy identified in Future Wales, which comprise those areas where the Welsh Government has already modelled the likely impact on the landscape and has found them to be capable of accommodating development in an acceptable way. Future Wales confirms that *"there is a presumption in favour of largescale wind energy development ... in these areas"* (page 95). Outside of these areas, Future Wales confirms that a positive policy framework still exists.
- 1.24 It has long been acknowledged by the Welsh Government, energy generators and network operators that a key challenge with respect to delivering Wales's net zero obligations is the fact that the strongest renewable resources are generally in areas that

² Committee on Climate Change. *The Sixth Carbon Budget*. Available at: <https://www.theccc.org.uk/publication/sixth-carbon-budget/>

³ HM Government (2021). *Net Zero Strategy: Build Back Greener*. Available at: <https://www.gov.uk/government/publications/net-zero-strategy>

⁴ Welsh Government (2016). *The Environment Act (Wales)*. Available at: <https://www.legislation.gov.uk/anaw/2016/3/contents/enacted>

⁵ Welsh Government (2021). *Future Wales*. Available at: <https://www.gov.wales/future-wales-national-plan-2040-0>

⁶ Welsh Government (2021). *Planning Policy Wales*. 11th Edition. Available at: <https://www.gov.wales/planning-policy-wales>

⁷ Welsh Government Climate Change Minister Press Release, 24th January 2023. Available at: <https://www.gov.wales/wales-aims-meet-100-its-electricity-needs-renewable-sources-2035>

have the lowest existing electricity network capacity, essentially meaning that key strategic opportunities for renewable energy generation are currently sterilised. Without intervention, this lack of grid infrastructure across Wales is likely to have a detrimental impact on achieving the United Kingdom and Welsh Governments' net zero targets. Future Wales notes "*The Welsh Government acknowledges the significant challenge that grid infrastructure and capacity will have on the potential for new on-shore and off-shore renewable energy developments across Wales*" (page 99) adding that the Welsh Government is "*committed to working with energy networks and developers to identify opportunities and barriers as well as working collaboratively to find solutions*". There is therefore a clearly identified national need for new renewable energy development and associated grid infrastructure in Wales.

- 1.25 In addition to the energy parks that will be directly connected to the grid, Bute Energy is proposing to develop new energy parks across Wales that are geographically remote from existing high voltage electricity infrastructure. Two of the proposed energy parks (Lan Fawr and Nant Ceiment) will be located in South West Wales, referred to as the South Wales Western Cluster of energy parks. Whilst the Nant Ceiment Energy Park is identified on Figure 4.1, its location was not a consideration for this routeing study.
- 1.26 The proposed energy parks and associated connection infrastructure provide a key opportunity to help to address the climate emergency in a timely manner by providing network connection capability for a strategic renewable energy generation hub.
- 1.27 Operation of infrastructure at 132 kilovolts within England and Wales is classified as 'Electricity distribution'. These assets are in the main owned and operated by Distribution Network Operators. However, in order to increase competition in the electricity distribution market, the Office of Gas and Electricity Markets, as the energy regulator for Great Britain, now licenses Independent Distribution Network Operators. Once licensed by Office of Gas and Electricity Markets, Independent Distribution Network Operator are able to develop, operate and maintain electricity distribution networks. Independent Distribution Network Operator connect their networks onwards into the local distribution network or transmission network.
- 1.28 Green GEN Cymru applied for an Independent Network Distribution Operator licence in October 2022 and is anticipating a determination on the application in the coming months. This will allow Green GEN Cymru to move forward with its plans to design, develop and construct the most appropriate solution for connecting the new energy parks, ensuring the best solutions for the local area. It also enables Green GEN Cymru to deliver efficient and reliable grid infrastructure in Wales, opening broader opportunities for connections in the future.
- 1.29 As with Distribution of Network Operators, an Independent Distribution Network Operator holds an electricity licence under Section 6(1)(c) of the Electricity Act 1989. Distribution Network Operators and Independent Distribution Network Operator licences also share the same Standard Licence Conditions. This places specific requirements on an Independent Distribution Network Operator, including "*to develop and maintain an efficient, co-ordinated, and economical system of electricity distribution*" (Section 9(1)(a)).
- 1.30 As a licence holder, Green GEN Cymru would be required to adhere to the Electricity Act 1989, including Schedule 9, which confirms that the licensee "*shall 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 shall 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.” (Schedule 9 (1)(a) and (1)(b)).

- 1.31 With oversight of the development of both the connection infrastructure promoted by Green GEN Cymru as well as the energy parks, Bute Energy Group will be able to ensure effective coordination between these two elements, enabling collaboration regarding technical and environmental considerations and delivering the most appropriate solution.
- 1.32 As a Welsh-based company, and a prospective Independent Distribution Network Operator licence holder, Green GEN Cymru will play a proactive role in the progression towards achieving Net Zero in Wales. Bute Energy Group will support the development of the proposed energy parks and, through the proposed connection to the national electricity transmission system promoted by Green GEN Cymru, will also be able to support the efficient and timely connection of future renewable energy projects across Wales, demonstrating the benefits of the Independent Distribution Network Operator framework.

The Development and Consenting Process

- 1.33 This Routeing and Consultation Document reports on the routeing stage of the Project, as described in the ‘Green GEN Cymru Approach to Routeing Grid Infrastructure in Wales’ guidance document (available for review alongside this Routeing and Consultation Document).
- 1.34 Prior to commencing this stage, Green GEN Cymru prepared a ‘Phase One Grid Connection Strategy’, which reports the findings of an appraisal of grid connection options to determine the most appropriate solution to connect the proposed South Wales Energy Parks to the national electricity transmission system. The document was recently updated in response to feedback received during the Green GEN Towy Usk Round One Consultation in March 2023 and is now referred to as the Updated Phase One Grid Connection Strategy. It provides an overview of the background and needs case for new grid infrastructure and an appraisal of connection options for the overarching technical design solution (for example, points of connection and choice of technology for the connection).
- 1.35 The Updated Phase One Grid Connection Strategy is available as a separate report, to be considered alongside this Routeing and Consultation Document.
- 1.36 The routeing process is iterative in nature with the output of each stage informing the subsequent stages. However, feedback received from consultation and/or technical review can also result in earlier stages being repeated as necessary in an iterative manner.

Development of National Significance

- 1.37 The Project will be a 'Development of National Significance' according to the [Planning \(Wales\) Act 2015](#)⁸. A Development of National Significance is an infrastructure development project of national importance and the majority of planning applications for a Development of National Significance are decided by the Welsh Ministers. The Development of National Significance consenting process is specific to Wales and includes bespoke requirements for pre-application consultation to take place later in the project development process.

Structure of the Document

- 1.38 The structure of this Routeing and Consultation Document is provided in the table below.

Table 1-1 Report Structure

Chapter	Content
2 'Proposed Grid Connection'	Introduces the Project and broad design parameters.
3 'Approach to Routeing'	Explains the overall methodology applied to the routeing stage of the Project.
4 'Corridor Identification and Selection'	Explains the methods used to identify and appraise corridor options.
5 'Route Option Identification and Selection of Preferred Route'	Explains the methods used to identify and appraise route options and details the outcome of the route option appraisal process, including identification of a preferred route.
6 'Consultation Process and Next Steps'	Sets out Green GEN Cymru's proposals to undertake consultation on the preferred route of the Project.
Appendices	Appendices are provided in a separate volume and include route option appraisal and review tables, and other relevant data.
Figures	Figures are provided in a separate volume and include corridor, route and constraints mapping.

⁸ Welsh Government (2015). *Planning (Wales) Act*. Available at: <https://www.legislation.gov.uk/anaw/2015/4/contents/enacted>

2 PROPOSED GRID CONNECTION

Points of Connection

- 2.1 The Project will connect into the onsite substation for the proposed Lan Fawr Energy Park. Lan Fawr Energy Park will consist of approximately 40 wind turbines of up to 220 metres height (to blade tip). Information on the Lan Fawr Energy Park is available from the project website (www.lanfawrenergypark.wales). The application for consent for Lan Fawr's onsite substation will form part of the Lan Fawr Energy Park Development of National Significance application, which will outline the location, design and environmental effects of the proposals. The substation site is therefore not considered further in this Routeing and Consultation Document.
- 2.2 The Project will terminate at a new Green GEN Cymru 132 kilovolt substation in proximity to a 400 kilovolt substation near Carmarthen close to the existing 400 kilovolt overhead transmission line (to be known as the Llandyfaelog Substation). The location of the proposed 400 kilovolt Llandyfaelog Substation, as shown on Figure 1.1, has been identified by National Grid Electricity Transmission.
- 2.3 The substation will connect Green GEN Towy Teifi to the transmission network. The substation will also provide a connection point for the Green GEN Towy Usk scheme and National Grid Electricity Distribution.
- 2.4 National Grid will be sharing plans about its proposals at their consultation in early 2024, ahead of submitting a planning application to Carmarthenshire County Council later in the year.
- 2.5 The Project will also provide opportunities to connect other green energy infrastructure to the grid network.

Overhead Line Voltage and Tower Type

- 2.6 The proposed overhead line will be supported on an 'L7' tower (or similar), which is a steel lattice tower with six cross-arms (three on each side).
- 2.7 There are three types of L7 tower as follows, examples of which are illustrated in Figure 2.1:
- Suspension towers, used to support overhead lines along straight sections of the connection route;
 - Angle towers, used particularly (but not exclusively) to support overhead lines at points where the route changes direction; and
 - Terminal towers, used where the overhead line terminates into a substation or onto an underground cable section via a separate cable sealing end compound or platform.
- 2.8 The overhead line itself will comprise of conductors (or wires) suspended at specific heights above the ground. The conductors are made of aluminium or copper, often with a steel core to prevent sagging.
- 2.9 The voltage of the overhead line will be 132 kilovolts. This is because the overhead line will transmit electricity directly from the point of generation at Lan Fawr via a transformer,

the purpose of which is to increase the voltage in order to reduce energy loss during transmission. The higher voltage capacity of the overhead line also allows other green energy infrastructure to connect to the transmission network without the need to construct more overhead lines.

Tower Heights and Span Lengths

- 2.10 The standard height for an L7 tower is 27 metres, however this can be increased by using one or more 3 metre extensions depending on the requirements in the area. The section of overhead line between the towers is known as the 'span', with the distance between them being known as the 'span length'. The average span length is approximately 250 metres, but this can also be increased or decreased depending on the requirements of the terrain or intermediate obstacles like water bodies. In these locations it may be necessary to have taller towers to accommodate these longer spans. The Environmental Impact Assessment will assess the impacts of this accordingly as part of the Project's planning application.
- 2.11 Because transporting electricity at high voltage requires higher clearance for safety reasons, a taller tower is needed to ensure nothing gets too close to the overhead lines, which are not insulated and can emit electrical discharges. At the connection to the substation, the electricity is then converted to a lower, more usable voltage and can be distributed to end users safely via smaller supports, such as wooden poles.

Construction Works

Ancillary Development and Temporary Working

- 2.12 To facilitate the construction of the Project, ancillary development will be required, which will include:
- Working areas around the base of each tower;
 - Temporary access tracks to tower locations and construction compounds;
 - Winching/pulling areas to raise the overhead line conductors; and
 - Construction compounds, including welfare facilities and materials laydown area.
- 2.13 The working area around each tower will be approximately 25 metres by 25 metres for standard towers and 50 metres x 50 metres for angle towers. In some cases, the shape or size of the working area is controlled by nearby environmental or land use constraints.
- 2.14 Ancillary development is associated with the construction phase only and will therefore be temporary. Decommissioning/dismantling of temporary structures, compounds and accesses associated with the construction process will follow recognised industry standards and procedures, and all ground used for ancillary development will be re-instated once it is no longer needed.

Steel Tower Construction

- 2.15 Construction of the Project will follow a well-established sequence of work involving the following:
- Tree felling and site preparation (if required);

- Access to every tower location;
- Excavation of foundations;
- Tower delivery, either:
 - by road in constituent parts and assembled on site; or
 - by air fully assembled or piece by piece;
- Erection of towers;
- Delivery of conductors and stringing equipment;
- Insulator and conductor erection and tensioning;
- Clearance and reinstatement; and
- Habitat enhancements and tree planting.

Access

- 2.16 Temporary accesses will be constructed as needed and temporary laydown/storage areas set up at intervals along the route. Wherever possible, existing tracks and watercourse crossings will be used and upgraded if necessary, in preference to the creation of new accesses.
- 2.17 During construction, low ground pressure vehicles and plant will be used along temporary accesses wherever possible. In the event that accesses must enter a sensitive area, other, less intrusive access options can be installed such as temporary steel matting or timber roadways.
- 2.18 Trees will only be cut back or removed where they present a risk to safety clearances.

Operation and Maintenance

- 2.19 The exposed elements of an overhead line, which suffer from corrosion, wear and tear, deterioration and fatigue, will require inspections and periodic maintenance over the operational life of the overhead line. The conductors generally require refurbishment after approximately 40 years. Any trees growing directly beneath the overhead line will be checked to ensure overhead clearance is maintained.

Decommissioning

- 2.20 When the operational life of the Project ends, it is possible the overhead line may be re-equipped with new conductors and insulators, and refurbished. However, the overhead line may also be decommissioned fully.

3 APPROACH TO ROUTEING

- 3.1 This chapter provides an overview of the approach that Green GEN Cymru has undertaken to the routeing stage for the Project. As detailed in Chapter 1, this follows on from the Project's need case, and appraisal of potential connection options for the connection of the South Wales Energy Parks to the national electricity transmission system as reported within the Green GEN Cymru Updated Phase One Grid Connection Strategy. This concluded that the most appropriate solution, taking into consideration environmental issues and technical and cost requirements, would be to connect the South Wales Energy Parks to a new substation in the Carmarthen area.

Routeing Aim

- 3.2 The aim of the route selection process was to identify a technically feasible and economically viable grid connection route between the Lan Fawr Energy Park and a proposed new substation south of Carmarthen, which causes the least disturbance to people and the environment. It is acknowledged that the main effects of overhead lines are visual, due particularly to the scale of overhead line towers relative to surrounding features within the landscape. As visual effects for overhead grid lines cannot always be mitigated (for example, with screening), careful routeing is the primary way in which visual effects may be reduced.
- 3.3 Other environmental and technical constraints also need to be taken into account when routeing an overhead line and these must be considered alongside, and balanced with, visual effects.

Routeing Methodology

Established Practice for Overhead Line Routeing

- 3.4 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 Plc (now National Grid Electricity Transmission as owner and operator of the electricity transmission network in England and Wales) with notes of clarification added to update the Holford Rules. A subsequent review of the Holford Rules (and National Grid Company clarification notes) was undertaken by Scottish Hydro Electric Transmission Limited in 2003 to reflect Scottish circumstances. The Holford Rules and accompanying clarification notes were used to inform the routeing of the Project. A summary of the Holford Rules is provided in Figure 3-1 below. The Holford Rules and National Grid's current clarification notes are provided in full in Appendix A.

Figure 3-1 Summary of the Holford Rules

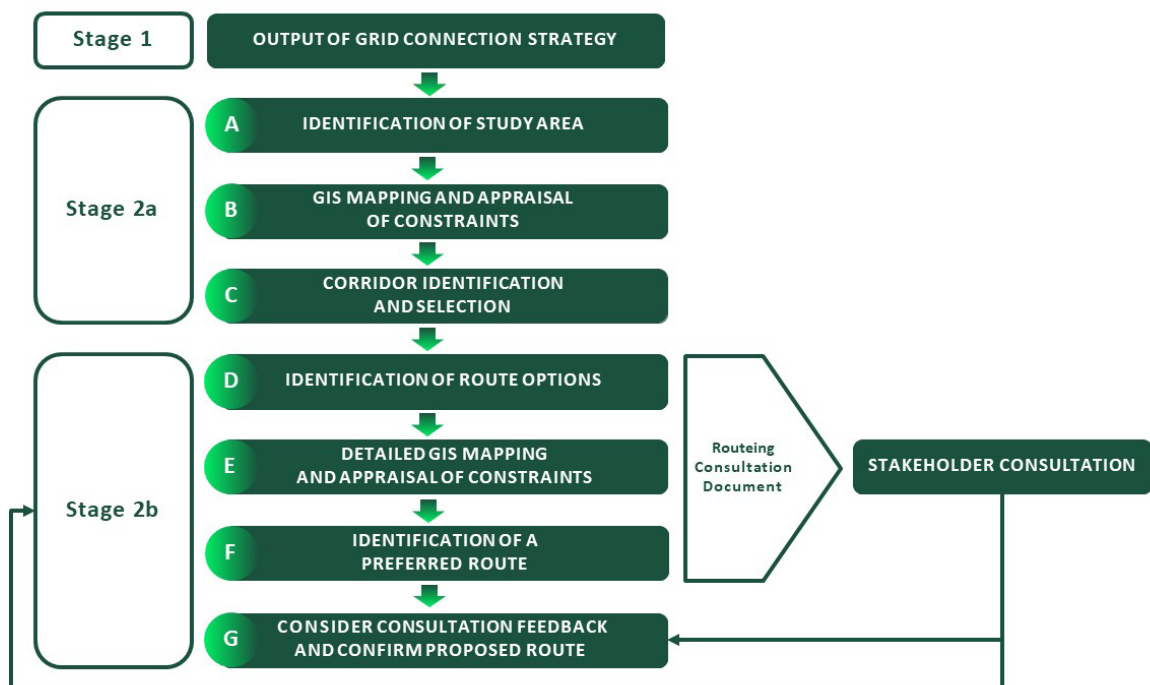
Rule 1	Avoid altogether, if possible, the major areas of highest amenity value, by so planning the general route of the line in the first place, even if the total mileage is somewhat increased in consequence.
Rule 2	Avoid smaller areas of high amenity value, or scientific interest by deviation; provided 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 fewer 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.

Green GEN Cymru's 'Approach to Routeing'

- 3.5 Green GEN Cymru's 'Approach to Routeing Grid Infrastructure in Wales' document is designed to establish a consistent methodology for the routeing and Environmental Impact Assessments (EIAs) of all Green GEN Cymru's grid connection projects. Informed by the Holford Rules, it outlines the process for identifying and appraising route options, as well as assessing environmental effects, as adopted by Green GEN Cymru.

- 3.6 At its simplest, route selection is a stepwise process whereby each step is completed before moving to the next, and the findings of each step are used to inform each consecutive step. Thus, the design of the Project route can be progressively refined based on increasingly detailed assessment. In practice, the route selection process is iterative. For example, feedback from stakeholders during consultation can be used to test the validity of each step and provide added confidence that the findings are sound before subsequent steps in the process are begun.
- 3.7 The key steps of the route selection process for the Project are illustrated in Figure 3-2 below. It is divided into two broad stages; Stage 2a relates to the consideration of broad corridors within which a number of different routes could be located and Stage 2b relates to the consideration of more specific route options within a preferred corridor.

Figure 3-2 Route Selection Process



Environmental Considerations

- 3.8 Statutory duties imposed by Section 38 and Schedule 9 of the Electricity Act 1989 require licence holders to seek to preserve features of natural and cultural heritage interest, and to mitigate where possible, any effects which their proposals may have on such features. The construction and operation of a grid connection will have potential effects on people and the environment, including potential effects on (in no hierarchical order):
- cultural heritage including archaeology;
 - ecology and ornithology;
 - hydrology, hydrogeology, geology and water resources;
 - landscape character;
 - land uses including mineral operations, agriculture and forestry;
 - recreation and tourism;

- noise and vibration;
- traffic and transport; and
- visual amenity.

3.9 Some effects can be avoided or limited through careful routeing. Other effects are best mitigated through local deviations of the route, the refining of steel tower locations and/or specific construction practices. Any potential effects will be identified and assessed during the Environmental Impact Assessment process, as part of the planning application.

Technical Considerations

3.10 Technical considerations which can influence routeing include the existing electricity transmission network, existing transport infrastructure such as railways, access requirements/opportunities, Ministry of Defence safeguarding areas, slope gradient, altitude, waterbodies and wind farms.

Economic Considerations

3.11 Section 9 of the Electricity Act 1989, states that *“It shall be the duty of an electricity distributor...to develop and maintain an efficient, co-ordinated and economical system of electricity distribution...”* This duty has been interpreted by Green GEN Cymru to mean that, as far as is reasonably practicable, and all other concerns being equal, the Project be as direct as possible and the route should avoid areas which would render the scheme unviable on economic grounds.

Identification and Appraisal of Corridors

3.12 For overhead line connections, a ‘corridor’ is identified that will contain a number of candidate route options. Selection of the corridor is initially preceded by identification of a study area (Step A) of a sufficient size to contain relevant alternative corridor options. Following mapping of environmental and technical considerations, a landscape-led approach is taken to identify corridor options within the study area (Step B), whilst also considering other potential constraints. A preferred corridor is then selected based on an appraisal of the corridor options against environmental and technical considerations referenced above, applying the Holford Rules as appropriate (Step C). The data used for this appraisal and the detail of the analysis is necessarily proportionate to the appraisal’s strategic scale.

Identification and Appraisal of Route Options

3.13 Following confirmation of the preferred corridor (Step C), the identification and appraisal of route options (Steps D and E) essentially follows the same process as the identification and appraisal of corridors, with the data used and detail of the analysis for this step being proportionate to the more narrowly defined spatial range of the appraisal. Route options have a defined width of approximately 200 metres to allow scope for further refinement of routeing and overhead line component locations (such as towers) within the route option width during subsequent stages of the development design process.

3.14 The appraisal of route options includes balancing of the environmental considerations, with this resulting in identification of an ‘emerging preferred route’. A technical review of the ‘emerging preferred route’ is then undertaken to inform, and where necessary modify,

the emerging preferred route. This process ends with confirmation of the preferred route for the purposes of consultation (Step F).

Review of Preferred Route Post-Consultation and Confirmation of Proposed Route

- 3.15 Following consultation with stakeholders, including landowners and the community, and a review of consultation responses, the preferred route will be refined further to take account of feedback. This review process is intended to be iterative and will be further informed by the Environmental Impact Assessment Scoping process, which will be undertaken in parallel with Stage 2b of the route selection process. This will ensure the selection of a preferred route is sufficiently robust to enable a proposed route alignment to be confirmed. Work on the detailed design will then progress in parallel with the Environmental Impact Assessment. Further public consultation on the detailed route alignment for the project, including proposed tower locations, access routes and working areas will also take place during the Environmental Impact Assessment process.

Primary Mitigation

- 3.16 As part of the route appraisal process and subsequent, more detailed environmental assessment, the scope to mitigate potential impacts through design is considered at a level of detail proportionate to the stage of appraisal or assessment.
- 3.17 Primary mitigation measures considered at the routeing stage relate primarily to the route alignment and the placement of towers, whereby towers can be placed closer together or further apart to avoid any direct, physical interaction with an environmental receptor, or to allow an overhead line to cross over the top of certain environmental features such as rivers or trees, whilst selecting the narrowest width to cross where possible.
- 3.18 Engineered solutions such as undergrounding may also be possible, although this in itself is not without risk in terms of significant environmental impacts. The technical complexity and cost is also increased when compared with an overhead solution and undergrounding is therefore contrary to the principle of delivering an efficient distribution system.
- 3.19 Underground solutions are generally more beneficial for visual-related effects from a landscape, residential and heritage perspective, but this benefit can often be outweighed by other environmental impacts it may cause, including:
- Loss of terrestrial habitats due to vegetation clearance and excavations;
 - Disturbance and/or loss of soils:
 - Peat;
 - Best and most versatile agricultural soils;
 - Contaminated soils;
 - Disturbance of buried archaeology (the preference is to preserve artefacts 'in situ', particularly around Scheduled Monuments);
 - Visual impacts and safety risks associated with above ground infrastructure, such as cable sealing ends; and
 - Mobilisation of sediments and soils impacting groundwater and surface water environment, and water-dependent habitats.

- 3.20 As such, the choice of an overhead line is justified as the parent design, with undergrounding only being considered on an exceptional basis as mitigation for identified constraints. The suitability of an underground solution will be considered in future consultations once the preferred route has been confirmed and the design has been developed.

4 CORRIDOR IDENTIFICATION AND SELECTION

Introduction to Stage 2a

- 4.1 A routeing study was undertaken to identify a preferred corridor between Lan Fawr Energy Park and the proposed new substation south of Carmarthen (known as the Llandyfaelog Substation). The routeing study involved identifying an initial study area and potential corridor options within this. These corridor options were then appraised relative to each other to identify the preferred corridor.
- 4.2 The identification of the preferred corridor consisted of a number of steps shown in Figure 3-2 in Chapter 3:
- Step A: Identification of Study Area
 - Step B: Geographical Information System Mapping and Appraisal of Constraints
 - Step C: Corridor Identification and Selection of Preferred Corridor

Step A: Identification of Study Area

- 4.3 The initial step was to identify a study area, predominantly for the purposes of gathering data specific to the project area. The initial study area was drawn to ensure it was large enough to accommodate all potential overhead line route options whilst maintaining a reasonably direct route between the two connection points in accordance with Holford Rule 3, which requires 'the most direct line, without sharp changes of direction'. As such, the study area was required to be able to accommodate a connection from the Lan Fawr Energy Park to the substation location south of Carmarthen. The identified study area is shown in Figure 4.1.
- 4.4 The study area extends broadly on a north-east to south-west alignment, from north-east of Lampeter in Ceredigion to the south of Carmarthen in Carmarthenshire. A straight line was drawn between the connection points at the north (location for Lan Fawr Energy Park) and south (approximate location of the new Carmarthen substation). A boundary with a 10 kilometres radius from the straight line was added to create an initial study area considered sufficiently wide enough to develop corridor options.
- 4.5 In order to find the shortest and most direct route (in line with Holford Rule 3), the northern and southern extents of the 10 kilometres buffer were clipped to extend approximately 1 kilometre north of Lan Fawr Energy Park and approximately 1 kilometre south of the new Carmarthen substation, rather than extending to 10 kilometres in these areas, as routeing this far beyond the connection points is neither economically nor environmentally advantageous.
- 4.6 Identification of the study area was also informed by Holford Rule 1 which requires 'avoidance altogether, if possible, of 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'. A high-level desk-based review was undertaken to identify major areas of highest amenity value within the initial study area. Although Special

Protection Areas are not listed as an area of highest amenity value in Holford Rule 1, the north-eastern boundary of the study area was refined to exclude the Elenydd – Mallaen Special Protection Area in the southern Cambrian mountains. Areas such as these are designated on the basis of their ecological value for internationally important bird species but may also be considered important for their amenity and recreational value. This level of value is particularly significant for the Cambrian Mountains, including the Elenydd and Mynydd Mallaen, for which a petition was submitted in late 2022 calling for the area to be designated as an Area of Outstanding Natural Beauty. The petition received considerable support from local communities and ministers, reflecting the high value placed on the area.

- 4.7 Given the topography within the area, terrain mapping was reviewed. The southern end of the Cambrian Mountains is located within the study area. Consideration was given to the possibility of defining the study area to avoid areas of higher ground, however, given that much of the northern and central study area was characterised by areas of higher terrain it was considered more appropriate to avoid areas of higher terrain at the corridor identification stage (Step C).
- 4.8 The western boundary of the study area is broadly aligned with the A485, which passes through several settlements between Lampeter and Carmarthen. The central corridor of the study area crosses higher terrain and there are several scattered settlements throughout the central and eastern sections of the study area, located on lower ground in the Cothi Valley. The Afon Tywi and associated floodplain flows across the southern section of the study area, from the northeast to south of Carmarthen.

Step B: Geographical Information System Mapping and Appraisal of Constraints

- 4.9 Within the study area, constraints were mapped which primarily reflected the Holford Rules, taking into account a number of constraints including those relating to areas of high amenity value. The presence of the following environmental constraints was used to inform the identification of corridor options (see Step C below):
- Special Protection Areas;
 - Special Areas of Conservation;
 - Ancient Woodland;
 - Sites of Special Scientific Interest;
 - National Nature Reserves;
 - Scheduled Monuments;
 - Registered Parks and Gardens;
 - Important Bird Areas;
 - Conservation Areas; and
 - Major Settlement Boundaries.
- 4.10 The approach to the identification of corridor options was to avoid larger areas constrained by the designations noted above. It was not possible to avoid all of the above constraints entirely. This is particularly the case with smaller designated areas such as Scheduled Monuments and wide-spread linear designations. Concentrations of the

above features were avoided. The broad nature of the corridor options means that there is flexibility to seek to avoid certain environmental and planning constraints at the route option identification stage.

- 4.11 Other areas were noted as ‘non-absolute’ constraints for the identification of corridors. These included, for example, Registered Historic Landscapes, Special Landscape Areas, Best and Most Versatile agricultural land and National Forest inventory woodland. It was not possible for the corridor options to avoid these entirely due to their geographic scale and location within the study area. However, corridor selection sought to minimise the length of overlap of the Project with these areas.
- 4.12 The following technical routeing considerations were also considered and mapped where appropriate:
- Steep slopes, avoiding gradients > 22 degrees where possible;
 - Areas of high ground;
 - Operational, consented or proposed wind farms (to maintain appropriate safety distance);
 - Existing 400 kilovolts and 132 kilovolts overhead lines;
 - Other third party infrastructure (for example railways); and
 - Peaty soils.

Step C: Corridor Identification and Selection

Overhead Line Corridor Identification

- 4.13 The Holford Rules (Rule 4) indicate that overhead line infrastructure is deemed most visible when located on higher ground, for example ridges and skylines, therefore the identification of corridors favours lower lying topography. Furthermore Holford Rule 3 states, all other things being equal, the most direct line should be taken, with the smallest distance and minimal changes in direction. Based upon these primary rules and the constraints discussed above, figures were produced to inform preliminary fieldwork undertaken to identify corridor options.
- 4.14 Holford Rules 4 and 5 formed the basis for the landscape led identification of corridors in the field. Direct corridors with fewer ‘bulky’ angle structures are recommended, as is the avoidance of ‘wirescape’ (Holford Rule 6, which states higher voltage lines should be kept away from smaller lines if possible). Consideration was therefore given to the potential ‘fit’ of the line within the landscape. Key objectives were as follows:
- Follow the grain of the landscape, following moderately open valleys and avoiding complex terrain;
 - Minimise the exposure of towers on ridges and skylines;
 - Avoid impacts on woodland where possible;
 - Use woodland and topography as a backdrop to the line or as a foreground screen;
 - Minimise the number of crossings of linear features (for example roads and rivers) and when appropriate cross at a perpendicular angle;
 - Avoid creating incoherent wirescapes with existing infrastructure of a different size;

- Avoid key views from recreational locations, such as popular walking routes, summits and promoted viewpoints, including those outside the route corridors where appropriate;
 - Avoid residential areas as far as practicable; and
 - Other things being equal, prefer the most direct alignment.
- 4.15 The topography of the study area informed the identification of corridors, as the Project is required to pass from the foothills of the Cambrian Mountains in the north and central sections of the study area, through to the Tywi catchment. There are wide areas of high ground, reaching elevations of approximately 400 metres in some parts of the study area, separated by the low lying areas of the Afon Cothi and Afon Teifi valleys and their tributaries, creating a complex terrain with a mix of ridges and valleys, some of which run perpendicular to the direct line between Lan Fawr and Carmarthen.
- 4.16 Three main corridor options were identified, which were positioned to follow the wider river valleys of the Afon Teifi and Afon Cothi, and to avoid the more mountainous ridges in the east and west central sections of the study area. The corridor options were given an alphabetical identifier (A, B or C). Each corridor was subdivided into shorter lengths to aid comparison and given a numerical identifier, for example, Corridor C comprises sections C1, C2, C3, C4 and C5, with C1 the northernmost section and C5 the southernmost section. Within each of these shorter sections, alternative options (that is, diversions of a particular section of the corridor) were also identified, where these presented more flexibility to avoid key constraints in specific locations. These were labelled as, for example, C3a and C3b, meaning Section 3 of Corridor C could follow the route of two alternative options: a or b. Similarly, links between two different corridors were identified, to facilitate potential linkage between different corridor sections. These were labelled, for example, Link BC1, BC2 or BC3, meaning one of three links between Corridor B and Corridor C.
- 4.17 An overview of the three corridor options A, B and C is shown in Figure 4.3. Corridor A is located to the west of the main ridge of high ground and broadly follows the valley of the Afon Teifi, directly connecting Lan Fawr and Carmarthen. Corridor B is located more centrally and follows the most direct route from Lan Fawr to Carmarthen, connecting to the last stretch of Corridor A rather than directly into the Carmarthen substation. Corridor B broadly follows the Afon Cothi valley, although it crosses multiple ridges of high ground at a perpendicular angle as opposed to following the grain of the landscape. Corridor C is located to the east, the northern section of which broadly follows the Afon Cothi valley and directly connects Lan Fawr to Carmarthen. It follows a less direct route than Corridor B, but better follows the grain of the landscape. All corridor options cannot be routed to avoid crossing the Afon Tywi and associated floodplain to the south.

Overhead Line Corridor Appraisal

- 4.18 To identify a preferred corridor, the three corridor options were appraised relative to each other across a range of criteria. The appraisal process sought to draw out distinctions between the corridors to enable the relative strengths and weaknesses of each to be identified. Professional judgement, specialist desk studies, Geographical Information System mapping and landscape-focused field observations were utilised to identify the preferred corridor, within which route options to accommodate the Project can be identified.

- 4.19 The comparative appraisal of corridor options was undertaken in stages set out below:
- Identification of appraisal criteria, together with reasons for inclusion;
 - Application of appraisal criteria to each corridor option, following the appraisal methodology; and
 - Comparative appraisal of corridor options to identify a preferred corridor.
- 4.20 The criteria comprised of the following:
- Landscape;
 - Visual;
 - Biodiversity and Nature Conservation;
 - Cultural Heritage;
 - Geology and Hydrogeology;
 - Hydrology and Flood Risk;
 - Land Use;
 - Construction Access;
 - Terrain (slope >22 degrees); and
 - Third Party Infrastructure.
- 4.21 Each corridor option was examined in relation to the above criteria and to the sub-criteria, listed in Table 4-1 below and shown in Figures 4.4.1, 4.4.2 and 4.4.3 (note that these are the criteria used for the appraisal of corridor options, which are more extensive than the set of considerations used to identify corridors). A preferred corridor was then identified in relation to each of the criteria. The appraisal process and findings are captured within appraisal tables, with appraisals set out by criteria. The appraisal tables for all three corridors cover the corridor sections, alternative options and links between corridors, available in Appendix B.
- 4.22 The appraisal process involved making a professional judgement concerning the potential interaction between the Project and the relevant environmental considerations represented by the sub-criterion, with the objective of avoiding or minimising likely significant effects. These judgements were made on a case-by-case basis, with the general principle being that the preferred corridor offered opportunities to avoid constraints during the subsequent routeing stage.

Table 4-1 Criteria and Sub-criteria used in Corridor Appraisal

Criterion	Sub-criterion
Landscape and visual amenity	Designated Landscapes Special Landscape Areas Landscape Character Areas LANDMAP (Habitats, Geology, Historical) Landscape Elements
Visual amenity	Landscape Character Areas LANDMAP (Visual and Sensory) Settlements

Criterion	Sub-criterion
	Transport Routes Recreation Cumulative visual impacts
Biodiversity and Nature Conservation	Special Protection Areas Ancient Woodland Site of Specific Scientific Interest Special Areas of Conservation Priority Habitats National Forest Inventory Woodland
Cultural Heritage	Scheduled Monuments Historic Parks and Gardens Conservation Areas Registered Historic Landscapes Listed Buildings Grade I, II and II*
Geology and Hydrogeology	Peaty Soils Peatlands of Wales Carbon Stock Geological Conservation Review Sites Regionally Important Geodiversity Sites
Hydrology and Flood Risk	Main Rivers, OS Watercourses Flood Zones 2 & 3
Land Use	Best and Most Versatile Agricultural Land Registered Common Land
Construction Access	Proximity to Roads
Terrain	Steep Terrain (slope > 22 degrees)
Third Party Infrastructure.	Existing Overhead Line Railway Networks Wind Turbines

Preferred Overhead Line Corridor

- 4.23 The appraisal of the three corridors resulted in Corridor A being identified as the preferred overhead line corridor, including the two alternative options A2a and A2c to the east of Carmarthen. The alternative option A2b was discounted due to areas of steep terrain and the need to cross a railway line at three separate locations. Whilst Corridors B and C performed better than Corridor A for some of the criteria, there were multiple sections of Corridors B and/or C that presented a higher level of risk to biodiversity and nature conservation, landscape and cultural heritage. There were also access constraints influencing Corridors B and C, and whilst Corridor B provided the shortest route of the three options, it crossed larger areas of steep terrain.

- 4.24 Overall, Corridor A, with A2a and A2c options, did not present an unacceptable risk for any of the criteria, although there are some potential issues which can be addressed at the routeing stage (Chapter 5). Particular considerations in its favour are:
- It is preferred in relation to biodiversity;
 - It has more favourable terrain; and
 - There are fewer access constraints.
- 4.25 Corridor A has numerous settlements, a number of which are linear, as well as individual properties scattered throughout. There are also multiple environmental constraints scattered though the corridor including areas of woodland (both Ancient woodland and Inventory Woodland). It has not been possible to avoid all environmental constraints, however, there are opportunities to avoid these during subsequent stages of routeing.
- 4.26 The appraisal concluded that Corridor A be progressed to the subsequent routeing stage. Figure 4.5 shows the preferred corridor taken forward to the next stage of appraisal. Full details of the corridor appraisal and a 'Corridor Appraisal Summary' are provided in Appendix B.

5 ROUTE OPTION IDENTIFICATION AND SELECTION OF PREFERRED ROUTE

Introduction to Stage 2b

- 5.1 Following the selection of the preferred corridor (Corridor A), a proportionate number of potential route options were identified within Corridor A, to link the Lan Fawr Energy Park substation with the proposed new substation south of Carmarthen. As with the selection of the preferred corridor, the purpose of identifying route options is to allow comparison between alternative route options in order that a preferred route can be identified taking into account environmental and technical constraints.

Step D: Identification of Route Options

- 5.2 To assist in the subsequent appraisal process Corridor A was divided into five sections along its length to allow comparison of route options over shorter distances. The five sections were as follows:
- Section 1: Lan Fawr Energy Park to Lampeter (approximately 9 kilometres);
 - Section 2: Lampeter to Llanllwni (approximately 11 kilometres);
 - Section 3: Llanllwni to Alltwalis (approximately 7 kilometres);
 - Section 4: Alltwalis to Rhydargaeau (approximately 4 kilometres); and
 - Section 5: Rhydargaeau to Llandyfaelog (approximately 14 kilometres).
- 5.3 Within each section, two or three route options were identified as well as several links between route options to provide the flexibility to switch from one route option to another within a section. These route options and links were positioned to provide a route which had the fewest routeing constraints. That is, to avoid as many settlements or groups of residential properties as possible, as well as key environmental constraints mapped for the identification of a preferred corridor, as described in Chapter 4 above and also taking into consideration additional constraints as detailed in Step E below.
- 5.4 The alternative route options within each section, were given a numerical and alphabetical identifier. These are shown in Figure 5.2 (comprising 13 sheets, with one route option shown per sheet). For example, there are three alternative route options in Section 2. The first is located in the east side of the preferred corridor and is therefore identified as 2E (2 representing the section number and capitalised E representing the eastern position). The other two route options in Section 2 are positioned to the west (2W) and centrally (2C). Some route options were allowed to overlap another route option for a short distance, where this alignment is clearly most favourable. In such cases, that part of the alignment is labelled for both route options (for example, '2W 2C' where route option 2W overlaps with route option 2C).
- 5.5 Diversions or links between route options were identified where these present more flexibility to avoid key constraints in specific locations. These links were also given a numerical and alphabetical identifier, comprising the section number they are located in and lower case letters in alphabetical order from north to south. For example, there are 4 links between route options in Section 2; from north to south these are 2a, 2b, 2c and 2d.

- 5.6 Each route option was defined with an approximate width of 200 metres, which allows a reasonable area within which detailed design of the route alignment and tower placement can be developed at later stages of the routeing work.
- 5.7 An overview of all route options is shown in Figure 5.1.

Step E: Detailed GIS Mapping and Appraisal of Constraints

Identification and mapping of constraints

- 5.8 The constraints mapped at the corridor selection stage were considered in defining the route options. Following the Holford Rules, major areas of highest amenity value were avoided as far as possible. Additional constraints of regional or local importance, and areas of high amenity value that are smaller in extent, were also taken into account when identifying route options.
- 5.9 During the corridor appraisal stage, residential properties were mapped at the scale of settlements. For this route option appraisal stage, individual residential properties were mapped, with a 150-metre visual buffer zone added around them (that is, a zone in which the potential for visual effects would require more detailed consideration).
- 5.10 Some 'non-absolute' constraints, including those identified during the corridor options appraisal (see Chapter 4), could not be avoided entirely due to their size, geographical 'reach' or frequency of occurrence within the preferred corridor, such as watercourses. Route options overlapping or crossing these constraints were refined to ensure the shortest length or lowest frequency of overlap or crossing, wherever possible.
- 5.11 Routeing sought to follow the grain of the topography to minimise the appearance of overhead lines and towers within open skylines as much as possible. As such, areas of rising ground were used to provide a natural backdrop to protect landscape and visual amenity, where feasible.
- 5.12 Routeing also sought to avoid the 150-metre visual buffer zone around residential properties as far as practical. It was not possible to avoid all residential buffer zones, particularly where these are in a linear pattern. Some individual properties therefore occur within all of the route options. All dwellings will be avoided in the final alignment.
- 5.13 Similarly, routeing sought to avoid areas of woodland as far as possible. Whilst large extents of woodland were avoided at the corridor identification stage, there are some smaller parcels of Ancient Woodland and National Forest Inventory within the route options. Where possible these woodlands would be avoided as far as possible at the detailed design of the route alignment and tower placement.

Appraisal of Route Options

- 5.14 The objective of the appraisal of the route options was to identify a preferred route based on a transparent assessment of route options against a range of environmental and technical criteria.
- 5.15 The more detailed design of the route alignment and tower placement during later stages of the development process will seek to address any identified overlap with constraints through avoidance, design or other forms of embedded mitigation where possible.

- 5.16 The route option appraisal criteria are topic based and contain specific sub-criteria related to each topic, as set out in Table 5-1 below.

Table 5-1 Criteria and Sub-criteria used in Route Option Appraisal

Criterion	Sub-criterion
Environmental	
Landscape and visual amenity	Designated Landscapes Locally Designated Landscapes (Special Landscape Areas) Landscape character including land cover, land pattern and vegetation, Topography LANDMAP areas with 'outstanding' or 'high' evaluations Visual amenity from settlements and residential properties Visual amenity from other receptors (such as cycle routes, public rights of way, transport corridors, long distance and national trails, tourism sites and recreational sites) Existing electricity infrastructure
Biodiversity and Nature Conservation	Sites of Specific Scientific Interest Special Areas of Conservation Priority Habitats of High Sensitivity (distinguished by habitat type)
Cultural Heritage	Scheduled Monuments Historic Parks and Gardens Conservation Areas Registered Historic Landscapes Listed Buildings Grade I, Grade II and Grade II* Non-designated historic assets recorded by the Historic Environment Record
Hydrology, Hydrogeology and Geology	Main Rivers Ordinary Watercourses and Water Bodies Flood Zones 2 & 3 Peaty Soils and Peatlands of Wales Carbon Stock Geological Conservation Review Sites Abandoned Mines Catalogue Local Authority Mineral Consultation Areas and Mineral Protection Areas Artificial Ground
Forestry and Woodland	Ancient Woodland National Forest Inventory Woodland (commercial conifer and other woodlands)
Land Use	Best and Most Versatile Agricultural Land (Grades 1, 2 and 3a)

Criterion	Sub-criterion
	Committed Development (Consented and Undetermined Planning Applications) Local Development Plan Allocations Green Space
Technical	
Construction Access	Proximity to the existing A road network
Major and complex crossings	Railway lines, A-roads and large watercourses
Terrain	Elevated areas Steep terrain (slope > 22 degrees) Land susceptible to flooding (based on Flood Zone 2 and 3).
Third Party Infrastructure	Existing 132 kilovolt and 33 kilovolt overhead lines and towers Wind turbines

- 5.17 The route options were appraised using the relevant guidance and methodologies specific to each topic. A list of appraisal objectives, together with a description of the appraisal methodology applied for each criterion, is provided in Appendix D (environmental) and Appendix F (technical). A schedule of the data sources used to inform the appraisal is presented in Appendix C.
- 5.18 The appraisal process sought to draw out distinctions between the alternative route options to enable the relative strengths and weaknesses of each to be identified. Professional judgement, specialist desk studies, geographical information system mapping and landscape-focused field observations were utilised to identify the preferred route option, within which detailed design of the routeing alignment and tower placement can be progressed at later stages of design development.
- 5.19 The objective of the appraisal was to ensure likely significant environmental effects were avoided or minimised for as many of the criteria and sub-criteria as possible, in order to identify a preferred route that is optimal from an environmental and technical perspective. However, it was not possible to identify a route option that was entirely constraint-free, that is, all options to a greater or lesser degree interacted with some, or all, of the following identified receptors:
- Residential properties;
 - Special Landscape Areas;
 - Ancient woodland; or other forestry;
 - Ecological receptors such as Site of Special Scientific Interest;
 - Scheduled monuments;
 - Listed buildings;
 - Areas of rising landform; and
 - Existing wood pole overhead line infrastructure.

- 5.20 Therefore, where differences in the preferred route arose between criteria and sub-criteria, professional judgement was used to balance these in a proportionate way and to ensure that, where a constraint resulted in a route option being least preferred for one topic but not others, the scope to avoid or mitigate that constraint during detailed design of the route alignment and tower placement was considered.
- 5.21 In the event that criteria and sub-criteria could not be balanced, for example because the appraisal resulted in conflicting preferences for a route option and the relevant constraints leading to this conflict cannot be avoided or mitigated, professional judgement was used to consider the level of potential impacts, drawing on relevant, topic-specific guidance and/or the relative level of policy protection that may or may not be afforded to the criteria or sub-criteria in question.
- 5.22 Consideration was also given to whether constraints that are avoidable from the point of view of one criterion would not be avoidable in practice due to the presence of constraints relating to other criteria. This might include locations, for example, where avoiding an area of Ancient Woodland would involve encroaching on an area of peat. Where conflicts of this kind were identified, professional judgement was applied concerning the weight to be given to the differing constraints involved.
- 5.23 To ensure professional judgement was applied robustly and objectively, workshops were held, drawing on the expertise of environmental and technical specialists to clarify the degree of preference between alternative route options and to review the feasibility for mitigation⁹ at the detailed design of the route alignment and tower placement stage.
- 5.24 Whilst appraisals for individual criteria contained quantitative elements e.g. hectareage of a constraint present within the route option, the overall approach to identifying a preferred route was qualitative and professional judgement-based. This was necessary since the importance attached to certain criterion at local and national policy level is often defined by its quality as well as its geographical extent, size or frequency.
- 5.25 A key example of this is the importance assigned to different heritage assets. The importance of a Scheduled Monument is generally given more weight than other heritage assets, as it is nationally significant. The level of importance can vary however, dependent on the type of Scheduled Monument and the experience gained from its setting. For example, if the Scheduled Monument is isolated, such as a barrow or a cairn, setting impacts are likely to be less. Other assets, such as a hill fort, were designed to have views to it and from it. These views are therefore considered more important, especially if the asset is a landmark that stands out, for example because it's at a roadside.

Step F: Identification of a Preferred Route

- 5.26 The environmental appraisal tables for each route option are provided in Appendix E. The technical appraisal tables for each route option are provided in Appendix G. These include a summary of the overall conclusions on the preferences for each route option.

⁹ Mitigation at this routeing stage has considered measures such as spanning of constraints by the overhead line and tower placement. Undergrounding and rationalisation of existing overhead lines has not been considered at this stage.

Figures 5.3 to 5.10 show the route options in relation to the key environmental considerations that were taken into account during the appraisal.

- 5.27 The outcome of the appraisal is described below for each section of the corridor (Corridor A), including a summary of the decision-making process and description of the preferred route.

Section 1: Lan Fawr Energy Park to Lampeter

- 5.28 There are two route options for this section (1E and 1W), with one link between them (1a). Both Route Option 1E and Route Option 1W follow the same route from Lan Fawr Energy Park, for approximately 2.5 kilometres, before diverging to the east and west for the remainder of Section 1 and converging again at the start of Section 2.
- 5.29 Route Option 1W is shorter than 1E by approximately 0.2 kilometres. There is scope for Route Option 1W to join Route Option 1E via link 1a, which would increase the overall length of 1W by approximately 1 kilometre. These length differences are marginal, however, and not considered to be a differentiating factor in the selection of a preferred route.
- 5.30 Route Option 1E follows the alignment of an existing 33 kilovolt wood pole overhead line for approximately 4 kilometres and further south, for another 1 kilometre approximately.
- 5.31 For landscape and visual amenity, Route Option 1E is preferred when compared with Route Option 1W, for the following reasons:
- Route Option 1E extends into the locally designated Teifi Valley Special Landscape Area for the shortest distance compared with Route Option 1W;
 - Both route options pass within the 150 metres buffer zone of multiple residential properties, but this occurs less frequently for Route Option 1E;
 - Route Option 1E would have fewer impacts on the landscape character associated with the Teifi Valley; and
 - Route Option 1E would have fewer visual impacts on receptors within the larger settlement of Lampeter.
- 5.32 For biodiversity and nature conservation, Route Option 1E is preferred, when compared with Route Option 1W, for the following reasons:
- Route Option 1E does not directly impact the Afon Teifi Special Area of Conservation and Site of Special Scientific Interest designations, whereas Route Option 1W and link 1a would need to cross these designations;
 - Both route options extend into areas of priority habitat, but Route Option 1E provides more opportunities to avoid these areas; and
 - Route Option 1E contains a smaller amount of Ancient Woodland than Route Option 1W (noting that 1W is preferred in respect of overall Ancient Woodland and National Forest Inventory sub-criteria, as these areas are close to the boundary of Route Option 1W and are easier to avoid).
- 5.33 For cultural heritage, Route Option 1W is preferred, when compared with Route Option 1E, for the following reasons:
- Route Option 1W is further away from sensitive designated assets;
 - Route Option 1W is considered less likely to impact the setting of nearby hill forts (Scheduled Monuments) due to its position in the lower-lying valley; and

- The setting of the wider historic landscape is affected the least for Route Option 1W.
- 5.34 For hydrology and flood risk, Route Option 1E is preferred as, although it contains high risk flood zones, these areas are of a smaller scale than in Route Option 1W and can be spanned or avoided.
- 5.35 For geology and hydrogeology, there are no key differentiating features. In other words, all route options are considered equal environmentally.
- 5.36 For land use, Route Option 1E is preferred, for the following reason:
- Route Option 1E contains a considerably smaller area of Best and Most Versatile agricultural land; and
 - There are no committed developments within the route option.
- 5.37 The technical preference is for Route Option 1E as this would take the route away from the floodplain to the southeast of Lampeter.
- 5.38 Use of Link 1a to cross from 1E to 1W was considered but did not offer any obvious benefits as the link also requires a crossing of the Afon Teifi Special Area of Conservation and Site of Special Scientific Interest designations, and crosses an area of high risk flood zone.

Overall Route Option Preference

- 5.39 For Section 1, the **preferred Route Option is 1E**, up to its point of connection with Route Option 2E in Section 2. This route was preferred for landscape and visual, biodiversity, hydrology and land use. Route Option 1E was also considered acceptable for the remaining criteria, having some flexibility to mitigate potential impacts during the detailed design of the route alignment and tower placement. In particular, whilst Route Option 1E is closer to some key designated heritage assets, these are still at least 1 kilometre away. Potential impacts on their setting, if relevant, and suitable mitigation will be assessed during the Environmental Impact Assessment process.
- 5.40 The main driving factor for this selection was landscape and visual as 1E runs for the shortest distance in a locally designated Special Landscape Area, passes within the 150-metre buffer zone of the least residential properties, would have fewer impacts on landscape character within close proximity to the Afon Teifi, and would have fewer visual impacts on receptors within the larger settlement of Lampeter. In addition, Route Option 1E does not directly impact the Afon Teifi Special Area of Conservation and Site of Special Scientific Interest designations, and high-risk flood zones within the route option are of a smaller scale than in Route Option 1W.

Section 2: Lampeter to Llanllwni

- 5.41 There are three route options for this section (2E, 2W and 2C), with two links between them (2a and 2b). Route Option 2E generally follows its own path; there is a small amount of convergence with Route Option 2W and Route Option 2C in the middle part of the corridor and at the south where it meets Section 3. Route Option 2W and Route Option 2C converge and overlap for approximately one third of their length in the north and middle parts of the corridor.

- 5.42 Route Option 2C is the shortest route at 11.1 kilometres and the longest route is Route Option 2E at 12.6 kilometres in length. There is scope for Route Option 2E to join Route Option 2C via Link 2a and 2b, which would increase the length of Route Option 2E by up to 800 metres. These length differences are marginal, however, and not considered to be a differentiating factor in the selection of a preferred route.
- 5.43 All three route options for this section follow the alignment of an existing wooden pole 132 kilovolt overhead line for varying lengths, although Route Option 2C has the greatest extent of existing 132 kilovolt overhead line within the corridor (approximately 8km).
- 5.44 For landscape and visual amenity, there are several sub-criteria that give rise to a conflicting preference for a route option and when considered as a whole, there is no preferred route. Therefore, Links 2a and 2b and the point of convergence of all three route options were an important consideration in balancing the sub-criteria. There is a slight preference for Route Option 2E, switching to Route Option 2C where all routes converge northeast of Ty Mawr, for the following reasons:
- Noting that none of the route options in Section 2 pass within a designated Special Landscape Area, Route Option 2E is the furthest away from a Special Landscape Area in the north part of the corridor and Route Option 2C is furthest away from a Special Landscape Area for the longest distance in the south part of the corridor; and
 - By switching to Route Option 2C in the middle of the corridor, the group of residential properties located along the B4337 at Ty Mawr can be avoided.
- 5.45 An alternative option is to switch from Route Option 2E to Route Option 2W (at the same point of route convergence as for 2C). This would increase the distance of the route option from one Special Landscape Area (Llanllwni Mountain) but would also bring it closer to another (Teifi Valley). This latter consideration is potentially outweighed by the fact that a 132 kilovolt overhead line mounted on wooden poles runs along the south part of Route Option 2C. According to the Holford Rules, this should be avoided to minimise visual incoherence between two different types of support (wood pole and steel lattice) that are of differing heights.
- 5.46 For biodiversity and nature conservation, the preferred route option is 2W for the following reasons:
- There are no designated sites overlapping Route Option 2W (noting that one small designated site overlaps Route Option 2E and Route Option 2C where they converge, however there is scope to avoid this during the detailed design of the route alignment and tower placement); and
 - Route Option 2W contains a smaller geographical area of Priority Habitats than Route Option 2E and Route Option 2C.
- 5.47 Although Route Option 2W contains the largest area of Ancient Woodland and National Forest Inventory woodland, there is scope to avoid some of these areas during the design of the route alignment and tower placement by passing around them or spanning the overhead lines across them.
- 5.48 For cultural heritage, Route Option 2C is preferred from the north, merging onto Route Option 2E where the two routes converge, and diverting from Route Option 2E midway along onto Route Option 2W via Link 2a. The reasons are as follows:

- The combination of route options and links will avoid the most Scheduled Monuments and their settings; and
 - Although Route Option 2W passes closer to a Registered Park and Garden to the south, any visual effects and effects on its setting could potentially be mitigated during the detailed design of the route alignment and tower placement.
- 5.49 For hydrology and flood risk, Route Option 2E is preferred as it does not cross a high risk flood zone associated with a Main River and contains the smallest area of high risk flood zones associated with Ordinary Watercourses and Waterbodies (noting that it is expected that high risk flood zones in all of the Section 2 route options can be spanned during the detailed design of the route alignment and tower placement, due to their relatively small widths).
- 5.50 For geology and hydrogeology, there are no key differentiating features. In other words, all route options are considered equal environmentally.
- 5.51 For land use, Route Option 2E is preferred, for the following reason:
- Best and Most Versatile agricultural land is not present in Route Option 2E; and
 - There are no committed developments in Route Option 2E.
- 5.52 The technical preference is for Route Option 2E, crossing to Route Option 2W where Route Options 2C and 2W converge or via Link 2a, in order to avoid woodland and the need to cross existing overhead lines.

Overall Route Option Preference

- 5.53 For Section 2, the **preferred route option is 2E to 2W/2C to 2W**. This route was preferred for landscape and visual (for the northern and central sections), cultural heritage (for the southern section) and from a technical perspective. This route option was considered acceptable for the remaining criteria, having some flexibility to avoid or span certain features during the detailed design of the route alignment and tower placement.
- 5.54 The driving factors for this selection were to maximise the distance from residential properties, Special Landscape Areas and Scheduled Monuments, and to avoid co-location with an existing wooden pole mounted overhead line. It also links with the preferred Route Option 1E in Section 1.

Section 3: Llanllwni to Alltwalis

- 5.55 There are two route options for this section (3E and 3W), with four links between them (3a, 3b, 3c and 3d). Both route options follow a separate path. In other words, there is no convergence of the route options at any point along the length of Section 3.
- 5.56 Route Option 3E is shorter than 3W by approximately 0.2 kilometres. There is scope for Route Option 3W to join 3E via Link 3a and/or Link 3d, which would increase the overall length of 3W by approximately 1 kilometre and 1.5 kilometres respectively. There is also scope for Route Option 3E to join Route Option 3W via Link 3b and/or Link 3c, which would increase the overall length of 3E by 1.4 kilometres and 0.4 kilometres respectively. These length differences are marginal, however, and not considered to be a differentiating factor in the selection of a preferred route.

- 5.57 There are two links in the north of Section 3, which allow the preferred route for Section 2 to link up with either of the route options in Section 2.
- 5.58 Link 3a follows the same alignment as an existing 132 kilovolt wooden pole overhead line for the length of the link.
- 5.59 For landscape and visual amenity, Route Option 3W is preferred, for the following reasons:
- Route Option 3W is the furthest away from a locally designated Special Landscape Area;
 - Route Option 3W extends into landscape evaluated as High or above in the LANDMAP Visual and Sensory category for the shortest distance; and
 - Route 3W is further away, and less visible from the three villages of New Inn, Gwyddgrug and Alltwalis, which are located between the western and eastern routes in Section 3.
- 5.60 For biodiversity and nature conservation, Route Option 3E is preferred, for the following reasons:
- Route Option 3E does not directly impact a designated site, whereas Route Option 3W crosses the Afon Teifi designated site, although it could potentially be avoided during the design of the route alignment by spanning and appropriate tower placement; and
 - Both route options extend into areas of Priority Habitat, however Route Option 3E crosses a smaller area of Priority Habitat.
- 5.61 Although Route Option 3E contains the largest area of Ancient Woodland and National Forest Inventory woodland, there is scope to avoid these during the detailed design of the route alignment and tower placement, by passing around them or spanning the overhead lines across them.
- 5.62 An alternative option is to follow Route Option 3W from the north and divert onto Route Option 3E via Link 3d. This would allow the largest parcel of Ancient Woodland located midway along Route Option 3E to be avoided entirely, rather than spanned, and would also avoid a smaller parcel of Ancient Woodland located within the far south part of Route Option 3W.
- 5.63 For cultural heritage, Route Option 3W is preferred from the north, linking to Route Option 3E to the south via Link 3d, for the following reasons:
- The combination of route options minimises the effect on the setting of and views from Scheduled Monuments located on higher ground to the east; and
 - The use of Route Option 3W to the north avoids Listed Buildings located within the northern part of Route Option 3E, although those impacts could be minimised during detailed design of the route alignment and tower placement.
- 5.64 For hydrology and flood risk, Route Option 3E is preferred as it does not cross any Main Rivers and has the smallest area of high risk flood zones compared with Route Option 3W. There is scope to utilise Route Option 3W from the north and divert to Route Option 3E via Link 3a which also avoids crossing a Main River. Ordinary Watercourses cross both route options equally and can be avoided or spanned during detailed design of the route alignment and tower placement.

- 5.65 For geology and hydrogeology, there are no key differentiating features. In other words, all route options are considered equal environmentally.
- 5.66 For land use, there is a slight preference for Route Option 3W for the following reason:
- It avoids the housing allocation (SC20/h2) within the adopted Carmarthenshire Local Development Plan that is partially located within Route Option 3E.
- 5.67 Alternatively, Route Option 3E from the north can be utilised, connecting to Route Option 3W via Link 3b or 3c, which will avoid the land allocations. From these links, southwards there is no preference for a route option.
- 5.68 The technical preference is for Route Option 3W as there are fewer areas of woodland.

Overall Route Option Preference

- 5.69 For Section 3, the **preferred route option is 3W to Link 3d to 3E**. This route was preferred for cultural heritage, Ancient Woodland and slightly preferred for landscape and visual amenity, and land use. It was considered acceptable for the remaining criteria, having some flexibility to avoid or span certain features during the detailed design of the route alignment and tower placement.
- 5.70 The driving factor for this selection was the need to avoid residential receptors as much as possible, achieved by utilising Route Option 3W for the northern part of Section 3. It was also driven by the need to avoid Ancient Woodland, achieved by crossing to Route Option 3E in the southern part of Section 3. Route Option 3E is also further away from a Scheduled Monument.
- 5.71 By avoiding the receptors driving the selection of this route option, crossing the designated Afon Teifi Special Area of Conservation cannot be avoided. However, the crossing at this location is at the outer limit of the designation at the headwaters and involves crossing a tributary of the Afon Teifi and not the main river. As a result, the crossing is not expected to result in a significant, direct impact to its integrity. It should be noted that a Special Area of Conservation is not designated specifically for its importance to bird species. Notwithstanding this, there will be ongoing assessment of the preferred route in relation to other ecological receptors that may be associated with the Special Area of Conservation and these will inform the detailed design of the route alignment, tower placement and mitigation options.

Section 4: Alltwalis to Rhydargaeau

- 5.72 There are two route options for this section (4E and 4W), with one link between them (4a). Both 4E and 4W follow on from the previous section routes 3E and 3W, respectively. There is no overlap between the two route options. Route Option 4E follows a slightly more direct path than Route Option 4W, which includes some relatively tight turns.
- 5.73 Route Option 4E is slightly shorter than Route Option 4W by approximately 0.1 kilometres. There is scope for Route Option 4E to join Route Option 4W via Link 4a, which would increase the overall length of 4E by approximately 0.5 kilometres. These length differences are marginal, however, and not considered to be a differentiating factor in the selection of a preferred route.

- 5.74 Route Option 4W follows the alignment of an existing 132 kilovolt wooden pole overhead line for approximately 3.5 kilometres.
- 5.75 For landscape and visual amenity, Route Option 4E is preferred when compared with Route Option 4W, for the following reason:
- Route Option 4W follows an existing overhead line that is of a different type and scale (mounted on wood poles) to that proposed, which would create visual incoherence when viewed in combination. This visual impact is avoided by Route Option 4E.
- 5.76 For biodiversity and nature conservation, Route Option 4E is preferred for the following reason:
- Route Option 4E contains a smaller geographical area of Priority Habitats than Route Option 4W and link 4a; and
 - There are no designated sites overlapping either route option, however, Route Option 4E is furthest away from a designated site by a small margin.
- 5.77 For cultural heritage, there is a slight preference for Route Option 4W, for the following reason:
- Route Option 4W is located furthest away from Listed Buildings within the Gwili Valley.
- 5.78 For hydrology and flood risk, Route Option 4E is preferred as it contains the smallest area of high risk flood zones associated with a Main River and Ordinary Watercourse (noting that all high risk flood zones in both of the route options can be either avoided or spanned during the detailed design of the route alignment and tower placement).
- 5.79 For geology and hydrogeology, Route Option 4E is preferred as it traverses a smaller area of mineral deposits compared with Route Option 4W.
- 5.80 For land use, there is a slight preference for Route Option 4W as it is the least constrained by committed developments, although committed developments in Route Option 4E can be avoided during detailed design of the route alignment and tower placement.
- 5.81 There is a slight technical preference for Route Option 4W as there are fewer areas of steep slopes >22 degrees.

Overall Route Option Preference

- 5.82 For Section 4, the **preferred route option is 4E**. This route was preferred for landscape and visual and was considered acceptable for the remaining criteria, having some flexibility to avoid or span certain features during the detailed design of the route alignment and tower placement.
- 5.83 The driving factor for this selection was that it avoids the existing wooden pole mounted overhead line within Route Option 4W. It also aligns with the south of the preferred route option for Section 3 (3E).

Section 5: Rhydargaeau to Llandyfaelog

- 5.84 There are two route options for this section (5E and 5W), with one link between them (5a). This is the last section of the preferred corridor. As the route options near the

southern part of the Section 5, after crossing the A48, they converge and follow the same path for approximately 3.3 kilometres to the proposed substation connection.

- 5.85 Route Option 5W is shorter than 5E by approximately 0.6 kilometres. There is scope for Route Option 5W to join 5E at the start of this section via Link 5a, which would increase the overall length of 5E by approximately 1.1 kilometres. These length differences are marginal, however, and not considered to be a differentiating factor in the selection of a preferred route.
- 5.86 Route Option 5W follows the alignment of an existing 132 kilovolt wooden pole overhead line for part of its length. This overhead line is the Brechfa Grid Connection. The Brechfa Grid Connection (which connects Brechfa Wind Farm to the National Grid network south of Carmarthen) comprises approximately 25 kilometres of wooden pole overhead line and an undergrounded section across the Tywi Valley.
- 5.87 This route options appraisal has been undertaken on the assumption that the proposed grid connection will be overhead. However, given the undergrounding of the Brechfa Grid Connection across the Tywi Valley, it is acknowledged that undergrounding as a potential form of mitigation may need to be considered for specific sections of Section 5 of the Project. Further assessments will be undertaken as part of ongoing studies to inform decisions on appropriate mitigation.
- 5.88 For landscape and visual amenity, there is a preference for Route Option 5E, when compared with Route Option 5W, for the following reasons:
- Both route options pass within the 150-metre buffer zone of multiple residential properties, but this occurs less frequently for Route Option 5E, which affects approximately 60 to 70 properties, whereas Route Option 5W affects approximately 150 to 170 properties;
 - Route Option 5E will affect fewer recreational receptors, including the holiday village at Llangunnor and other visitor attractions in Carmarthen;
 - Route Option 5E avoids co-location with an existing wooden pole mounted overhead line, which partially follows the path of Route Option 5W; and
 - Although Route Option 5W passes through a smaller section of the Tywi Valley Special Landscape Area, the area difference compared to Route Option 5E is marginal.
- 5.89 For biodiversity and nature conservation, Route Option 5W is preferred, when compared with Route Option 5E, for the following reasons:
- Both route options extend into areas of priority habitat, but Route Option 5W contains the smallest area of Priority Habitat (noting that Priority Habitat in both route options can generally be avoided or spanned during the detailed design of the route alignment and tower placement);
 - Route Option 5W crosses one Site of Special Scientific Interest compared with two crossed by Route Option 5E;
 - There are fewer Sites of Special Scientific Interest located within 2 kilometres of Route Option 5W; and
 - Both route options cross areas of National Forest Inventory and Ancient Woodland, however, Route Option 5W crosses the smallest total area of woodland, which is generally localised and therefore easier to avoid or span during detailed design of the route alignment and tower placement.

- 5.90 For cultural heritage, Route Option 5W is preferred, when compared with Route Option 5E, for the following reasons:
- Route Option 5W avoids ‘Merlins Hill’ Hill Fort (Scheduled Monument), located within and adjacent to Route Option 5E; and
 - Although Route Option 5W passes closer to a higher number of Listed Buildings than Route Option 5E and also to a Registered Park and Garden, this is outweighed by the benefit of avoiding a route close to the Scheduled Monument in Route Option 5E.
- 5.91 As described in paragraph 5.25, Merlins Hill in this instance is considered to be of more significant importance when compared to other types of Scheduled Monument and other types of heritage assets, hence the preference for Route Option 5W. However, it may be possible to minimise impacts on Merlins Hill through the detailed design of the route alignment, tower placement and other mitigation measures.
- 5.92 For hydrology and flood risk, Route Option 5E is preferred as it contains a smaller area of high risk flood zones associated with Ordinary Watercourses than Route Option 5W. There are large areas of high risk flood zones associated with Main Rivers in both route options, which cannot be avoided.
- 5.93 For geology and hydrogeology, Route Option 5E is preferred for the following reasons:
- Route Option 5E crosses a smaller area of peatland compared to Route Option 5W (noting that areas of peatland in both route options can be avoided or spanned);
 - Route Option 5E crosses a smaller area of safeguarded mineral deposit compared to Route Option 5W; and
 - Route Option 5E crosses a smaller area mapped as ‘abandoned mine catalogue’ land compared to Route Option 5W.
- 5.94 For land use, Route Option 5E is preferred, for the following reasons:
- Route Option 5E contains a smaller area of Best and Most Versatile agricultural land than Route Option 5W; and
 - Route Option 5E avoids crossing any areas of protected open space (specifically sports facilities), two of which span the width of Route Option 5W.
- 5.95 The technical preference is for Route Option 5E as it has a smaller flood risk area and is less affected by peat.

Overall Route Option Preference

- 5.96 For Section 5, the **preferred route option is 5E**. This route was preferred for landscape and visual, flood risk, geology, land use and technical. However, it was least preferred from a cultural heritage perspective due to the proximity to Merlin’s Hill hillfort, a Scheduled Monument located on high ground adjacent to and slightly overlapping Route Option 5E. There is potential to avoid or mitigate effects on the setting of the Scheduled Monument, subject to further assessment during the detailed design of the route alignment and tower placement. Route Option 5E was considered acceptable for the remaining criteria, having some flexibility to avoid or span certain features during the detailed design of the route alignment and tower placement.

- 5.97 The main driving factors for this selection was that it avoids the existing wooden pole mounted overhead line within Route Option 5W (in accordance with Holford Rule 6), it avoids two protected open space areas associated with sports facilities, which span the full width of Route Option 5W, there is less interaction with the 150-metre buffer zone of residential properties, and it will affect fewer recreational receptors, including the holiday village at Llangunnor and other visitor attractions in Carmarthen compared with Route Option 5W.
- 5.98 These factors were balanced against the heritage constraints of Route Option 5E, whilst also taking into consideration the preference for an eastern corridor within Section 4 (4E), as well as at the southern end of Section 3 (3E).

Overall Route Preference

- 5.99 From north to south, the **overall preferred route is 1E to 2E to 2C2W to 2W to 3W to Link 3d to 3E to 4E to 5E**. The sections of the overall preferred route are shown in Figure 5.11 (sheets 1 to 6). Each section of the preferred corridor was appraised consecutively from north to south. The relationship between sections was then considered, following a process of cross checking between them to ensure the start and end points of the preferred route in one section aligned with the start and end points of neighbouring sections.
- 5.100 As described in paragraph 5.23, where there were conflicting preferences for a route option (e.g. east versus west route options), workshops were held to allow professional judgement to be applied to balance the constraints in a proportionate way and to ensure that likely significant environmental effects are avoided or minimised as far as possible. It was not possible to identify a route option that was entirely constraint-free, that is, all route options interact with constraints.
- 5.101 It is acknowledged that there is likely to be a need to mitigate certain environmental features, which may include minor deviation from the preferred route option or partial undergrounding of the grid connection to reduce the level of interaction with a specific environmental feature. The type and scale of mitigation will also need to consider its technical, environmental and economic feasibility.

6 CONSULTATION PROCESS AND NEXT STEPS

Introduction

- 6.1 Green GEN Cymru's consultation is seeking feedback from stakeholders and communities so that this can be considered in the decisions we make on the Project.
- 6.2 This chapter provides an overview of the consultation we will undertake for the Project. It covers:
- Why we are consulting;
 - The consultation process – the planning context and our approach to consultation;
 - Our plans for consultation - an overview of the pre-application consultation and where, who, how and when we are consulting in Round One;
 - Why feedback is important and how it influences the development of our proposals; and
 - How to provide feedback.
- 6.3 The consultation is open from 24th January to 6th March 2024.

Why consult?

- 6.4 We are developing a stronger, more resilient renewable electricity network that is greatly needed to distribute clean, green energy. Our proposals increase access to new renewable energy, helping address the biggest threat facing us and future generations – the climate emergency. This Project has the potential to enable the connection of other organisations energy parks, community projects, and support energy resilience.
- 6.5 Delivering the infrastructure we need to address climate change requires a careful balance. We are focused on causing the least disturbance to those who live, work and enjoy recreation close to our Project and we are committed to protecting the surrounding environment.
- 6.6 It is important to us that communities and stakeholders have the opportunity to comment on our Project at an early stage, so we can make decisions in view of the feedback received and identify ways to reduce or avoid impacts and create opportunities.
- 6.7 We are committed to ensuring our community consultation is accessible, understandable and meaningful. These guiding principles have informed the information set out in this chapter and the materials we will provide for the January 2024 consultation.

The consultation process

- 6.8 The Planning Act (Wales) 2015 requires applicants to consult local communities and stakeholders on their proposals.
- 6.9 The Development of National Significance application process is managed by Planning and Environment Decisions Wales, which has set out its expectations for public

consultation and engagement on infrastructure projects in its document Pre-Application Community Consultation: Best Practice Guidance for Developers (December 2021), in which Section 3.1 states: *“The challenge is for a developer to consult widely and clearly to capture a balanced and informed response. When executed well, engagement should increase the level of transparency, develop relationships, and shape the project by considering and responding to feedback.”*

- 6.10 As a company based in Wales, and investing in Wales, Green GEN Cymru attaches great importance to the effect that its work may have on the environment and local communities in Wales.
- 6.11 Green GEN Cymru is committed to providing clear and up-to-date information on its proposals, and listening to local people and consulting them at each stage where their views can help to shape Green GEN Cymru's proposals before a consent application is submitted.
- 6.12 Green GEN Cymru recognises that finding a route for the Project is a complex process, and its consultation strategy goes beyond the Planning and Environment Decisions Wales good practice guidance to ensure that local people have the opportunity to comment at each stage of the routeing process. Therefore, three rounds of pre-application consultation will be carried out, as follows:
- Round One: Public consultation on the preferred route for the Project, starting in January 2024;
 - Round Two: Public consultation on a detailed route alignment for the Project, including proposed tower locations, access routes and working areas, likely starting in early 2025; and
 - Round Three: Public consultation on our proposed Development of National Significance application, likely starting in Autumn 2025.
- 6.13 Following submission of the consent application, Planning and Environment Decisions Wales will carry out further statutory consultation with the public and stakeholders before making any decision on the proposal.
- 6.14 Following each round of consultation, we will prepare a Consultation Report summarising how we consulted the community and how the responses influenced the development of the Project.

Our plans for consultation – January 2024

- 6.15 We are planning a consultation to invite comments on our Project, prior to making an application for consent.
- 6.16 We will take a digital first approach, consistent with current best practice. Our Project website (www.greengentowyeifi.com) will be the primary means of accessing information about the Project and the preferred method for providing feedback. Digital platforms will be suitable for both desktop and mobile devices. The digital approach will be accompanied by physical engagement methods including mailings to addresses, community events, and hard copies of consultation materials being available.

Where we will consult

- 6.17 We have defined an area in the vicinity of the Project based on the potential impacts of our work (such as visual effects and/or effects from construction). This area comprises approximately 1km from either side of the preferred route corridor – our consultation zone.
- 6.18 Most of our community consultation activities will be focused on this zone, including information publicising the consultation being issued to households, and community events. Where suitable venues are not available in the consultation zone, we will organise events in the nearest population hubs.
- 6.19 We will also undertake activities to promote broad awareness of the consultation outside the consultation zone. We will invite and encourage feedback on the project from communities outside of the immediate consultation zone through local advertising and notifying relevant stakeholders across the wider region.

Who we will consult

Those living and working in the consultation zone

- 6.20 We will primarily seek to engage with the communities and stakeholder groups within the consultation zone. This will include residents, businesses, and their elected representatives.

Seldom heard groups

- 6.21 We recognise that there are individuals and groups that may have difficulties taking part in the consultation process, such as young and elderly people; people with a physical disability or learning difficulty; or whose first language is not Welsh or English. Requests for consultation materials to meet specific requirements (such as Braille or foreign languages, or for those with literacy difficulties) will be considered on a case-by-case basis so we can establish how best to provide information.

People with an interest in land

- 6.22 We will engage fully with all relevant organisations and individuals (such as landowners and occupiers) who have an interest in the land affected by our Project at this stage. While it is important that we capture their feedback during the consultation, we will also encourage an ongoing dialogue beyond that period and continue engagement as the project design evolves.

Prescribed and non-statutory stakeholders

- 6.23 The Planning (Wales) Act 2015 requires that we consult with a range of organisations, nationally and locally, whose operations and knowledge is consistent with providing feedback on our Project.
- 6.24 Prescribed stakeholders include County and Community Councils, NRW, local highways, Health and Safety Executive and Welsh Ministers.

Local stakeholder organisations

- 6.25 We have identified a range of local stakeholder organisations with relevant knowledge and interests relating to aspects of our Project - such as the environment, landscape, wildlife, heritage, tourism and agriculture. We are inviting these organisations to comment on our proposals.
- 6.26 Local stakeholder organisations include local business groups, schools, universities', sports clubs, as well as farmers', tourism, wildlife, youth and community groups.

What we are consulting on

- 6.27 We are consulting on:
- The preferred route to provide a connection between the proposed Lan Fawr Energy Park and a new 400 kilovolt National Grid substation (known as the Llandyfaelog Substation), via a new 132 kilovolt Green GEN Cymru substation that will be located south of Carmarthen, close to the existing 400 kilovolt overhead line. As well as connecting the Lan Fawr Energy Park into the wider electricity network, the Project will also provide the necessary infrastructure to connect other, future renewable energy generation schemes to this network.
- 6.28 We are also asking for feedback on:
- Our work to date including any factors you feel have not been considered in the identification of the preferred route;
 - Any specific factors you think we should consider when developing our Project; and
 - The experience of consultation and the information we have made available.

Public exhibitions

- 6.29 We will hold community events to give people the opportunity to talk to our team and ask questions. Large scale maps, photos and other materials will be available to view at physical events. Welsh and English-speaking staff will be at all of our events.

Table 6-1 Public event and webinar details

Community events	Date	Event time
Llanllwni Church Community Hall – Llanllwni, Pencader, SA39 9DR	Wednesday 7 February	2pm - 7pm
Alltwalis Community Centre – The Old School, Alltwalis, Carmarthen, SA32 7EA	Thursday 8 February	2pm - 7pm
St. Peter's Hall – Nott Square,	Friday 9 February	2pm - 7pm

Community events	Date	Event time
Carmarthen, SA31 1PG		
Cellan Hall – Cellan Millenium Hall, Tre Cynon, Lampeter, SA48 8HU	Thursday 22 February	2pm - 7pm
Aberduar Baptist Chapel – Glanduar, Llanybydder, SA40 9RS	Friday 23 February	2pm - 7pm
Peniel Community School – Peniel, Carmarthen, SA32 7AB	Saturday 24 February	10am - 2pm

Consultation materials

- 6.30 We are producing the following materials for this consultation. These are intended for the public and provide information on our Project to support providing feedback.

Table 6-2 Overview of public consultation materials

Consultation material	Overview
Project website	The project website has details of the Project. It holds all consultation materials. A digital feedback form is available.
Consultation postcard	A consultation postcard with a brief explanation of the Project and clear signposts of how to find out more (including website, contact details for the project team and details of consultation events). The postcard is being sent to all addresses in the consultation zone (approximately 5,500).
Consultation brochure	An overview of the Project includes maps of the proposed route and substation site. It is available to download from the website, or in hard copy on request from the project team.
Consultation feedback form	Hard copy and digital versions of feedback form for consultees to provide comments.

- 6.31 Consultation materials listed above will be available in print at our events and on request. We are happy to respond to reasonable requests from consultees for copies of documents. Copies of the documents, plans and maps will be available free of charge in digital format. Requests for hard copies will be reviewed on a case-by-case basis. A reasonable copying charge may apply (up to a maximum of £500 for one full suite of documents) to be paid for by the recipient.

Enquiries and information

- 6.32 We will operate a freephone enquiry line (0800 915 2496) in Welsh and English (9am-5pm Mon-Fri) with an answer phone service in operation outside of these hours. Email and freepost will also be available.

Responding to the consultation

- 6.33 There will be several ways to provide feedback:
- Online feedback form on our website: www.greengentowyteifi.com;
 - Sending an email to: info@greengentowyteifi.com; and
 - Sending written feedback to us: FREEPOST Green GEN Cymru TT.
- 6.34 Feedback will need to be received by 23:59 on Wednesday 6th March 2024. Any feedback received after this day may not be considered by our team.

How we will use feedback

- 6.35 We will draw together all the feedback and respond to the themes and issues raised in a feedback report. In this way, everyone will be able to see all the themes and issues raised and how we plan to take them into account.
- 6.36 We will use the feedback to review the decisions we have made to date and to inform our work going forward. Our next steps will involve more detailed routeing and identifying locations for pylons and additional infrastructure. In making these decisions, we will also consider:
- Environmental and socio-economic assessments;
 - Our duties to develop a safe, efficient and affordable connection; and
 - Planning policy and related guidance.
- 6.37 We will take into account all of these considerations and refine our proposals ready for further consultation.

Next steps

- 6.38 As set out in the Approach to Routeing chapter of this document (Chapter 3), following consultation with stakeholders, including landowners and the community, and a review of consultation responses, the preferred route will be refined further to take account of feedback.
- 6.39 We will review and assess all consultation feedback received from stakeholders, communities and landowners. This will include consideration of all the issues raised and on any refinement to the preferred route that may result.
- 6.40 We will present this in a Stage One Consultation Feedback Report, which will provide an account of the comments we have received, set out the issues raised and explain how we have considered them in refining the project design for the preferred route. Where we have not altered our proposals to reflect issues raised, we will explain our reasoning.
- 6.41 We anticipate publishing the Stage One Consultation Feedback Report to coincide with the launch of the Stage Two Consultation, which will present a proposed design for the

OHL infrastructure (including pylon locations). This second stage of consultation will allow us to gather and consider further comments that may help refine the design before we submit our application. This will include comments gathered as part of the Environmental Impact Assessment Scoping process, which will be undertaken in parallel with Stage 2b of the route selection process.

- 6.42 Between Stage One and Stage Two Consultation we will keep people up to date with relevant news on the project. This will include stakeholder briefings, web updates and community updates for those that sign up to be kept informed via the project website. with community newsletters and web updates.
- 6.43 Our consultation may be supplemented by additional consultations should the proposals benefit from further community and stakeholder input. Should this be required, we will advertise the supplementary consultations and consultees will be notified.
- 6.44 During and after this stage of consultation, we will look to engage and establish an ongoing dialogue with all landowners potentially affected by the Project.

GREEN GEN TOWY TEIFI

Consultation January 2024



www.greengen.towyteifi.com



info@greengen.towyteifi.com



0800 915 2496



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