Glenvernoch Wind Farm

Additional Information
Volume I – Main Text

April 2026

Energiekontor UK Ltd
George.oldroyd@energiekontor.com

CONTENTS

FIGURES

APPENDICES

1 INTRODUCTION

Introduction

1.1 This Additional Information (AI) is submitted in support of an application for consent under Section 36 of the Electricity Act 1989 by Energiekontor UK Ltd ("the Applicant") to the Energy Consents Unit (ECU) for thirteen wind turbines and associated infrastructure ("the Proposed Development") on land at Glenvernoch ("the Site"). The application was accompanied by an Environmental Impact Assessment Report ("the EIAR") as required under the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 ("the EIA Regulations").

1.2 Regulation 19 of the EIA Regulations directs that, in order to ensure the completeness and quality of the EIAR, the Scottish Ministers must (having regard in particular to current knowledge and methods of assessment) seek from the developer supplementary information about any matter in schedule 4 which in the opinion of Scottish Ministers is directly relevant to reaching a reasoned conclusion on the significant effects of the development on the environment.

Purpose of AI

1.3 This AI has been prepared by the Applicant with specialist input to provide details of the potential grid connection for the Proposed Development, together with an assessment of the potentially likely significant environmental effects associated with the grid connection and in-combination with the Proposed Development. The AI is based on the information that is known at the time of writing.

1.4 For the avoidance of doubt, permission is not sought for the grid connection itself as part of this application. The connection would be subject to its own separate consenting process in the future, which would be led by SP Energy Networks ("SPEN"). SPEN would also construct, operate and own the grid connection infrastructure.

1.5 It should be stressed at the outset that the final details of the grid connection are not currently known. A number of ongoing initiatives relating to electricity network planning may influence the eventual point of connection, connection date, connection voltage, routeing of the connection, and the balance of underground cable and overhead line. These include Connections Reform, the Strategic Spatial Energy Plan (SSEP), Regional Energy Strategic Planners (RESPs) and Centralised Strategic Network Planning (CSNP). These initiatives are discussed in section 2.

Structure of Report

1.6 This FEI is structured as follows:

- Section 2 provides the regulatory and policy background for connecting wind farms to the grid in Scotland;

- Section 3 discusses SPEN's approach to routeing grid connections;
- Section 4 describes the likely grid connection details for Glenvernoch Wind Farm;
- Section 5 – 11 provide an environmental assessment of the grid connection; and
- Section 12 provides a non-technical summary of the environmental assessment.

The Applicant

1.7 Energiekontor UK Ltd is a renewable energy development company with offices in Glasgow, Edinburgh and Leeds. The company was formed in 1999 and develops onshore wind and solar farms throughout the United Kingdom. The company operates eleven existing wind farms in the UK, including three subsidy-free wind farms in Scotland, with many others at various stages of the development process in the UK.

1.8 Energiekontor UK Ltd is part of the Energiekontor Group. The parent company, Energiekontor AG, was established in 1990 in Bremerhaven in Northern Germany. It has since grown to become one of the leading wind energy companies in Europe and is active in Germany, France, Portugal, the USA and the UK. The company has built more than 170 onshore wind farms and solar parks in Europe with a total nominal power of 1.5 gigawatts.

Contact for Further Information

1.9 For additional copies, a charge of £10 will be made for a full electronic copy of this FEI on CD. Costs for paper copies are as follows:

- Written Text £15.
- Figures £15

1.10 Requests for copies should be sent to: George.Oldroyd@energiekontor.com.

1.11 Hard copies of this FEI will be available for public inspection at Dumfries and Galloway Council, Council HQ, English Street, Dumfries, DG1 2DD.

2 REGULATORY AND POLICY BACKGROUND

Introduction

2.1 As part of its commitment to tackling climate change, the Scottish Government has set legally binding targets to reach net zero greenhouse gas emissions by 2045. In delivering net zero, the electricity system – how electricity is generated, transmitted, distributed and used – is undergoing significant transformational change. This section sets out the regulatory and policy context that underpins how this transformation will be delivered in practice.

Regulatory Context

2.2 Scottish Hydro Electric Transmission plc, operating and known as Scottish and Southern Electricity Networks Transmission ("SSEN Transmission") owns and maintains the electricity transmission networks across the north of Scotland. SP Energy Networks ("SPEN") owns and maintains the electricity transmission networks across the south of Scotland.

2.3 There are a number of legal provisions which apply to the development of electricity transmission and distribution lines and associated infrastructure. The principal legislation which applies in the UK is the Electricity Act 1989. Licence holders are required under Section 9(2) of the Electricity Act to:

- Develop and maintain an efficient, co-ordinated and economical system of electricity transmission; and
- Facilitate competition in the supply and generation of electricity.

2.4 Transmission licence holders therefore have statutory and licence obligations to develop the electricity transmission network to provide adequate transmission capacity and to provide connections to customers who wish to connect to and use the transmission system to participate in the national wholesale electricity market, including new electricity generators. Similar obligations exist for distribution licence holders.

2.5 Section 38 and Schedule 9 of the Electricity Act imposes a further statutory duty on licence holders to take account of the following factors in formulating proposals for the installation of overhead transmission lines:

- "*(a) 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*
- *(b) 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.*"

2.6 The Construction (Design and Management) Regulations 2015 require that the design of new grid infrastructure minimises hazards and reduces risk during construction.

2.7 The Holford Rules provide guidance relating to the routeing of overhead electricity transmission lines.

2.8 In the context of the above, transmission licence holders are required to identify electrical connections that meet the technical requirements of the electricity system, which are economically viable, and to consider and mitigate environmental impacts on both the environment and the people who live, work and enjoy recreation within it.

Policy Context

Planning Policy

2.9 NPF4 recognises the need for the expansion of the electricity grid in Scotland and includes 'Strategic Renewable Electricity Generation and Transmission Infrastructure' as a 'national development'. This is to support a large and rapid increase in electricity generation from renewable sources, which is essential for Scotland to meet its net zero emissions targets. This will require substantial reinforcement of the electricity transmission grid, including the addition of new infrastructure to connect and transmit the output from new on and offshore capacity to consumers in Scotland, the rest of the UK and beyond. NPF4 makes it clear that national developments "will be a focus for delivery".

2.10 Policy 11 of NPF4 relates to energy generation and infrastructure. The intent of the policy is stated to be:

> *"To encourage, promote and facilitate all forms of renewable energy development onshore and offshore. This includes energy generation, storage, new and replacement transmission and distribution infrastructure and emerging low-carbon and zero emissions technologies including hydrogen and carbon capture utilisation and storage (CCUS)."*

2.11 Policy 11 also states that "grid capacity should not constrain renewable energy development" and that "it is for developers to agree connections to the grid with the relevant network operator".

2.12 The Onshore Wind Policy Statement sets out the Scottish Government's ambition to install a minimum capacity of 20GW of onshore wind in Scotland by 2030. This will help to "support the rapid decarbonisation of our energy system, and the sectors which depend on it, as well as aligning with a just transition to net zero whilst other technologies reach maturity" (paragraph 1.3.3).

Connections Reform

2.13 The UK's energy system is undergoing a fundamental transformation to achieve the UK Government's Clean Power 2030 ambition, support the transition to net zero, and reform the way projects connect to the electricity network. The National Energy System Operator (NESO) has introduced 'Connections Reform' to address a grid connection queue that

was blocked by projects that were not making any progress towards connecting. The reform introduces significant changes to the codes and methodologies that govern how projects enter and progress through the connections process; it will remove unviable projects from the grid connection queue; and prioritise those critical to delivering clean power and wider industrial decarbonisation.

2.14 Previously, the way energy projects connected to the grid was based on a long 'first come, first served' queue. Projects joined the queue according to the order in which their grid connection application was submitted, and whichever project was first in line would be prioritised for connection first, even if that project was not ready to build. This led to delays, wasted resources and sometimes unnecessary network upgrades.

2.15 As part of the reformed connections process, the rules have changed and projects are now assessed and assigned a status – or 'Gate' – based on their readiness and strategic alignment with the UK Government's energy goals:

- Gate 1 applies to projects that do not meet the Gate 2 criteria. These projects will not be assigned a confirmed point of connection or connection date, but may progress to Gate 2 in the future if both Readiness and Strategic Alignment can be demonstrated.

- Gate 2 applies to projects that meet the new requirements for readiness and strategic alignment. These projects can secure a confirmed point of connection, connection date, and queue position.

2.16 Readiness and Strategic Alignment are defined by NESO in the new rules. Readiness generally means that a project has secured land rights, while Strategic Alignment for Scottish onshore wind projects currently means that planning consent has been gained.

2.17 In December 2025 NESO published its re-ordered connections queue based on the application of Gate 1 and Gate 2 criteria to all projects in the existing queue. The result is that for onshore wind in Scotland, sufficient projects have received Gate 2 status to achieve the UK Government's current clean energy targets until 2035.

2.18 On the face of it, this means that in the next round of applications to connect to the grid, only projects in Scotland that qualify for special protections will be awarded Gate 2 status. The Proposed Development benefits from such special protections and as such would be awarded Gate 2 status in the event it receives consent, regardless of whether there is remaining capacity in Great Britian for new onshore wind projects or not. In the short to medium term, the picture will be complex because some current Gate 2 sites may not be realised, in turn freeing up capacity, and some of the remaining capacity for new onshore wind projects in England and Wales (currently approximately 5GW) may be reallocated to Scotland. In addition, it is likely that the emerging Strategic Spatial Energy Plan (as discussed below) will increase the onshore wind capacity requirements in Scotland.

2.19 Regardless of future Gate status, projects which are not currently at Gate 2 are unable to confirm their point of connection or connection date with the relevant grid licence holder until they gain planning consent and can move to Gate 2. Glenvernoch Wind Farm does

not currently benefit from Gate 2 status and the final details of the grid connection are not therefore known.

Strategic Spatial Energy Plan

2.20 NESO is currently working with a broad range of stakeholders, including the UK, Scottish and Welsh governments, to develop Great Britain's first ever spatial plan for energy: the Strategic Spatial Energy Plan (SSEP). This will be a comprehensive blueprint for the energy system across Great Britain and drive a more strategic approach to energy infrastructure planning from 2030 to 2050, aiming to speed up the transition away from fossil fuels and towards homegrown clean energy. The SSEP will be instrumental in achieving clean power and net zero.

2.21 The SSEP will be used to help plan the future of the energy system for the whole of Great Britain. It will take over from the government's Clean Power 2030 report and sit alongside and grow with future government policy and market-led interventions, providing a more strategic approach to energy system. The SSEP's outputs will directly feed into the Centralised Strategic Network Plan (CSNP), which is a plan for transmission network infrastructure which NESO is also developing.

2.22 The overall goal of the SSEP is to help accelerate and optimise the transition to clean, affordable and secure energy across Great Britain. This goal, and the objectives that support it, will be achieved via a partnership between the UK government, Scottish and Welsh governments, Ofgem, NESO and private industry. It will be supported in achieving these goals through work including the CSNP and regional energy plans produced by Regional Energy Strategic Planners (RESPs).

2.23 The SSEP will contribute to achieving these goals by providing greater clarity on the long-term evolution of the energy system as we decarbonise the economy in line with our net zero commitments. It will also support policy decisions with its assessment of the optimal locations, quantities and types of energy infrastructure required to meet future energy demand with clean, affordable and secure supply. It will take account of public views, environmental considerations and cross-sectoral demands on land and sea, and express this information as a spatial plan for energy generation.

2.24 The first SSEP, currently due to be published in autumn 2027, will take account of current and planned infrastructure and map the potential locations, quantities and types of electricity generation and storage infrastructure required between 2030 and 2050. Following publication of the first plan it is intended that the SSEP will be updated every three years. It is anticipated that the initial SSEP, together with future iterations, will revise the capacity requirements for individual generation technologies in different regions in response to evolving electricity demand patterns as the economy decarbonises.

Summary

2.25 In summary:

- Licence holders have statutory and licence obligations to develop the electricity network to provide adequate capacity and to provide connections to customers who wish to connect to and use the electricity system.

- NPF4 is clear that "grid capacity should not constrain renewable energy development" and that "it is for developers to agree connections to the grid with the relevant network operator".

- In delivering net zero, the electricity system – how electricity is generated, transmitted, distributed and used – is undergoing significant transformational change.

- Connections Reform has moved from the previous 'first come, first served' process to a new gated process, which prioritises projects based on their readiness and strategic alignment with the UK Government's energy goals.

- Only projects with Gate 2 status are assessed in detail by the network licence holders and only these projects will have confirmed points of connection and connection dates.

- Scottish onshore wind projects with Gate 1 status will not have details confirmed for their points of connection or connection dates and, at least until the SSEP is published, will only progress to gate 2 when they receive consent.

- Glenvernoch Wind Farm does not currently benefit from Gate 2 status but, due to relevant protections, should it receive consent in the future then it would be eligible for Gate 2 status.

- While there is currently a prima facie sufficient supply of onshore wind capacity in Scotland to meet UK energy targets to 2035, this position will change following publication of SSEP in 2027 and subsequent updates. Committed capacity is also likely to fluctuate as a result of project attrition.

3 APPROACH TO ROUTEING

Introduction

3.1 SP Energy Networks ("SPEN") has a legal duty to develop and maintain a technically feasible and economically viable transmission and distribution system in central and southern Scotland. This section outlines SPEN's approach to fulfilling this duty whilst having due regard to environmental interests including natural and cultural heritage assets and people. Further information on SPEN's process is set out in its publication Approach to Routeing and Environmental Impact Assessment[1]. The discussion below reflects SPEN's published guidance.

SPEN Approach to Routeing and Siting

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

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

3.4 SPEN's approach to developing connection projects is based on two stages:

- Stage 1: Identification and appraisal of route options to select a preferred route including consultation with stakeholders and the wider public to establish a proposed route. Under the Electricity Act 1989, SPEN is required to consider technical, economic and environmental matters, and reach a balance between them. This means that the proposed route will be the one, selected after an appraisal of a number of route options, which balances technical feasibility and economic viability with the least disturbance to the environment and people.

- Stage 2: After the selection of a proposed alignment, it is necessary, in the majority of cases, to undertake an EIA of the likely environmental effects, and to reduce,

[1] https://www.spenergynetworks.co.uk/userfiles/file/SPEN_Approach_to_Routeing.pdf

offset or prevent significant adverse effects, where practicable. This results in the final alignment for the basis of the application.

3.5 These two stages are discussed in more detail below.

Stage 1: Routeing Strategy

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

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

3.8 On that basis, a well-routed line takes into account other environmental and technical considerations and will avoid, wherever possible, areas of high amenity value. Environmental considerations include potential effects on:

- Visual amenity;
- Landscape character;
- Ecology and ornithology;
- Forestry and woodland (including areas of ancient and native woodlands);
- Hydrology, hydrogeology, geology (such as carbon-rich soils and deep peat) and water resources;
- Cultural heritage including archaeology;
- Land uses including mineral operations and agriculture; and
- Recreation and tourism.

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

3.10 Every project broadly follows SPEN's well-established sequential step-by-step process:

- **Step 1: Routeing Strategy**

A routing strategy is developed to provide clarity on how the overall routeing objective will be achieved for the specific project in question, based on established practice and consideration of the specific technical and environmental constraints and opportunities identified in the study area.

- **Step 2: Development of Route Options**

  Considerations identified in the routeing strategy are applied to the study area to establish a number of possible route options. This process involves the avoidance wherever possible of designated areas of high amenity value and irreplaceable habitat.

- **Step 3: Appraisal of Route Options**

  Each route option is appraised against the environmental and technical routeing considerations. By definition, the route of the line must be continuous and as a consequence, the environmental advantages for routeing in one area may be offset by the disadvantages of routeing through an adjoining area. The options which perform poorly in this initial appraisal are rejected. The remaining route options are then further refined and re-appraised if necessary.

- **Step 4: Selection of a Preferred Route**

  After a comparative appraisal of route options, an emerging preferred option is subjected to further technical analysis prior to SPEN confirming its preferred option. This is then taken forward for stakeholder, including public, consultation.

- **Step 5: Modification of Preferred Route**

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

- **Step 6: Selection of the Proposed Route**

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

3.11 In terms of identifying and appraising options for underground cable sections, as opposed to overhead lines, SPEN's approach is based on the premise that the most significant effects are likely to result from the level of ground disturbance required for the construction of cable trenches and associated works. Where possible, cables will be routed to follow existing linear features that have already created disturbance such as roads or existing overhead line corridors. Well routed cables take into account environmental and technical considerations and seek to avoid, wherever possible, areas of irreplaceable

habitats which are difficult to reinstate. The following criteria are particularly important for underground cables:

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

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

Stage 2: EIA of Major Electrical Infrastructure Projects

3.13 EIA is part of the iterative design process of overhead line routeing and, in conjunction with the technical design and landowner inputs, is used to refine the proposed route to a detailed alignment along with siting and design of tower or pole positions and ancillary development. Once the final design is 'frozen' the formal assessment of environmental effects is undertaken. EIAs are undertaken according to the following principal steps:

- Scoping of the EIA;
- Collection of baseline information;
- Identification and assessment of the likely significant effects;
- Identification of mitigation measures; and
- Preparation of the formal EIA Report

The Holford Rules

3.14 It is generally accepted across the electricity industry that the guidelines developed by the late Lord Holford in 1959 for routeing overhead transmission lines, 'The Holford Rules', should continue to be employed as the basis for routeing high voltage overhead transmission lines. The Holford Rules were reviewed circa 1992 by the National Grid Company (now NESO) as owner and operator of the electricity transmission network in England and Wales, with notes of clarification added to update the Rules. A subsequent review of The Holford Rules (and clarification notes) was undertaken by Scottish Hydro Transmission Ltd in 2003 to reflect Scottish circumstances. The Holford Rules are reproduced at **Appendix 3.1**.

Stakeholder Engagement

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

3.16 SPEN undertakes engagement at four different steps of project development:

- Step 1: Pre-notification and engagement. Discussions at this stage enable the views of stakeholders to inform project design, advice on routeing and assessment methodologies.
- Step 2: Information gathering. Discussions at this stage inform the routeing strategy through the gathering of relevant environmental and planning considerations within the study area.
- Step 3: Obtaining feedback on emerging route options and substation sites. This often includes discussion of alternative corridors, line routes, cable section routes and substation sites which are being considered. For larger projects, these alternatives may be set out in a 'Routeing Consultation Document' prepared by SPEN, which will clearly indicate the preferred route and set out the reasons for the other route options being discarded.

- Step 4: The EIA stage. The results of stakeholder engagement are taken into consideration and used to confirm the 'proposed route' (and substation site if relevant) for progression to EIA.

Summary

3.17 In summary:

- SPEN has a legal duty to develop and maintain a technically feasible and economically viable transmission and distribution system in central and southern Scotland.
- SPEN seeks to fulfil this duty whilst having due regard to environmental interests including natural and cultural heritage assets and people.
- SPEN has a detailed approach to routeing which involves two main stages: identification of routes, and environmental assessment. These two stages must be completed before an application for consent is submitted.
- Consultation with stakeholders is undertaken by SPEN at various stages of the project's development.

3.18 For the Glenvernoch grid connection, it is the case that SPEN is yet to begin carrying out any of these development or consultation activities. However, it is likely that a proportion of any future grid connection for the Proposed Development would be underground and would follow the roadside verge of the local road network, particularly the A714 from where the Site is accessed. Depending on the location of the PoC, part of the grid connection route may also comprise overhead lines.

3.19 The details of two potential grid connection routes for the Proposed Development are discussed in Section 4 below.

4 GRID CONNECTION DETAILS

Introduction

4.1 This section outlines the currently understood parameters of the potential grid connection for the Proposed Development. The subsequent sections provide a high-level assessment of the potentially significant environmental effects associated with the grid connection. This assessment is based on the information available at the time of writing, recognising that the grid connection details for the Proposed Development are currently unknown. To inform the assessment, reasonable assumptions of potential grid connection routes have been made.

Uncertainty

4.2 The EIA process is designed to ensure robust information about the environmental effects of a development is reported in a systematic way to inform decision making. There will, however, always be an element of uncertainty as to the exact scale and nature of the predicted effects. As required by Schedule 4, Part 6 of the EIA Regulations, any uncertainty shall be identified within an EIA Report.

4.3 Under the process of Connections Reform outlined in Section 2, Glenvernoch Wind Farm does not currently benefit from a Gate 2 grid connection agreement. The Gate 1 connection agreement for the Proposed Development confirms that the Point of Connection (PoC) will be on the Glenvernoch Wind Farm site at the proposed 132kV substation, however, the means by which the transmission network would be extended to connect to the PoC will not be confirmed until the Proposed Development achieves Gate 2 status, which would not happen until the Proposed Development achieves consent. As such the following details for the grid connection have not been confirmed by SPEN:

- Connection voltage (although it is most likely to be 132kV);
- Route corridors for new transmission infrastructure, including the preferred route; and
- The balance of overhead line and underground cable sections of the preferred route.

4.4 Until these details are confirmed by SPEN it is not possible to provide an EIA of the final grid connection route. As explained in Section 2, paragraphs 2.13-2.19, SPEN will not commence work on the connection details unless and until consent for the Proposed Development has been granted. This necessarily limits the level of detail at which environmental effects can be assessed at this stage. Accordingly, this AI presents a high-level environmental assessment based on the information currently available regarding the likely grid connection at the time of writing, noting that the level of uncertainty is high given the hypothetical nature of the grid corridors identified.

Indicative Grid Connection Details

Grid Connection Corridor

4.5 As indicated at paragraph 4.3 above, owing to the fact that Glenvernoch wind farm does not benefit from a Gate 2 offer, the grid connection corridor for the Proposed Development is unknown. Therefore, the approach taken to assist this assessment has been to identify the two nearest substations to the site (one to the north and one to the south) and identify a potential route corridor for each from the Glenvernoch substation. It should be stressed however that these route corridors will be hypothetical until SPEN has confirmed how the transmission network will be extended to reach the PoC at Glenvernoch Wind Farm.

4.6 The nearest grid connection point to the south is the Newton Stewart GSP, located approximately 8km south of the site via the local road network. The nearest grid connection point to the north is the Pinwherry Primary Substation, approximately 19km north west of the site via the local road network.

4.7 It is assumed that given the proximity to the Newton Stewart GSP, then a route to connection here could be achieved entirely via underground cabling at 132kV voltage along the local road network via the A714 and U52W Barnkirk Road.

4.8 With regard to the Pinwherry Primary Substation, as this is 13 miles north west via the local road network, the route to connection would likely be a mix of underground cabling along the local road network via the A714 and overhead lines at 132kV voltage.

4.9 Figure 4.1 shows the potential connection points, potential routes to connection, and an area of search for the possible overhead line elements of the grid connection infrastructure heading north west to the Pinwherry Primary Substation. These plans and assumptions form the basis for subsequent assessment of potentially significant environmental effects.

Overhead Lines

4.10 With an overhead line, conductors (or wires) are suspended at a specified height above ground and supported by wooden poles, spaced at intervals. Conductors can be made either of aluminium or steel strands.

4.11 Wood poles can be used for single circuit lines operating at 33kV and 132kV. Wood poles are fabricated from pressure impregnated softwood, treated with a preservative to prevent damage to structural integrity.

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

4.13 There are three types of pole:

- Intermediate: where the pole is part of a straight line section.

- Angle: there is only one type of angle pole which can support changes in direction up to a maximum of 300 degrees. All angle structures will require to be back stayed.

- Terminal: where the overhead line terminates into a substation or on to an underground cable section via a cable sealing end.

4.14 Span lengths between poles average between 80m and 120m. The average height for a pole varies from 14m to 16m. New wood poles are dark brown in colour and weather over the years to a light grey.

Underground Cables

4.15 With an underground cable, the conductors are encased in insulated material and buried in a backfilled trench of suitable depth and width. The number of cables, and the depth and width of the trench, depends on a range of factors including voltage, number of circuits and the rating of the cables to be installed.

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

4.17 Open cut trenching is the most frequently used construction method for cable installation. However, in crossing under watercourses or motorways for example, a trenchless technique such as directional drilling may be used. Works at each section commonly consist of the excavation of the cable trench by mechanical excavators, the storage of excavated material, cable laying, the backfilling of the trench and surface reinstatement. Sections of cable are joined together at cable jointing pits, with the location of these dictated by a number of factors including cable size/length and ongoing access requirements. Manhole covers above jointing pits enable access just below the surface for routine maintenance. Underground cables are marked on service maps provided to other utilities and are installed with surface marker tape to warn of their presence below the ground. If lines are decommissioned, cables can either be left in situ or removed carefully by opening up the ground.

4.18 The connection works period would be unlikely to take longer than 12 months in total and works would be subject to SPEN's established construction methodology to avoid or minimise any adverse construction effects. Temporary traffic management measures would be deployed as necessary where works are due to take place within or adjacent to the public highway.

Environmental Effects Scoped In

4.19 Based on the currently understood parameters of the likely grid connection and the associated high level of uncertainty, a proportionate assessment of environmental effects is provided for the following topics:

- Landscape and visual amenity;

- Cultural heritage and archaeology;
- Ecology;
- Geology, hydrology and hydrogeology;
- Forestry; and
- Traffic and transport.

4.20 These topics are considered separately in the following sections of this AI.

Environmental Effects Scoped Out

4.21 The following topics are scoped out of the assessment as it is considered that no significant environmental effects are likely:

- Air quality – Due to the short term and localised nature of the construction and decommissioning phases, any temporary impacts to air quality, including from construction traffic, are likely to be minimal and locally concentrated. Operational impacts are expected to be negligible as the activities associated with maintenance will be sporadic. Consequently, no significant effects are predicted in relation to air quality.

- Construction and operational noise – Due to the short term and localised nature of the construction and decommissioning phases of the grid connection, any temporary noise created (including from construction traffic) is likely to be minimal and locally concentrated. During operation, overhead lines can create audible noise depending on the operating voltage and the type of conductor system used. For connections at 132kV and below however, audibility of noise would be limited to an observer directly below the line. Consequently, no significant effects are predicted in relation to noise.

- Land quality and contamination – During construction and maintenance of the grid connection there could be a potential risk of accidental fuel or oil spills from the operation of plant and machinery, which could potentially lead to pollution of nearby watercourses or sensitive habitats. It is expected that SPEN would follow its established construction guidance and would be regulated under the future consent for the grid connection. Relevant Guidance for Pollution Prevention (GPP) documents would also be strictly followed by SPEN to minimise risks. The use, storage, transport and handling of materials on site will comply with relevant legislation and best practice, including adherence to Control of Substances Hazardous to Health (COSHH) regulations and the appointed contractor will prepare and adhere to a Materials Management Plan (MMP) to mitigate any potential risks effectively. Given these robust preventative measures to manage and mitigate potential impacts, no significant effects are predicted in relation to land quality and contamination.

- Material assets and waste – The grid connection is not anticipated to generate significant quantities of waste during construction or operation. It is expected that SPEN would adopt its established practices in effective waste management to promote the reduction, reuse and recycling of waste material. Mitigation measures would be put in place to further minimise the potential environmental effects associated with waste storage and transportation. Consequently, no significant effects are predicted in relation to material assets and waste.

- Climate – It is considered unlikely that the grid connection would lead to significant effects on climate or the ability of receptors to adapt to climate change.

- Population and human health – Given that no significant effects are predicted in relation to noise, air quality and socio-economics, and that noise and dust nuisances will be adequately mitigated through the implementation of good practice construction methods and mitigation, it is considered that no significant effects are likely to occur in relation to population and human health.

- Major accidents and disasters – The grid connection is not located in an area with a history of natural disasters and the operation of the connection would be managed in line with the requirements of a number of health and safety related regulations. Consequently, no significant effects are predicted in relation to major accidents and disasters.

- Light, heat and radiation – Electromagnetic fields are produced by electrical charges. Exposure guidelines developed by the International Commission on Non-Ionising Radiation Protection (ICNIRP) ensure the protection of human health from dangerous levels of occupational and public exposure. These guidelines have been adopted by Public Health England, which the Sottish Government follows on matters relating to electromagnetic fields. The grid connection voltage and equipment is considered by the Government to be inherently compliant with exposure limits due to design. During construction, temporary pollution from light and heat sources would be minimised through adherence to standard best practice construction practices and working hours that would be implemented by the appointed contractor. Consequently, no significant effects are predicted in relation to light, heat and radiation.

- Socio-economics, recreation and tourism – The construction and decommissioning phases are anticipated to cause minimal disturbance to recreational activities, localised to small working areas as construction progresses. Post-construction, use of the land would continue as normal with the exception of the occasional need for maintenance. Due to the relatively short construction period and the scale of the grid connection, impacts to employment and local income generation are not anticipated to be significant, and there would be a small but not significant benefit due to the capital expenditure associated with the grid connection. Consequently, no significant effects are predicted in relation to socio-economics, recreation and tourism.

4.22 The subsequent sections consider the potential significant environmental effects of the grid connection in relation to the topics scoped into this AI, including any cumulative effects in-combination with the Proposed Development.

5 LANDSCAPE AND VISUAL EFFECTS

Introduction

5.1 This section presents an assessment of the likely significant environmental effects of the grid connection on landscape character and visual amenity. It also describes the baseline conditions that currently exist and any potential mitigation measures that could be put in place.

5.2 Only the northern route, which includes overhead line elements, is considered in this appraisal. The southern route would utilise underground cable for its entire length and would therefore be unlikely to give rise to any significant landscape or visual effects. As such the southern route is scoped out of this appraisal.

5.3 This appraisal of the indicative grid connection is accompanied by a bareground Zone of Theoretical Visibility (ZTV) map (Figure 5.1) showing theoretical visibility from an indicative linear route corridor in an indicative Area of Search from the proposed 132kV substation in the Site (that was assessed as part of the Proposed Development) to the existing Pinwherry Substation, which is located approximately 18.9km northwest of the Site (see Figure 5.1: Preliminary Identified OHL ZTVs).

5.4 In preparing this appraisal, the previous assessments included in Chapter 6: Landscape and Visual of the EIAR have been reviewed to ascertain if the addition of the indicative grid connection, when considered as part of the Proposed Development, would result in any change to the landscape and visual effects as set out in the original LVIA material presented in Chapter 6: Landscape and Visual, when assessing the grid connection as a standalone development. An overall conclusion in relation to any additional significant effects from the inclusion of the indicative grid connection as part of the Proposed Development as a whole has been included.

5.5 The information presented in this appraisal has been prepared by chartered Landscape Architects at Pegasus Group who prepared the assessment of landscape and visual effects as set out in Chapter 6: Landscape and Visual.

Approach and Scope

5.6 The methodology and approach taken to the indicative grid connection appraisal follows that of the earlier LVIA work set out in EIAR Chapter 6: Landscape and Visual.

5.7 National Planning Framework 4 (NPF4) was published in February 2023, with relevant policies considered as part of the original LVIA material. In particular, Policy 11 is considered of relevance, as it confirms that significant landscape and visual impacts "are to be expected" for wind energy development and that "*Where impacts are localised and/or appropriate design mitigation has been applied, they will generally be considered to be acceptable*".

5.8 The relevant Local Plan remains the Dumfries and Galloway Local Development Plan 2 (LDP2) which was adopted in 2019 and that was considered as part of the original LVIA material. The 'Dumfries & Galloway Wind Farm Landscape Capacity Study' supplementary guidance from February 2020 has been superseded by the 'Dumfries and Galloway Council Appendix C: Wind Energy Landscape Sensitivity Study Assessment of Larger Wind Turbines Assessment of Larger Wind Turbines' supplementary guidance (February 2025), and it is content from this document, that has been taken under consideration when producing this appraisal.

5.9 It is noted that since the preparation of the original LVIA material, NatureScot has published its 'Guidance on Aviation Lighting Impact Assessment' (November 2024). With the Proposed Development proposing turbines that require visible aviation lighting, this guidance document is considered of relevance to the Proposed Development as a whole; however, as the grid connection would not include any aviation lighting, there is not considered to be the potential for any notable changes to the effects assessed in relation to the Proposed Development as set out in the original LVIA material. NatureScot have also released an updated version of their pre-application guidance for onshore wind farms (October 2025).

5.10 For this appraisal, the guidance contained in the above documents has been applied alongside the guidance documents considered as part of the original LVIA material (see **Legislation, Policy, and Guidance and Methodology sections in EIAR Chapter 6: Landscape and Visual** for further details).

5.11 This appraisal presents a high-level assessment on the potential landscape and visual effects that may arise from the indicative northern grid connection corridor when considered as part of the Proposed Development as a whole during the construction and operational phases.

5.12 No significant landscape and visual impacts from the indicative grid connection would be expected during decommissioning. Whilst some short-term and minor temporary disturbance would be expected to the landscape fabric, in the longer-term, the infrastructure would be removed or would not be visible in the landscape. As a result, an assessment during the decommissioning phase has been scoped out of this appraisal.

5.13 It should be noted that this appraisal is based on what can reasonably be predicted at the time of writing (April 2026). Further assessment of a defined route would be required as part of a future application under Section 37 of the Electricity Act 1989 should the Proposed Development be consented and therefore achieve Gate 2 status.

5.14 The scope of this appraisal is set out as follows:

- Indicative Grid Connection Corridor;
- Assumptions and Limitations;
- Zone of Theoretical Visibility Analysis;
- Landscape and Visual Considerations;

- Assessment of Landscape Effects;
- Assessment of Visual Effects;
- Cumulative Assessment; and
- Summary.

5.15 This indicative grid connection corridor appraisal is supported by the following Figures:

- Figure 5.1: Preliminary Identified OHL ZTVs.

Indicative Grid Connection Corridor

5.16 Based on current information, potential points of connection have been identified for the Proposed Development to the north and south of the Site. The southern route connects into the existing Newton Stewart Substation, which is located approximately 8km south of the Proposed Development. This would require an underground cabling route in its entirety, which would be routed along the roadside verge of the A714.

5.17 The northern route connects into the existing Pinwherry Substation, which is located approximately 18.9km northwest of the Site. Given the distance, it is likely that the grid connection for this route would be made via a combination of underground and above ground works, i.e. overhead line on wooden poles, with indicative divisions calculated as follows: underground works (~15.5km), and overhead line works (~11.5km). Any underground cabling for this option would again be proposed along the roadside verge of the A714.

5.18 From the 132kV substation proposed as part of the Proposed Development (that was assessed as part of the original LVIA), an indicative grid connection route has been identified to Pinwherry Substation. This is located within a broader Area of Search corridor. Should the northern route be selected in the future by SPEN then any refinement to the detailed routing design would likely be located within or close to this indicative search area and by applying the Holford Rules. The indicative grid connection route from the proposed Glenvernoch substation and Pinwherry Substation has been identified on **Figure 5.1: Preliminary Identified OHL ZTVs**.

5.19 Broadly speaking, once any proposed underground cable is installed, it would not be visible, negating the need for an assessment of operational landscape and visual effects. With any effects associated with the laying of underground cables for either identified grid connection option predicted to be limited and localised, there is not considered to be any potential for these underground elements to alter the findings of the previous assessments as set out in the original LVIA material prepared for the Proposed Development. As a result, for the purposes of this assessment, it is only the overhead line on wooden poles relating to the northern route from the Glenvernoch substation proposed as part of the Proposed Development to Pinwherry Substation that is considered.

5.20 As shown on **Figure 5.1**, the indicative route of the overhead line would predominantly span across multiple field boundaries (predominantly third-party land) before connection at the Pinwherry Substation.

5.21 It is assumed that the route of the proposed overhead line would be designed to fit appropriately with the host landscape and surrounding land use, to minimise potential landscape and visual impacts, including maximising setbacks from surrounding receptors, working with existing landform, and implementing other mitigation measures (e.g. landscape mitigation measures) to reduce impacts, where appropriate and practicable. For further information on the assumptions built into this appraisal, please refer to the Assumptions and Limitations of Assessment section.

5.22 In terms of design parameters, the design guidelines developed by Lord Holford in 1959 for routeing overhead transmission lines, 'The Holford Rules', are widely considered to be a principal point of reference, alongside GLVIA3, when appraising potential landscape and visual effects of linear infrastructure routes. Whilst the Holford Rules were prepared principally for the routing of pylons, similarities exist with the routing of an overhead line on wooden poles. As a result, the rules are considered a useful guide for this appraisal.

Assumptions and Limitations of Assessment

Design of Indicative Grid Connection Corridor (under Section 36 of the Electricity Act 1989)

5.23 For the purposes of this appraisal, the above ground grid connection components are considered to comprise a 132kV circuit of trident wooden poles with overhead lines, which has been adopted as a precautionary worst-case scenario.

5.24 In order to conduct an assessment, the following assumptions have been made and applied in the figure that informs the assessment:

- Adoption of a combination of single and double (also known as 'H') trident wooden poles.
- The poles would typically have a standard height above ground of 15m (including insulators); although, individual pole heights may change to meet statutory clearance requirements (including standard minimum statutory ground level clearance of 6.7m).
- Individual pole heights may be increased locally (up to 20m) where required to navigate features such as watercourses, road and railway crossings, changes in localised topography, or built features, etc.
- Individual pole heights may be reduced locally where required to navigate changes in localised topography etc. As a consequence, the heights of the poles above ground (to the top of the insulators mounted on the poles), are assumed to range from approximately 10m to 20m, with an average height of 15m adopted for the 3D modelling for the ZTV map calculations.
- The span length between poles may range between approximately 80m – 120m, to navigate changes in localised topography, and when accounting for environmental and technical constraints. For the purposes

of this appraisal, an average span length of 90m has been adopted for the 3D modelling for the ZTV map calculations.

- The route of the overhead line would be informed by a preference to follow existing linear features, such as transport corridors, including the A714, the B7027, and railway lines, where practicable.
- The poles are expected to be seasoned and treated with a suitable preservative, resulting in a dark brown appearance, which would weather to a silver/grey colour over a period of approximately five years following installation.
- The construction period for the overhead line works is expected to take approximately 12months, with the poles and overhead line then in-place throughout the operational lifetime of the Proposed Development.

Study Area

5.25 Based on an understanding of visibility gained during site-based visits, an appraisal of the indicative grid connection corridor options, and the results of the ZTV plan (see **Figure 5.1**), this appraisal has focussed on a 1km study area around the Area of Search corridor, but more specifically within a 1km study area from the indicative overhead line route (see **Figure 5.1**).

Baseline Information

5.26 The baseline landscape resource and visual receptors were identified through a desk-based study of Ordnance Survey mapping, published landscape character studies, relevant planning policies, interrogation of aerial photography, as well as photographs taken, and observations made, during site-based work.

5.27 Access during site-based visits was largely restricted to publicly accessible locations or land within the Site. Certain residents/ landowners of those properties evaluated in the Residential Visual Amenity Assessment (RVAA) produced as part of the original LVIA material (see EIAR Volume III – Technical Appendices **Appendix 6.6: Residential Visual Amenity Assessment (RVAA)**) granted access to their property and/or property curtilage as part of the original LVIA; however, in the main, assumptions are made regarding the view from private properties. These assumptions have been based on an understanding of the properties and features present within the wider landscape gained during site visits from publicly accessible locations. Assumptions are guided by professional experience and judgement.

5.28 The main LVIA presented in Chapter 6: Landscape and Visual as part of the EIAR was supported by figures and visualisations in **EIAR Volume 2**, and technical appendices in **Volume 3**.

Site Visits

5.29 As part of the baseline study, visits to the Site and surrounding area were undertaken during spring months in 2024, with further visits occurring in the intervening time since, up to the time of writing this appraisal (April 2026).

5.30 During the site-based visits, representative viewpoint locations have been micro-sited; roads have been driven; access tracks and paths have been walked; and important landscape features in-and-around the Site have been recorded and photographed.

Distances

5.31 Where distances are given in this appraisal, these are approximate distances between the nearest part of the Site and the nearest receptor in question, unless stated otherwise.

Detailed Design of Grid Connection Corridor (under Section 37 of the Electricity Act 1989)

5.32 In considering a detailed grid connection corridor, as part of any future Section 37 application associated with the Proposed Development, it is assumed that the following design measures (largely derived from 'The Holford Rules') will be adopted:

- Final route selection chosen to avoid residential areas as far as possible on grounds of general amenity.
- In rural areas, final route selection chosen to maximise distances to scattered residential properties, ensuring that visibility from principal living spaces is minimised, to avoid risk of overhead line and wooden poles dominating isolated house, farms, or other small-scale settlements.
- Final route selection chosen to limit the visual effect as perceived by users of roads, and public rights of way, with attention also to the effects of recreational, tourist and other well used routes.
- Final route selection chosen to respect areas of high amenity value (such as national and local landscape designations), whilst maximising opportunities to take advantage from containment of natural features such as woodland, particularly as a screening measure from key views, to help minimise effects on the landscape character of the area.
- Final route selection chosen to minimise the loss of existing trees to reduce extent of local landscape change.
- Final route selection chosen to maximise opportunities to take advantage of landform, with route layout working with existing levels, as far as possible, to maximise ground disturbance and to avoid intrusion into surrounding areas.
- Final route selection chosen to maximise opportunities for the proposed overhead line to route alongside existing infrastructure, as far as practicable, to limit the introduction of new infrastructure to previously undeveloped areas.

Zone of Theoretical Visibility Analysis

5.33 As shown on **Figure 5.1**, the ZTV map illustrates the prospective visibility pattern when considering a 15m high overhead line supported on wooden poles along the extents of the above ground portion of the indicative grid connection. Whilst this indicative route has been considered in this appraisal, the ZTV map prepared indicates the theoretical visibility of a 15m high overhead line on wooden poles within the full width of the Area of Search corridor for reference purposes.

5.34 Whilst it is acknowledged that the final design for the overhead line associated with the Proposed Development may be lower than 15m above ground level in certain places, or conversely, higher (e.g. up to 20m) to navigate changes in local topography and built features etc, a 15m height has been assigned for the purposes of 3D modelling for the ZTV map calculations.

5.35 It is important to note that the ZTV depicts theoretical visibility based on landform only. It does not consider the additional screening effects of buildings and vegetation, which in many places would contribute notably to restricting views of the grid connection and Proposed Development as outlined in more detail below under the receptors scoped into the appraisal.

5.36 When considering the ZTV pattern displayed on **Figure 5.1** compared to the bareground ZTV for the Proposed Development (see **Figure 6.16: Blade Tip ZTV up to 20km**) there would only be a marginal increase in theorical visibility levels, with visibility of the indicative grid connection largely occurring on the edges of areas displaying visibility of the Proposed Development towards the northwestern extents of the study area in proximity to Pinwherry Substation. Across the other portions of the 20km LVIA study area, there are no notable new areas displaying visibility of the indicative grid connection corridor in isolation from the proposed turbines.

Landscape and Visual Considerations

5.37 An appraisal of the indicative grid connection has been completed within a 1km study area around the Area of Search corridor, and more specifically within a 1km study area from the indicative overhead line route, in order to better understand the potential for significant effects when considering the indicative grid connection as part of the Proposed Development as a whole (see **Figure 5.1**).

5.38 **Table 5.1: Landscape and Visual Receptors** below presents a list of LVIA considerations, and a list of those landscape and visual receptors scoped into this appraisal.

Table 5.1: Landscape and Visual Receptors

Considerations	Receptors Scoped into the Appraisal
National Designations	None identified within the study area

Local Designations	Galloway Hills Regional Scenic Area (RSA) The Stinchar Valley Local Landscape Area (LLA)
Landscape Character Types (LCT)	LCT 174: Plateau Moorland with Forest LCT 160: Narrow Wooded Valley LCT 78: Plateau Moorland - Ayrshire [SALWCS LCT 18c] LCT 72: Pastoral Valleys - Ayrshire [SALWCS LCT 13][2]
LVIA Viewpoints	Viewpoints 1, 2, 3, 4, 5, 7, 9, and 19
Visual Receptors	Residents of Poundland, Pinwherry, and Barrhill Scattered residential properties Users of the Southern Upland Way (and Core Path UNNO/504/5-10) Users of Ayrshire Core Paths (near of Poundland, Pinwherry, and Barrhill) Users of National Cycle Network (NCN) Route 7 Road users of A714, B7027, and B734

Assessment of Landscape Effects

5.39 It was previously identified for the Proposed Development that there would be no more than a moderate/ minor, adverse effect to moorland vegetation, as well as watercourses and drainage channels during construction, which would not be significant. When considering the indicative grid connection during the construction phase as part of the Proposed Development as a whole, the change to landscape features is not considered to be substantive. As a result, there is judged to be no change to the assessment of effects on landscape features as set out for the Proposed Development in the original LVIA.

[2] There are variances in the characterisation in the NatureScot National Landscape Character Assessment and the South Ayrshire Landscape Wind Capacity Study [SALWCS]. Whilst the NatureScot guidance was primarily adopted in the original LVIA material, as the most recently published document, LCT numbering from both documents has been included for reference purposes.

5.40 When comparing **Figure 5.1 and Figure 6.5: Landscape Character Types within 20km Study Area**, the indicative route of the proposed overhead line would pass through three LCTs: namely, LCT 174: Plateau Moorland with Forest (the 'host' LCT in which the proposed substation, and wind turbines of the Proposed Development are located), LCT 78: Plateau Moorland – Ayrshire, and LCT 72: Pastoral Valleys – Ayrshire. Both LCT 174: Plateau Moorland with Forest and LCT 78: Plateau Moorland – Ayrshire are characterised by an extensive flat and slightly undulating elevated plateaux covered by open or forested moors, whilst LCT 72: Pastoral Valleys – Ayrshire is characterised by the presence of medium to small-scale pastoral valleys that intersect into the foothills and moorlands of the Ayrshire uplands.

5.41 LCT 160: Narrow Wooded Valley, which is partly crossed by the Site boundary (but in which no proposed wind turbines of the Proposed Development are located) lies within the extents of the Area of Search corridor study area. This LCT is primarily characterised by the occurrence of narrow valleys with wooded slopes that enclose pastoral floors. Whilst ground disturbance relating to underground works may occur in this LCT, no works pertaining to the proposed overhead line route are set to occur. As a result, any impact is not considered to be materially different from that presented for the Proposed Development in the original LVIA.

5.42 At present, LCT 174: Plateau Moorland with Forest, LCT 78: Plateau Moorland – Ayrshire, and LCT 72: Pastoral Valleys – Ayrshire, are influenced by the appearance of existing wind farm development, as well as by the presence of existing pylons and wooden poles supporting overhead lines. The LCTs are further influenced, albeit to varying degrees, by the presence of settlement, and built development on settlements fringes.

5.43 Land within LCT 174: Plateau Moorland with Forest, LCT 78: Plateau Moorland – Ayrshire, and LCT 72: Pastoral Valleys – Ayrshire would experience temporary disturbance during construction of the grid connection. However, given the small built footprint of construction works associated with wooden poles and an overhead line, along with the short-term nature of landscape and visual impacts resulting from the presence of construction machinery, as well as traffic and activities, the magnitude of change would be modest, with effects localised and predominantly contained to the immediate vicinity of the works where unobscured visibility occurs. Consequently, significant effects on the landscape during the construction phase from the grid connection are not predicted.

5.44 LCT 174: Plateau Moorland with Forest, LCT 78: Plateau Moorland – Ayrshire, and LCT 72: Pastoral Valleys – Ayrshire all have the potential to experience landscape effects during the operational phase of the grid connection and the Proposed Development. As the proposed overhead line routes towards Pinwherry Substation it would cross (and/or connect to) the routes of the existing overhead line infrastructure that links the grid connection of the Arecleoch and Mark Hill schemes at the Mark Hill Substation. This route comprises a line of pylons, and in this context, a proposed overhead line on wooden poles would be perceived as a minor additional infrastructure element.

5.45 The indicative grid connection route would also cross the consented grid connection route between the Chirmorie and Stranoch 2 schemes. Towards Pinwherry Substation there is also an existing network of overhead lines on wooden poles, which further supports the

judgement that the proposed overhead line would be perceived as a minor additional infrastructure element in the receiving landscapes. When considering the lower height and reduced visual impact of overhead lines on wooden poles compared with pylons, it is not expected that the scale of change, geographical extent, and magnitude of change from the grid connection would exert in a notable contribution to the significant effects upon landscape character that would arise, and have already been assessed in the original LVIA, for the Proposed Development during the operational phase.

5.46 When considering landscape designations, attention has to be given to the Galloway Hills RSA and The Stinchar Valley LLA.

5.47 With regards to the Galloway Hills RSA, whilst this RSA lies within the extents of the Area of Search corridor study area, care has been taken to avoid this RSA when selecting the overhead line route portion of the indicative grid connection. Whilst ground disturbance relating to underground works for the grid connection may occur in the RSA, such works would be temporary, with any impact not considered to be materially different from that presented for the Proposed Development in the original LVIA material.

5.48 The northern part of the overhead line would pass through The Stinchar Valley LLA. When reviewing the original LVIA material, this LLA was scoped out from assessment based on there being limited theoretical visibility of the Proposed Development, at distances extending beyond 10km to the northwest. At present, this LLA is influenced by existing pylons and overhead lines, as well as the operational turbines at Arecleoch and Mark Hill. In this context, and when considering the relatively modest scale of the wooden poles and overhead line, there is not predicted to be any potential for significant effects arising from the addition of the indicative northern grid connection route when considered as part of the Proposed Development as a whole.

5.49 As it is judged that the proposed changes would only be discernible from the closer landscape receptors, there is not considered to be any further changes to the level of significant effects as previously identified in the original LVIA material for the Proposed Development.

Assessment of Visual Effects

5.50 Representative viewpoints from the original LVIA material have been used for reference purposes to understand the portion of the indicative grid connection corridor route in baseline views, primarily Viewpoints 1, 2, 3, 4, 5, 7, 9, and 19 (see **Figure 5.1** and **Figure 6.23: Blade tip ZTV up to 35km with Viewpoints**).

5.51 At this preliminary stage, there is likely to be some limited visibility of the potential overhead line from the small rural settlements of Poundland, Pinwherry, and Barrhill. When reviewing the original LVIA material, these settlements were scoped out from the assessment based on there being limited theoretical visibility of the proposed wind turbines of the Proposed Development at each settlement, which extend beyond 10km to the northwest of the Site.

5.52 In this context, and when considering the relatively modest scale of the proposed wooden poles and overhead line, along with the proximity to taller existing pylons, the presence of

much closer overhead lines on wooden poles, as well as the operational turbines at Arecleoch and Mark Hill, the proposed overhead line would represent a minor addition to views. When also accounting for the prospect for intermittent screening from intervening landform and local planting and the likelihood for built development to provide screening from within the settlements, there is judged to be no potential for significant visual effects arising from the addition of the indicative northern grid connection route when considered as part of the Proposed Development as a whole.

5.53 The proposed overhead line has the potential to route close to a number of scattered residential properties. When reviewing the original LVIA material, these properties were scoped out from the assessment based on there being limited theoretical visibility of the proposed wind turbines of the Proposed Development at properties, which extend beyond 10km to the northwest of the Site. As a consequence, there is judged to be no potential for significant visual effects arising from the addition of the indicative grid connection when considered as part of the Proposed Development as a whole.

5.54 Baseline views of the route of the proposed overhead line from the Southern Upland Way (and Core Path UNNO/504/5-10) are broadly represented by Viewpoints 1, 4, and 7; although, each of these views are directed towards the proposed wind turbines of the Proposed Development. Similarly, whilst Viewpoints 9 and 19 are located on the route of the NCN Route 7, views are orientated towards the proposed wind turbines.

5.55 With regards to the Southern Upland Way (and Core Path UNNO/504/5-10) and NCN Route 7, whilst these routes cross the extents of the Area of Search corridor study area, care has been taken to avoid these routes when selecting the overhead line route portion of the indicative grid connection.

5.56 On review, intervening plantation and tree cover in the direction of the potential grid route would largely screen views of the overhead line, negating any potential for the overhead line to exert a notable contribution to visual effects from the Proposed Development as a whole. As a result, any change is not considered to be materially different from that presented for the Proposed Development in the original LVIA.

5.57 There is likely to be limited visibility of the potential overhead line from the Ayrshire Core Paths in proximity of Poundland, Pinwherry, and Barrhill. When reviewing the original LVIA, all Core Paths in Ayrshire were scoped out from the assessment based on there being limited theoretical visibility of the Proposed Development at distances extending beyond 10km to the northwest of the Site. In this context, and when considering the relatively modest scale of the wooden poles and overhead line, along with the proximity to taller existing pylons, the presence of existing overhead lines on wooden poles, as well as the operational turbines at Arecleoch and Mark Hill, the potential overhead line would represent a minor addition to views. When also accounting for the prospect for intermittent screening from intervening landform, local planting, and scattered incidences of built development, there is judged to be no potential for significant visual effects arising from the addition of the grid connection as part of the Proposed Development. As a result, any change is not considered to be materially different from that presented for the Proposed Development in the original LVIA material.

5.58 It is predicted that there would be intermittent visibility of the potential overhead line for road users travelling in both directions along the A714 and the B7027, particularly where the indicative route of the overhead line has the potential to run adjacent or close to the roads.

5.59 Baseline views of the route of the potential overhead line from the A714 are broadly represented by Viewpoints 2, 3, and 4, whilst Viewpoint 7 represents baseline views from the B734; although, each of these views are directed towards the proposed wind turbines of the Proposed Development. At present, the A714 passes underneath the existing overhead line that links the grid connection of the Arecleoch and Mark Hill schemes at the Mark Hill Substation. This route comprises a line of pylons, which lie in proximity to the roadside, and in this context, a potential overhead line on wooden poles would be perceived as a minor additional infrastructure element.

5.60 The A714 and B7027 are both set to pass underneath the consented grid connection route between the Chirmorie and Stranoch 2 schemes. Towards Pinwherry Substation there is also an existing network of overhead lines on wooden poles, which further supports the judgement that the potential overhead line would be perceived as a minor additional infrastructure element in views as experienced at road level.

5.61 As demonstrated by the baseline views and **Figure 5.1**, there would be intermittent screening of the potential overhead line by intervening plantations, whilst roadside tree and hedgerow cover would commonly provide screening of the overhead line in views at road level from the A714 and B7027. Where visible, there would be incidences where the potential overhead line would be experienced in the context of the taller and more visible existing pylons. In this context, whilst the potential overhead line would be visible, it would appear visually subservient to this existing infrastructure. On other occasions, the potential overhead line would appear in views with existing overhead lines on wooden poles.

5.62 There is likely to be limited visibility of the potential overhead line from the B734 in proximity of Poundland and Pinwherry. When reviewing the original LVIA, the B734 was scoped out from the assessment based on there being limited theoretical visibility of the Proposed Development at distances extending beyond 20km to the northwest from the Site. When considering these factors, the potential overhead line is thought to represent only a minor addition to views from the various roads under consideration. On this basis, it is judged that there would be no notable changes attributable to the indicative grid connection when considered as part of the Proposed Development as a whole, beyond the level of significant visual effects previously identified for the Proposed Development.

Cumulative Assessment

5.63 From a cumulative perspective, the proposed wind turbines of the Proposed Development represent the principal source of landscape and visual change, introducing large-scale vertical elements within the receiving landscape. The grid connection, particularly when aligned with existing overhead infrastructure, would form a linear and secondary feature largely within an area already modified by transport corridors and overhead lines. Consequently, it is assessed that there would be no potential for significant cumulative

effects as a result of the addition of the grid connection when considered as part of the Proposed Development, alongside other wind farm and grid connection developments.

Summary

5.64 Overall, the potential grid connection (as illustrated on **Figure 5.1**) is considered to result in very small changes to landscape and visual effects compared with the Proposed Development as assessed in the original LVIA. The landscape and visual effects resulting from the addition of the grid connection would be highly limited in extent or nature and not result in any additional significant landscape and visual effects.

5.65 Indeed, from many locations within the 20km LVIA study area, the route of the overhead line would be difficult to perceive. Whilst recognised that individual poles may be more apparent in localised locations, in the main, this is not considered to alter the judgements on the effects from the Proposed Development as set out in the original LVIA in any substantive manner as the proposed wind turbines would represent the principal source of landscape and visual change, introducing large-scale vertical elements within the receiving landscape.

5.66 In this context, there is not considered to be any evidence from a landscape and visual perspective that would suggest that the addition of a grid connection would result in any significant effects upon landscape and visual receptors that are materially different to those already identified for the Proposed Development in the original LVIA.

5.67 A detailed LVIA of the final route would be required to be conducted through extensive field survey, consultation, mapping, and visualisations to inform the future Section 37 application for the grid connection.

5.68 As per the summary presented in the original LVIA, the identified effects on landscape character and visual amenity should be balanced against the wider benefits of the Proposed Development. Whilst the LVIA identifies some significant landscape and visual effects, it is noted that locally significant effects on landscape character and visual amenity are inevitable as a result of commercial wind energy development anywhere in the UK and are in line with the expectations of NPF4.

6 CULTURAL HERITAGE AND ARCHAEOLOGY

Introduction

6.1 This section presents an assessment of the likely significant environmental effects of the grid connection on the historic environment. It also describes the baseline conditions that currently exist and any mitigation measures that are likely to be set out in a future planning consent for the grid connection, in line with SPEN's established construction practices.

6.2 An assessment of the Proposed Development, as described in the EIAR, was included as part of the original Cultural Heritage and Archaeology Baseline – Technical Appendix 7.1, and Chapter 7: Cultural Heritage and Archaeology, which was submitted as part of the application for the Proposed Development in November 2024.

6.3 This appraisal of the indicative grid connection is accompanied by a bare earth Zone of Theoretical Visibility (ZTV) showing theoretical visibility from an indicative linear route corridor in an indicative Area of Search from the proposed 132kV substation in the Site (that was assessed as part of the Proposed Development) to the existing Pinwherry Substation, which is located approximately 18.9km northwest of the Site (**Figure 5.1: Preliminary Identified OHL ZTVs**). It should be noted that ZTVs imply a much greater geographical extent of influence on the landscape and views of it than would actually be the case. As these are based on a 'bare-earth' scenario – that is they have been created using terrain data only and do not include any buildings or vegetation. It is also the case that with both proposed connection routes, much or all of the proposed connection will be belowground, therefore visibility is a moot point.

6.4 In preparing this appraisal, the previous assessments included in Chapter 7: Cultural Heritage and Archaeology have been reviewed to ascertain if the addition of the indicative grid connection, when considered as part of the Proposed Development, would result in any change to the effects or result in any additional significant effects to those set out in the original assessment.

6.5 The information presented in this appraisal has been prepared by Donald Sutherland, Principal Heritage Consultant at Pegasus Group, who prepared the assessment of cultural heritage effects as set out in Chapter 7: Cultural Heritage and Archaeology.

Scope and Methodology

6.6 The methodology and approach taken to the indicative grid connection appraisal follows that of the earlier Cultural Heritage work set out in paragraphs 7.21-7.22 of Chapter 7: Cultural Heritage and Archaeology.

6.7 National Planning Framework 4 (NPF4) was published in February 2023, with relevant policies considered as part of the original Cultural Heritage material.

6.8 The relevant Local Plan remains the Dumfries and Galloway Local Development Plan 2 (LDP2) which was adopted in 2019 and that was considered as part of the original Cultural

Heritage material, as was the supplementary guidance in Wind Energy: Development Management Considerations, dated February 2020.

6.9 For this appraisal, the guidance contained in the above documents has been applied alongside the guidance documents considered as part of the original Cultural Heritage material (see 'Legislation and Policy Context' section in Chapter 7: Cultural Heritage and Archaeology, and 'Legislation & Planning Policy Framework' section of Cultural Heritage and Archaeology Baseline – Technical Appendix 7.1 for further details).

6.10 This appraisal presents a proportionate assessment on the potential cultural heritage effects that may arise from the indicative grid connection when considered as part of the Proposed Development as a whole during the construction and operational phases.

6.11 No significant cultural heritage impacts from the indicative grid connection would be expected during decommissioning. Whilst some short-term and minor temporary disturbance would be expected, in the longer-term, the infrastructure would be removed or would not be visible in the landscape. As a result, an assessment of the decommissioning phase has been scoped out of this appraisal.

6.12 It should be noted that this appraisal is based on what can reasonably be predicted at the time of writing (April 2026). Further analysis would be required to provide a detailed assessment of a defined route if the Proposed Development were awarded planning consent (under Section 37 of the Electricity Act 1989).

6.13 The scope of this appraisal is set out as follows:

- Indicative Grid Connection Corridor;
- Assumptions and Limitations Assessment;
- Baseline Conditions;
- Assessment of Effects;
- Mitigation Measures;
- Cumulative Assessment; and
- Summary.

6.14 This indicative grid connection corridor appraisal is supported by the following Figures:

6.15 Figure 6.1 – Designated Heritage Assets and Proposed Connection Routes – North-West of Planning Application Area.

Indicative Grid Connection Corridor

6.16 Based on current information, two potential points of connection have been identified for the Proposed Development. The first potential point of connection is the existing Newton Stewart Substation, which is located approximately 8km south of the Proposed

Development. This would require an underground cabling route in its entirety, which would be routed along the roadside verge of the A714.

6.17 The second potential point of connection is the existing Pinwherry Substation, which is located approximately 18.9km northwest of the Site. It is projected that any grid connection made to the north would be via a combination of underground and above ground works, i.e. overhead line on wooden poles, with indicative divisions calculated as follows: underground works (~15.5km), and overhead line works (~11.5km). Any underground cabling for this option would again be proposed along the roadside verge of the A714.

6.18 From the proposed 132kV substation in the Site boundary (that was assessed as part of the Proposed Development in the original assessment of Cultural Heritage), an indicative grid connection has been identified to Pinwherry Substation. This is located within a broader Area of Search corridor. It is likely that any refinement to the detailed routing design would be located within or close to this indicative search area. The indicative grid connection route from the proposed substation in the Site and Pinwherry Substation is identified on **Figure 6.1 – Designated Heritage Assets and Proposed Connection Routes North-West of Planning Application Area**.

6.19 As shown on **Figure 6.1 – Designated Heritage Assets and Proposed Connection Routes North-West of Planning Application Area,** the indicative route of the overhead line would predominantly span across multiple field boundaries (predominantly third-party land) before connection at the Pinwherry Substation.

6.20 It is assumed that the route of the potential overhead line would be designed to fit appropriately within the Site and the surrounding land use, to minimise potential cultural heritage impacts, including maximising setbacks from assets in the vicinity, working with existing landform, and implementing other mitigation measures (e.g. localised avoidance of areas of known local archaeological interest) to reduce impacts, where appropriate and practicable. For further information on the assumptions built into this appraisal, please refer to the Assumptions and Limitations of Assessment section.

6.21 In terms of design parameters, the design guidelines developed by Lord Holford in 1959 for routeing overhead transmission lines, 'The Holford Rules', are widely considered to be a principal point of reference, when appraising cultural heritage effects of linear infrastructure routes. Whilst the Holford Rules were prepared principally for the routing of pylons, similarities exist with the routing of an overhead line on wooden poles. As a result, the rules are considered a useful guide for this appraisal.

Assumptions and Limitations of Assessment

Design of Indicative Grid Connection Corridor (under Section 36 of the Electricity Act 1989)

6.22 For the purposes of this appraisal, the above ground grid connection components are considered to comprise a 132kV circuit of trident wooden poles with overhead lines, which has been adopted as a precautionary worst-case scenario.

6.23 In order to conduct an assessment, the following assumptions have been made :

- Adoption of a combination of single and double (also known as 'H') trident wooden poles;
- The poles would typically have a standard height above ground of 15m (including insulators); although, individual pole heights may change to meet statutory clearance requirements (including standard minimum statutory ground level clearance of 6.7m);
- Individual pole heights may be increased locally (up to 20m) where required to navigate features such as watercourses, road and railway crossings, changes in localised topography, or built features, etc.;
- Individual pole heights may be reduced locally where required to navigate changes in localised topography etc. As a consequence, the heights of the poles above ground (to the top of the insulators mounted on the poles), are assumed to range from approximately 10m to 20m, with an average height of 15m adopted for the 3D modelling for the ZTV map calculations;
- The span length between poles may range between approximately 80m – 120m, to navigate changes in localised topography, and when accounting for environmental and technical constraints. For the purposes of this appraisal, an average span length of 90m has been adopted for the 3D modelling for the ZTV map calculations;
- The route of the overhead line would be informed by a preference to follow existing linear features, such as transport corridors, including the A714, the B7027, and railway lines, where practicable;
- The poles are expected to be seasoned and treated with a suitable preservative, resulting in a dark brown appearance, which would weather to a silver/grey colour over a period of approximately five years following installation; and,
- The construction period for the overhead line works is expected to take approximately 12months, with the poles and overhead line then in-place throughout the operational lifetime of the Proposed Development.

Study Area

6.24 Based on an understanding of visibility, an appraisal of the indicative grid connection corridor options, and the results of the ZTV plan (see **Figure 5.1**), this appraisal has focussed on a 1km study area from the indicative overhead line route. However, consideration has also been given assets within a 1km study area around the Area of Search corridor, where it surrounds the proposed overhead line route, to allow for potential changes in route (see **Figure 6.1 – Designated Heritage Assets and Proposed Connection Routes North-West of Planning Application Area**).

Distances

6.25 Where distances are given in this appraisal, these are approximate distances between the nearest part of the Site and the nearest receptor in question, unless stated otherwise.

Detailed Design of Grid Connection Corridor (under Section 37 of the Electricity Act 1989)

6.26 In considering a detailed grid connection corridor, as part of any future Section 37 application associated with the Proposed Development, it is assumed that the following design measures (largely derived from 'The Holford Rules') will be adopted:

- Final route selection chosen to respect areas of highest amenity value (e.g. designated historic assets), whilst maximising opportunities to take advantage from containment of natural features such as woodland, particularly as a screening measure from key views, to help minimise effects on the heritage assets within the vicinity;
- Final route selection chosen to minimise impacts on the setting of historic buildings and other cultural heritage features as far as possible; and,
- Final route selection chosen to maximise opportunities for the proposed overhead line to route alongside existing infrastructure, as far as practicable, to limit the introduction of new infrastructure to previously undeveloped areas.

Baseline Conditions

Designated Historic Assets

6.27 There is a single designated historic asset with the potential to be directly impacted by the Pinwherry connection route. This is the Listed building *Bargrennan, Middle Bridge of Cree* (NX37NW 71), which provides the existing road crossing point for the A714 over the River Cree at Bargrennan. In order to avoid direct impacts on the listed bridge structure it is expected that either a directional drill would be used to cross under the River Cree at this location, or the cable would be laid directly in the road deck of the bridge (subject to sufficient space being available). No significant impacts are therefore predicted for this asset.

6.28 As no other direct impacts to designated historic assets are anticipated as a result of the proposed below ground connection routes, only assets in the vicinity of the potential overhead connection from Pinwherry substation will be considered further in this assessment.

6.29 The following designated historic assets are recorded within the 1km study area from the indicative overhead line route:

- The Category B Listed Pinwherry Castle (ref. LB1057);

- The Category B Listed Daljarrock Hotel, Pinwherry (ref. LB104);
- The Category B Listed Ballochmorrie House (ref. LB1053); and,
- The Category B Listed Martyrs' Tomb, Barrhill (ref. LB1054).

6.30 Two additional assets were identified within the 1km study area around the western extent of Area of Search corridor, where it surrounds the potential overhead element of the connection route. These comprise:

- The Category A Listed Kildonan House, Barrhill (ref. LB1052); and,
- The Category C Listed Former Arnsheen Church, Barrhill (ref. LB51617).

6.31 Some additional assets are located within the eastern extent of the route, however this section of the potential the connection route would be below ground within the road corridor, and there would be no direct impacts to designated historic assets resulting from the potentia connection route, therefore these assets have not been taken forward for further assessment.

Non-designated Heritage Assets – Proposed Newton Stewart Connection Route

6.32 A review of Dumfries and Galloway's online planning constraints has identified that the potential Newton Stewart Connection route does not pass through any recorded Archaeological Sensitive Areas.

6.33 A review of Historic Environment Records for Dumfries and Galloway, and South Ayrshire has identified that the indicative connection corridor associated the Newton Stewart connection route includes, or partially includes, areas of recorded archaeological interest and/or archaeological records. In most cases recorded features or areas lie within fields adjacent to the road, or are set back from the road, so it is anticipated that these would be avoided with the proposed siting of underground cables along the existing road verges.

6.34 There are however localised areas where the proposed corridors pass through areas of recorded archaeology, such as at the southern extent of the potential Newton Stewart connection route, which passes through a recorded ring ditch which is bisected by the A714 (ref. MDG8173). However, it is anticipated that construction associated with the A714 will have impacted land immediately adjacent to the road, and there is considered to be low potential for surviving, undisturbed archaeological remains within the roadside verge.

Non-designated Heritage Assets – Proposed Pinwherry Connection Route

6.35 A review of Dumfries and Galloway's online planning constraints has identified that the southern extent of the potential Pinwherry connection route does not pass through any recorded Archaeological Sensitive Areas.

6.36 A review of Historic Environment Records for Dumfries and Galloway, and South Ayrshire has identified that the indicative connection corridors associated with the potential Pinwherry connection route includes, or partially includes, areas of recorded

archaeological interest and/or archaeological records. In most cases recorded features or areas lie within fields adjacent to the road, or are set back from the road, so it is anticipated that these would be avoided with the proposed siting of underground cables along the existing road verges.

6.37 There are however localised areas where the potential corridors pass through areas of recorded archaeology. The potential underground connection associated with the Pinwherry route crosses a recorded area of archaeological interest (ref. MDG2665), which extends to the northern edge of the A714, associated with the Cairnderry, chambered cairn Scheduled Monument (ref. SM1007). The Scheduled Monument itself lies c.30m north of the road. However, it is anticipated that construction associated with the A714 will have impacted land immediately adjacent to the road, and there is considered to be low potential for surviving, undisturbed archaeological remains within the roadside verge.

6.38 The section of potential overhead cables associated with the Pinwherry Connection route also pass in proximity to several areas of recorded archaeology and crosses one record, comprising an area of land recorded as holding a historic farmstead, and associated agricultural features, along with possible remains of a former chapel (WoSASPIN 11529).

Assessment of Effects

Construction Phase

6.39 Groundworks associated with the underground connection routes, and with the installation of poles associated with the overground connection route have potential to result in below ground impacts to areas of recorded and/or unrecorded archaeology. However, based on the nature and location of the potential routes, it is anticipated that at most, this may result in **Minor Adverse** effects, which are not significant in EIA terms.

Operational Phase

6.40 The Category B Listed Pinwherry Castle lies c.200m west of the potential overhead connection route from the Pinwherry substation (ref. LB1057). The asset comprises the remains of an L-shaped (in plan) tower-house dating to the 16th century, measuring c.10m x 9m and situated on a low mound. The walls survive to a height of approximately 13m. This asset was not considered as part of the cultural heritage assessment within the EIAR relating to the Proposed Development. At this preliminary stage, it is considered that while the ZTV indicates potential visibility of the potential overhead line from the asset, it is anticipated that the Listed building would be well screened from the overhead route by intervening woodland east of the castle, and on either side the Duisk River. Should any glimpsed views be possible then it is anticipated they would be seen in the context of, and alongside existing lines leading from the substation. The castle lies within the grounds of a residential property, which lies to its south-east, with further modern development to the castle's north-west. The key element of this asset's setting is the immediately surrounding land which has potential for archaeological remains associated with the castle's construction and use. The castle's association with the Duisk River is also considered to contribute, as the asset was potentially sited in this location to control a crossing point over the river; it is possible that this is the same location as occupied by the current road bridge

c.90m north of the asset. At this stage the potential connection route is anticipated to have no impact, and a **neutral** effect on the significance of the asset.

6.41 The Category B Listed Daljarrock Hotel, Pinwherry, lies c.300m north-west of the potential overhead connection route from the Pinwherry substation (ref. LB104). The building was constructed c.1750, with alterations by Reginald Farilie in 1928. This asset was not considered as part of the cultural heritage assessment within the EIAR relating to the Proposed Development. At this preliminary stage, it is considered that while the ZTV indicates potential visibility of the overhead line from the asset, it is anticipated that there would be at least some screening afforded by the intervening woodland. It is also anticipated that any views of the overhead line would be seen in the context of, and alongside existing lines leading from the substation. The house is set within private grounds and carparking, with a static caravan park to its south-south-east. The key element of this asset's setting is the historically associated grounds and buildings. Land associated with the potential overhead connection route does not form part of the setting of this asset and would result in no impact, a **neutral** effect on the significance of the asset.

6.42 The Category B Listed Ballochmorrie House lies c.660m east of the overhead connection route from the Pinwherry substation (ref. LB1053). The building was constructed in 1833 by W. Macadam, grandson of the celebrated road improver, and is ashlar fronted with a 2-storey cemetrical façade and two splayed bays. This asset was not considered as part of the cultural heritage assessment within the EIAR relating to the Proposed Development. At this preliminary stage, it is considered that while the ZTV indicates potential visibility of the potential overhead line from the asset, it is anticipated that the building will be well screened from the overhead connection route by intervening woodland. The house is set within private gardens, with woodland to the west, separating it from the A714. The key element of this asset's setting is the historically associated grounds and buildings. Land associated with the overhead connection route does not form part of the setting of this asset and the proposed connection route would result in no impact, a **neutral** effect on the significance of the asset.

6.43 The Category B Listed Martyrs' Tomb, Barrhill lies c.760m north-east of the potential overhead connection route from the Pinwherry substation (ref. LB1054). The asset comprises a pedimented monument topped by ball finial, with a stone walled enclosure in front. It bears the inscription "*Erected anew 1825 to the memory of John Murchie and Daneil Meiklewrick*" and fragments of an older monument with earlier inscription lie at its side. This asset was not considered as part of the cultural heritage assessment within the EIAR relating to the Proposed Development. At this preliminary stage, it is considered that while the ZTV indicates potential visibility of the overhead line from the asset, it is anticipated that the building will be well screened from the overhead connection route by the surrounding woodland. The asset lies near the Cross Water, within an area of woodland, c.250m south of Barrhill. The key element of this asset's setting is the immediately surrounding woodland and river valley. Land associated with the overhead connection route does not form part of the setting of this asset and the connection route would result in no impact, a **neutral** effect on the significance of the asset.

6.44 The Category C Listed Former Arnsheen Church, Barrhill lies c.1.02km north-east of the potential overhead connection route from the Pinwherry substation (ref. LB51617). The

former church was constructed in 1887 to the design of Robert Samson Ingram. It is cruciform in plan and crow-stepped Baronial church with 4-stage clock tower to its south-east corner. This asset was not considered as part of the cultural heritage assessment within the EIAR relating to the Proposed Development. At this preliminary stage, it is considered that while the ZTV indicates potential visibility of the overhead line from the asset, it is anticipated that the overhead connection route will not be readily appreciable from the asset due to intervening woodland and distance. by the surrounding woodland. Should any distant, glimpsed views be possible then they would be seen beyond an existing overhead line which lies in much closer proximity to the church. The asset lies on a small rise at the north-west entrance to the settlement of Barrhill. The key element of this asset's setting is the associated churchyard, and the settlement of Barrhill. Land associated with the overhead connection route does not form part of the setting of this asset and the connection route would result in no impact, a **neutral** effect on the significance of the asset.

6.45 The Category A Listed Kildonan House, Barrhill lies c.1.1km north-east of the potential overhead connection route from the Pinwherry substation (ref. LB1052). The asset is a modern mansion constructed to the designs of James Miller, and reminiscent of the work of Sir Edwin Lutyens. This asset was not considered as part of the cultural heritage assessment within the EIAR relating to the Proposed Development. At this preliminary stage, it is considered that while the ZTV indicates potential visibility of the overhead line from the asset, it is anticipated that the building will be well screened from the overhead connection route by the surrounding, and intervening woodland. Views would be further limited due to the distance of the overhead line route from the asset, and should any distant, glimpsed views be possible it is anticipated that these would be seen beyond, and in the context of existing overhead lines of similar scale which lie closer to the asset. The asset lies within extensive gardens and grounds which includes woodland in most directions, except for to the south-east where there are more open views across parkland. The key elements of this asset's setting are the immediately surrounding gardens and grounds, along with associated buildings such as lodge houses. Land associated with the overhead connection route does not form part of the setting of this asset and the connection route would result in no impact, a **neutral** effect on the significance of the asset.

Mitigation Measures

6.46 The detailed assessment of the grid connection route would be informed by field survey to determine those assets to be assessed in detail, photography and visualisations where required, and consultation with HES and the local authorities.

6.47 There is potential that ground disturbing works associated with underground cable routes and overhead line infrastructure could disturb any buried archaeological remains along the length of the route. Sensitive design and localised avoidance could be used in areas of known local archaeological interest, and an archaeological watching brief could be undertaken by SPEN where appropriate.

Cumulative Assessment

6.48 From a cumulative perspective, the proposed wind turbines of the Proposed Development represent the principal source of change, introducing large-scale vertical elements within the landscape. The grid connection, particularly when aligned with existing overhead infrastructure, would form a linear and secondary feature largely within an area already modified by transport corridors and overhead lines. Consequently, it is assessed that there would be no potential for significant cumulative effects as a result of the addition of the grid connection when considered as part of the Proposed Development, alongside other wind farm developments.

Summary

6.49 At this stage, there is not considered to be any evidence to suggest that the addition of a grid connection would result in any significant effects upon cultural heritage or archaeology.

6.50 While there are potential for below ground impacts associated with the underground connections, and elements of infrastructure associated with the overhead connection, it is not anticipated that any effects would be greater than **Minor adverse**, at most. It is also anticipated that that any impacts could be largely avoided through design measures, or could be mitigated through archaeological survey and/or monitoring.

6.51 A detailed cultural heritage assessment of the final route would be required to be conducted through field survey, consultation, mapping, and potentially visualisations to inform the future Section 37 application for consent.

6.52 As per the summary presented in the original Cultural Heritage and Archaeology Chapter of the EIAR, the identified effects on cultural heritage should be balanced against the wider benefits of the Proposed Development. No effects which would be considered as significant in EIA terms have been identified as arising from the Proposed Development, or from the proposed grid connection routes.

7 ECOLOGY

Introduction

7.1 This section presents an assessment of the likely significant environmental effects of the grid connection on ecology and biodiversity. It also describes the baseline conditions that currently exist and any mitigation measures that are likely to be set out in a future planning consent for the grid connection, in line with SPEN's established construction practices.

Baseline Conditions

7.2 A desk study to help establish the baseline conditions relevant to the two grid connection routes has been completed. The desk study sought to identify ecological features which could occur within the zone of influence (ZoI) of both potential grid connections and be significantly affected by their construction and/or operation.

7.3 A stratified approach was taken when defining the desk study area based on the likely ZoI of the potential grid connections. Accordingly, the desk study searched for:

- Any Special Areas of Conservation (SAC), Special Protection Area (SPA) or Wetlands of International Importance (Ramsar sites) within 10km of the grid connections;
- Any Sites of Special Scientific Interest (SSSI) within 2km of the grid connections;
- Any other locally designated nature conservation sites within 2km of the grid connections; and
- Records of protected and/or notable habitats and species within 1km of the grid connections.

7.4 A range of data sources were used for the desk study, as set out in Table 7.1 below.

Table 7.1: Desk study data sources

Data Source	Date Accessed	Data Obtained
Ordnance Survey (OS) 1:25,000 maps and aerial images (Apple Maps and Google Earth)	23 April 2026	Habitats and connectivity relevant to interpretation of planning policy and potential protected/notable species constraints.
Multi-Agency Geographic Information for the Countryside (MAGIC) website	23 April 2026	SPAs, SACs and Ramsar Sites within 10km and 20km of the grid connections (as relevant). SSSIs within 2km of the grid connections.
NatureScot SiteLink website	23 April 2026	SPAs, SACs and Ramsar Sites within 10km and 20km of the grid connections (as relevant).

		SSSIs within 2km of the grid connections
NBN Atlas Scotland website	23 April 2026	Commercially available records of protected and/or notable species within 1km of the grid connections, made since 2000
Saving Scotland's Red Squirrels website	23 April 2026	Red Squirrel records
Mammal Society Species Hub website	23 April 2026	Information on protected and notable mammals

Assessment Methodology

7.5 In order to determine the preliminary value of the habitats and species found through the desktop study detailed above, and the potential impacts of either grid connection route, the desktop baseline results were assessed against the criteria developed by the Chartered Institute of Ecology and Environmental Management (CIEEM 2024).

7.6 The method used in this assessment involved four key stages:

- Baseline studies;
- Identification of Valued Ecological Receptors;
- Identification and characterisation of potential impacts; and
- Assessment of impact significance.

Identification of Valued Ecological Receptors

7.7 From amongst the species populations or species assemblages present within the zone of influence of the two grid connection routes, Valued Ecological Receptors (VERs) and Valued Ornithological Receptors (VOR) were identified. VERs and VORs are typically species of conservation that could be significantly affected by a proposed development.

7.8 The value of populations of species, species assemblages and habitats is evaluated with reference to:

- Their importance in terms of 'biodiversity conservation' value (which relates to the need to conserve representative areas of different habitats and the genetic diversity of species populations);
- Any social benefits that species and habitats deliver (e.g. relating to enjoyment of flora and fauna by the public); and
- Any economic benefits that they provide.

7.9 For the purposes of this assessment, sites, species populations, species assemblages and habitats have been valued using the following scale:

- International;
- National;
- Regional/County;
- District;
- Local; and
- Low.

7.10 These criteria are detailed in Table 7.2 below

Table 7.2: Criteria for determining the nature conservation value of specific features.

Value of Feature	Key Examples
International	An internationally designated site or candidate site (SAC, SPA, Ramsar Site, Biogenetic Reserve) or an area which meets the designation criteria for such sites. Internationally significant and viable areas of a habitat type listed in Annex 1 of the Habitats Directive, or smaller areas of such habitat, which are essential to maintain the viability of a larger whole. Any regularly occurring, globally threatened species. A regularly occurring population of an internationally important species, which is threatened or rare in the UK, of uncertain conservation status. A regularly occurring, nationally significant population/number of any internationally important species.
National	A nationally designated site (e.g. SSSI, NNR) or a discrete area which meets the published selection criteria for national designation (e.g. SSSI selection guidelines) irrespective of whether or not it has yet been notified. A viable area of a UK BAP priority habitat, or smaller areas of such habitat which are essential to maintain the viability of a larger whole. A regularly occurring significant number/population of a nationally important species e.g. listed on the Wildlife and Countryside Act 1981 (as amended). A regularly occurring population of a nationally important species that is threatened or rare in the county or region. A feature identified as being of critical importance in the UK BAP.
Regional/County	Viable areas of key habitat identified in the Regional or County BAP or smaller areas of such a habitat, which are essential to maintain the viability of the larger whole. Regional/county significant and viable areas of key habitat identified as being of regional value by statutory bodies. A regularly occurring significant population/number of any important species important at a regional/county level. Any regularly occurring, locally significant population of a species which is listed in a Regional/County RDB or BAP on account of its regional rarity or localisation. Sites of conservation importance that exceed the district selection criteria but that fall short of SSSI selection guidelines.

Value of Feature	Key Examples
District	Areas of habitat identified in a District/City/Borough BAP or in the relevant Natural Area profile. Sites that the designating authority has determined meet the published ecological selection criteria for designation, including Local Nature Reserves selected on District/City/Borough ecological criteria. Sites/features that are scarce within the District/City/Borough or which appreciably enrich the District/City/Borough habitat resource. A diverse and/or ecologically valuable hedgerow network. A population of a species that is listed in a District/City/Borough BAP because of its rarity in the locality or in the relevant Natural Area profile because of its regional rarity or localisation. A regularly occurring, locally significant number of a District/City/Borough important species during key phases of its life cycle.
Local	Areas identified in a Local BAP or the relevant natural area profile. Sites/features which area scarce in the locality or which are considered to appreciably enrich the habitat resource within the local context, e.g. species-rich hedgerows. Local Nature Reserves selected on Neighbourhood/Local ecological criteria. Significant numbers/population of a locally important species e.g. one which is listed on the Local BAP. Any species, populations or habitats of local importance.
Low	Habitats of moderate to low diversity which support a range of locally and nationally common species, the loss of which can be easily mitigated.

Sensitivity of Receptors

7.11 The sensitivity of any species or feature to a proposed development must also be considered when determining the significance of any impact upon a particular species or habitat. This is based on the conservation value or importance of that species or habitat, as outlined in Table 7.3 below:

Table 7.3: Criteria for assessing the sensitivity of species, habitats and sites.

Sensitivity of Feature	Assessment Criteria
Very High	A species, population or habitat which is/are a designated feature of a SPA, Ramsar Site, SAC or SSSI.
High	Sites, habitats or species of at least national importance, as identified through field survey, desk survey or consultation or features are likely to be significantly affected by the Proposed Development.
Moderate	Sites, habitats or species of at least county importance, as identified through field survey, desk survey or consultation or features, although potentially affected, which would not suffer significant effects as a result of the Proposed Development.
Low	Sites, habitats or species of local or neighbourhood importance, as identified through field survey, desk survey or consultation or features which would not be significantly affected by the Proposed Development.

Impact Magnitude

7.12 The magnitude of each potential impact was determined using Table 7.4. The impact magnitude was also assessed based on whether the impact will be positive or negative and direct or indirect.

Table 7.4: Criteria for magnitude of impacts.

Magnitude of Impact	Assessment Criteria
Very Major	The proposed development will have effects which would result in a change in the integrity of a SAC, SPA, Ramsar Site or SSSI.
Major	The proposed development would have effects which would result in a change in the integrity of a site, or a change in the ability of a species to retain its current population levels (at a regional or higher level).
Intermediate	The proposed development would have effects which would alter key attributes of a site but which would not result in a change to a site's evaluation, or would result in changes in the distribution of a species but not affect its population status at a regional level.
Minor	The proposed development would have effects which would neither alter key attributes of a site nor change its evaluation, or would affect the distribution or status of a species at a local level.
Neutral/Negligible	No impact or the proposed development will have very minor effects which would neither alter key attributes of a development site nor change its evaluation, or will affect the distribution or status of a species at a local level.

Significance of Effect

7.13 The magnitude of impacts was compared against the value and sensitivity of particular features in order to determine the significance of effects the proposed development is likely to have upon such features, prior to mitigation. It should be noted that such effects may be negative or positive. The matrix below (Table 7.5) was used to determine the significance of effects upon sites and species. Cells highlighted in light grey are classified as a significant effect for the purposes of this assessment.

Table 7.5: Matrix for assessing significance of effects.

Sensitivity of Feature	Magnitude of Impact				
	Very Major	**Major**	**Intermediate**	**Minor**	**Neutral/ Negligible**
Very High	Very Major	Major	Moderate/ Major	Minor	Negligible
High	Major	Major	Moderate/ Major	Minor	Negligible
Moderate	Major	Moderate/ Major	Moderate/ Minor	Minor	Negligible
Low	Moderate/ Major	Moderate/ Minor	Minor	Minor/ Negligible	Negligible

7.14 The impacts that will have a Very Major, Major or Moderate/Major negative effect upon a feature are considered to be significant, and measures will be put in place to mitigate or compensate for these effects where appropriate.

7.15 Effects that were assessed to be Minor/Negligible were subject to professional judgement as to whether the effect was indeed Minor or Negligible. In such cases, mitigation or compensation was included for effects where appropriate to help ensure that there is no net loss in biodiversity as a result of the proposed development.

7.16 The duration and reversibility of effects was also considered as a part of the assessment. The definitions used to describe the duration of the effects are explained in Table 7.6. The duration of effects is extremely variable and is dependent upon an individual or species tolerance towards an effect.

Table 7.6: Definitions of the duration of effects.

Effect Magnitude	Assessment Criteria
Permanent	Effects that have the potential to continue over 15 years are considered as permanent. This typically includes habitat loss such as tree felling.
Temporary	Long term: 10 to 15 years. Medium term: 5 to 10 years. Short term: 0 to 5 years.

Reversibility

7.17 A temporary impact is one that means recovery is possible. A permanent impact is one that means recovery is unlikely to occur within a reasonable timescale.

Statutory Designated Sites

7.18 Table 7.7 details the statutory designated sites within the ZoI, in proximity to the two potential grid connections.

Table 7.7: Statutory Designations within the ZoI.

Designated Site	Reason for Designation	Proximity to Newton Stewart PBS grid connection	Proximity to Pinwherry PS grid connection
European Designated Sites			
Galloway Oakwoods SAC	Old Sessile Oakwoods	110m east	610m south-east
Lendalfoot Hills Complex SAC	Mountain grassland and fen habitats	-	1.3km north & west
River Bladnoch SAC	High quality Atlantic Salmon population	3.8km west	3.8km west
Glen App and Galloway Moors SPA	Breeding Hen Harrier	-	5.7km south-west

Carsegowan Moss SAC	Active raised bog habitat	6.4km south	-
Merrick Kells SAC	Blanket bog, wet heath & alpine and boreal grassland habitats	9.6km north-east	7.7km east
Kirkcowan Flow SAC	Blanket bog habitat	-	9.8km west
Sites of Special Scientific Interest			
Wood of Cree SSSI	Oak woodland, flora and breeding birds	110m east	610m south-east
Feoch Meadows SSSI	Fen meadow and lowland neutral grassland habitats	-	750m north-east
Aldons Hill SSSI	A range of upland habitats	-	1.3km north
Lower River Cree SSSI	Only know spawning site of Spelt in Scotland	1.4km south	-

Non-Statutory Designated Sites

7.19 No non-statutory sites were identified during the desk study.

Species Records

7.20 Table 7.8 provides details of the species records that the desk study returned, for a search radius of 1km around the Newton Stewart GSP grid route.

Table 7.8: Species recorded with 1km of Newton Stewart GSP grid route.

Species	Number of Records in 1km radius
Mammals: 17 species	
Soprano Pipistrelle	2,987
Common Pipistrelle	1,752
Daubenton's Bat	339
Red Squirrel	229
Leisler's Bat	207
Brown Long-eared Bat	15
Grey Squirrel	12
Noctule	5
Hedgehog	4
Natterer's Bat	4
Fallow Deer	3
Brown Hare	2
Wood Mouse	1

Species	Number of Records in 1km radius
Water Vole	1
Whiskered Bat	1
Rabbit	1
Red Fox	1
Amphibians: three species	
Common Frog	7
Palmate Newt	5
Great Crested Newt	1
Reptiles: one species	
Slow-worm	3
Birds: 102 species, including the notable/sensitive species below	
Goosander	11
Pink-footed Goose	9
Common Crossbill	6
Greylag Goose	5
Oystercatcher	5
Woodcock	5
Common Sandpiper	4
Golden Plover	2
Shelduck	2
Barn Owl	2
Lapwing	2
Wigeon	1
Red-breasted Merganser	1
Curlew	1
Shoveler	1

7.21 Table 7.9 provides details of the species records that the desk study returned, for a search radius of 1km around the Pinwherry PS grid route.

Table 7.9: Species recorded with 1km of Pinwherry PS grid route.

Species	Number of Records in 1km radius
Mammals: three species	
Red Squirrel	8
Grey Squirrel	10
Otter	3
Amphibians: one species	
Common Frog	1

Species	Number of Records in 1km radius
Birds: 47 species, including the notable/sensitive species below	
Barn Owl	2
Common Crossbill	1

Assessment of Effects

Newton Stewart GSP

7.22 The potential significant effects from the construction and/or operation of the Newton Stewart GSP grid connection on VERs and VORs are summarised below:

- Permanent habitat loss (e.g. the loss of important habitats due to construction of access tracks or other infrastructure). This will be limited as the proposed Newton Stewart GSP grid connection will be underground along the existing road network;
- Temporary habitat loss (e.g. the temporary loss of habitat to accommodate temporary construction compounds or other works areas). Again, this will be limited as such temporary works areas will be adjacent to the existing road network;
- Habitat degradation as a result of pollution incidents (e.g. fuel or oil spills);
- Temporary disturbance and/or displacement of species during construction (e.g. disturbance of protected species whilst occupying places of shelter or nest sites); and
- Potential for direct mortality of species during construction (e.g. as a result of increased vehicular traffic, or as a result of pollution incident).

7.23 The predicted effects of the proposed Newton Stewart GSP grid connection on both VERs and VORs, prior to mitigation, are shown in Table 7.10 below. These predicated effects are solely based on the results of the desktop study undertaken above, and may be subject to change following full ecological and ornithological surveys and EcIA.

Table 7.10: Assessment of the predicted effects of the Newton Stewart GSP grid connection prior to mitigation.

Receptor & Summary of Predicted Effect	Sensitivity of Feature	Magnitude of Impact	Duration of Pre-mitigation Effect	Significance of Effect
Construction Phase - Ecology				
Habitats: loss through construction	Low - Moderate	Minor	Permanent	Minor/negligible
Bat species: disturbance during construction	High	Minor	Short-term	Minor

Receptor & Summary of Predicted Effect	Sensitivity of Feature	Magnitude of Impact	Duration of Pre-mitigation Effect	Significance of Effect
Otter: disturbance during construction	High	Minor	Short-term	Minor
Water Vole: disturbance during construction	High	Minor	Short-term	Minor
Badger: disturbance during construction	High	Minor	Short-term	Minor
Red Squirrel: disturbance during construction	High	Negligible	Short-term	Negligible
Pine Marten: disturbance during construction	High	Negligible	Short-term	Negligible
Fish species: disturbance during construction	Moderate	No effect	Short-term	No effect
Reptiles: disturbance during construction	Moderate	Minor	Short-term	Minor
Construction Phase – Ornithology				
Breeding wildfowl: disturbance during construction	Low - Moderate	Negligible	Short-term	Negligible
Breeding raptors: disturbance during construction	Moderate	Negligible	Short-term	Negligible
Breeding waders: disturbance during construction	Moderate	Negligible	Short-term	Negligible
Black Grouse: disturbance during construction	Moderate	No effect	Short-term	No effect
Breeding owls: disturbance during construction	Low – Moderate	Negligible	Short-term	Negligible
Nightjar: disturbance during construction	Moderate	No effect	Short-term	No effect
Common Crossbill: disturbance during construction	Moderate	No effect	Short-term	No effect
Operational Phase - Ecology				
Bat species: disturbance during operation	High	Negligible	Permanent	Negligible
Otter: disturbance during operation	High	Negligible	Permanent	Negligible

Receptor & Summary of Predicted Effect	Sensitivity of Feature	Magnitude of Impact	Duration of Pre-mitigation Effect	Significance of Effect
Water Vole: disturbance during operation	High	Negligible	Permanent	Negligible
Badger: disturbance during operation	High	Negligible	Permanent	Negligible
Red Squirrel: disturbance during operation	High	Negligible	Permanent	Negligible
Pine Marten: disturbance during operation	High	Negligible	Permanent	Negligible
Fish species: disturbance during operation	Moderate	No effect	Permanent	No effect
Reptiles: disturbance during operation	Moderate	Negligible	Permanent	Negligible
Operational Phase – Ornithology				
Breeding wildfowl: displacement during operation	Moderate	Negligible	Permanent	Negligible
Breeding wildfowl: collision during operation	Moderate	No effect	Permanent	No effect
Breeding raptors: displacement during operation	Moderate	Negligible	Permanent	Negligible
Breeding raptors: collision during operation	Moderate	No effect	Permanent	No effect
Breeding waders: displacement during operation	Moderate	Negligible	Permanent	Negligible
Breeding waders: collision during operation	Moderate	No effect	Permanent	No effect
Black Grouse: displacement during operation	Moderate	No effect	Permanent	No effect
Black Grouse: collision during operation	Moderate	No effect	Permanent	No effect
Breeding owls: displacement during operation	Moderate	No effect	Permanent	No effect
Breeding owls: collision during operation	Moderate	No effect	Permanent	No effect

Receptor & Summary of Predicted Effect	Sensitivity of Feature	Magnitude of Impact	Duration of Pre-mitigation Effect	Significance of Effect
Nightjar: displacement during operation	Moderate	No effect	Permanent	No effect
Nightjar: collision during operation	Moderate	No effect	Permanent	No effect
Common Crossbill: displacement during operation	Moderate	Negligible	Permanent	Negligible
Common Crossbill: collision during operation	Moderate	No effect	Permanent	No effect

Pinwherry PS

7.24 The potential significant effects from the construction and/or operation of the Pinwherry PS grid connection on VERs and VORs are summarised below:

- Permanent habitat loss (e.g. the loss of important habitats due to construction of access tracks or other infrastructure);
- Temporary habitat loss (e.g. the temporary loss of habitat to accommodate temporary construction compounds or other works areas);
- Habitat degradation as a result of pollution incidents (e.g. fuel or oil spills);
- Permanent or temporary changes to hydrological conditions which may affect vegetation and habitats (e.g. where tracks intercept flushes or infrastructure impacts upon a groundwater dependent terrestrial ecosystem);
- Loss of habitat which supports protected and/or notable species;
- Creation of barriers to animal movements;
- Temporary disturbance and/or displacement of species during construction (e.g. disturbance of protected species whilst occupying places of shelter or nest sites);
- Potential for direct mortality of species during construction (e.g. as a result of increased vehicular traffic, or as a result of pollution incident); and
- Potential for birds to collide with the new overhead line.

7.25 The predicted effects of the proposed Pinwherry PS grid connection on both VERs and VORs, prior to mitigation, are shown in Table 7.11 below. These predicted effects are solely based on the results of the desktop study undertaken above, and may be subject to change following full ecological and ornithological surveys and EcIA.

Table 7.11: Assessment of the predicted effects of the Pinwherry PS grid connection prior to mitigation.

Receptor & Summary of Predicted Effect	Sensitivity of Feature	Magnitude of Impact	Duration of Pre-mitigation Effect	Significance of Effect
Construction Phase - Ecology				
Habitats: loss through construction	Low - Moderate	Minor	Permanent	Minor/negligible
Bat species: disturbance during construction	High	Minor	Short-term	Minor
Otter: disturbance during construction	High	Minor	Short-term	Minor
Water Vole: disturbance during construction	High	No effect	Short-term	No effect
Badger: disturbance during construction	High	Minor	Short-term	Minor
Red Squirrel: disturbance during construction	High	Negligible	Short-term	Negligible
Pine Marten: disturbance during construction	High	Negligible	Short-term	Negligible
Fish species: disturbance during construction	Moderate	No effect	Short-term	No effect
Reptiles: disturbance during construction	Moderate	Minor	Short-term	Minor
Construction Phase – Ornithology				
Breeding wildfowl: disturbance during construction	Low - Moderate	Minor - Intermediate	Short-term	Moderate/Minor
Breeding raptors: disturbance during construction	Moderate	Minor - Intermediate	Short-term	Moderate/Minor
Breeding waders: disturbance during construction	Moderate	Minor - Intermediate	Short-term	Moderate/Minor
Black Grouse: disturbance during construction	Moderate	No effect	Short-term	No effect
Breeding owls: disturbance during construction	Low – Moderate	Minor - Intermediate	Short-term	Moderate/Minor
Nightjar: disturbance during construction	Moderate	No effect	Short-term	No effect

Receptor & Summary of Predicted Effect	Sensitivity of Feature	Magnitude of Impact	Duration of Pre-mitigation Effect	Significance of Effect
Common Crossbill: disturbance during construction	Moderate	Minor	Short-term	Minor
Operational Phase - Ecology				
Bat species: disturbance during operation	High	Negligible	Permanent	Negligible
Otter: disturbance during operation	High	Negligible	Permanent	Negligible
Water Vole: disturbance during operation	High	No effect	Permanent	No effect
Badger: disturbance during operation	High	Negligible	Permanent	Negligible
Red Squirrel: disturbance during operation	High	Negligible	Permanent	Negligible
Pine Marten: disturbance during operation	High	Negligible	Permanent	Negligible
Fish species: disturbance during operation	Moderate	No effect	Permanent	No effect
Reptiles: disturbance during operation	Moderate	Negligible	Permanent	Negligible
Operational Phase - Ornithology				
Breeding wildfowl: displacement during operation	Moderate	Negligible	Permanent	Negligible
Breeding wildfowl: collision during operation	Moderate	Minor	Permanent	Minor
Breeding raptors: displacement during operation	Moderate	Negligible	Permanent	Negligible
Breeding raptors: collision during operation	Moderate	Minor	Permanent	Minor
Breeding waders: displacement during operation	Moderate	Negligible	Permanent	Negligible
Breeding waders: collision during operation	Moderate	Minor	Permanent	Minor

Receptor & Summary of Predicted Effect	Sensitivity of Feature	Magnitude of Impact	Duration of Pre-mitigation Effect	Significance of Effect
Black Grouse: displacement during operation	Moderate	No effect	Permanent	No effect
Black Grouse: collision during operation	Moderate	No effect	Permanent	No effect
Breeding owls: displacement during operation	Moderate	No effect	Permanent	No effect
Breeding owls: collision during operation	Moderate	Minor	Permanent	Minor
Nightjar: displacement during operation	Moderate	No effect	Permanent	No effect
Nightjar: collision during operation	Moderate	No effect	Permanent	No effect
Common Crossbill: displacement during operation	Moderate	Negligible	Permanent	Negligible
Common Crossbill: collision during operation	Moderate	No effect	Permanent	No effect

Mitigation Measures

7.26 In line with SPEN's established construction guidance, the chosen grid connection is likely to engage the following mitigation hierarchy where there is potential for adverse effects on ecological and ornithological features:

- Avoid ecological and ornithological features where possible;
- Minimise impact by design, method of working or other measures (mitigation); and,
- Compensate for significant residual effects (e.g. by providing suitable alternative habitat elsewhere).

7.27 This hierarchy requires the highest level to be applied where possible. Only where this cannot reasonably be adopted should lower levels be considered. At this stage in the design of the grid connection, it is not possible to make detailed recommendations for mitigation. The requirement for specific mitigation wouldl be determined based on the results of desk study and field survey work and the subsequent EcIA. However, it is likely that the following generic mitigation measures would be included by SPEN to reduce the impacts and effects of the grid connection on both ecological and ornithological features:

- Minimising the loss of habitats of high conservation value through project design and micro-siting;
- Providing compensatory habitat, where appropriate, for permanent losses to the grid connection (e.g. replanting of a larger area of native broadleaved trees than is felled to accommodate construction works);
- Restoring areas of habitat temporarily lost during the construction period;
- Implementing standard pollution prevention measures to protect surface water systems, groundwater and species;
- Maintaining the existing hydrological regime, particularly in any areas of peat bog and Ground Water Dependant Terrestrial Ecosystems (GWDTEs);
- Designing watercourse crossings to be maintain passage for species such as Otter, Water Vole and fish species;
- Avoiding key areas and/or features used by important ecological and ornithological features through project design and micro-siting;
- Timing of construction activities to minimise impacts upon species;
- Pre-construction and pre-felling checks for protected species;
- Implementing works exclusion zones around specially protected species to ensure that they are not disturbed or otherwise directly harmed during construction, and acquiring associated licensing where necessary to ensure legal compliance; and
- Appointment of an Ecological Clerk of Works (ECoW) for the duration of the construction period.

Cumulative Assessment

7.28 From a cumulative perspective, the assessment of the grid connection would not give rise to any significant effects on ecological and ornithological receptors associated with the Proposed Development. Consequently, it is assessed that there would be no potential for significant cumulative effects as a result of the addition of the grid connection when considered as part of the Proposed Development, alongside other wind farm and grid connection developments.

Summary

7.29 No likely significant effects on ecology, biodiversity and ornithology are predicted as a result of the northern grid connection route or the southern grid connection route. The mitigation outlined above follows SPEN's established construction practices and are likely to be proposed on a precautionary basis as part of any future planning application for the defined grid connection route once it is known. Subject to mitigation measures, no likely significant residual effects are predicted.

8 GEOLOGY, HYDROLOGY AND HYDROGEOLOGY

Introduction

8.1 This section presents a desk-based assessment of the likely significant environmental effects of the grid connection on geology, hydrology and hydrogeology. It also describes the baseline conditions that currently exist and any mitigation measures that are likely to be set out in a future planning consent for the grid connection, in line with SPEN's established construction practices.

8.2 The assessment considers potential interactions between the Indicative grid connection routes and the water environment, with a focus on geological and superficial conditions, surface water features, groundwater and flood risk.

8.3 Baseline conditions have been established using publicly available datasets and mapping. The potential for significant adverse effects to arise from Indicative grid connection routes have been screened and are identified on the basis of professional judgement. The assessment is qualitative in nature and is intended to inform further design development and identify whether additional detailed assessment or mitigation will be required at subsequent stages of the project.

8.4 As detailed in Section 4: Grid Connection Details, two connection options have been considered in this Additional Information;

i) 15.5km of Overhead Line (OHL) and 11.5km buried Underground Cable (UGC) running north from the Proposed Glenvernoch Wind Farm Substation to Pinwherry Substation; and

ii) 8 km buried Underground Cable (UGC) running south from the Proposed Glenvernoch Wind Farm Substation to Newton Stewart GSP.

8.5 This section should be read in conjunction with the Chapter 12: Hydrology, Geology and Hydrogeology of the EIAR.

Scope and Methodology

8.6 The scope of the assessment is limited to a desk-based review of geology, hydrology and hydrogeology receptors relevant to the potential grid connection. No site walkovers, intrusive investigations, monitoring, consultation or hydraulic modelling have been undertaken as part of this assessment.

8.7 The methodology comprised a review of publicly available datasets and mapping, including Ordnance Survey (OS) mapping, geological and superficial deposit mapping, and SEPA flood risk and water environment information. Hydrology, geology and hydrogeology information presented in Chapter 12 of the Glenvernoch Wind Farm EIAR has also been considered.

8.8 Professional judgement has been applied to identify key receptors, sensitivities and potential constraints associated with the water environment. The assessment focuses on identifying potential interactions between the Indicative grid connection routes and the geological and hydrological environment and is intended to provide a screening-level appraisal to identify initial mitigation requirements as well as inform the need for further assessment or surveys required for subsequent design phases.

8.9 During the construction phase of the Indicative grid connection routes, there is the potential for the following short-term impacts on the hydrology, hydrogeology, geology and soils environment in the absence of mitigation measures;

- pollution of surface watercourses, groundwater and water supplies;
- impact on water resource availability;
- short-term increase in flood risk;
- soil erosion, compaction and excavation;
- direct and indirect disturbance of peat and peatland; and
- impacts upon GWDTE.

8.10 There are no adverse operational effects anticipated from the Indicative grid connection routes; therefore, these have been scoped out from the assessment.

8.11 The Study Area comprises: (i) the Pinwherry Underground Cable (UGC) corridor plus a 1km buffer and the Pinwherry Overhead Line (OHL) Area of Search; and (ii) the Newton Stewart Grid Supply Point (GSP) UGC corridor plus a 1km buffer. The 1km buffer has been applied for all receptors, with the exception of Ground Water Dependent Terrestrial Ecosystems (GWDTE), which will be assessed to a distance of 250m.

Baseline Conditions

North Grid Connection Route - Glenvernoch Wind Farm to Pinwherry Substation

Bedrock Geology

8.12 According to the British Geological Survey (BGS) 1:50,000 scale Bedrock Geology mapping, the Study Area is predominantly underlain by the Kirkcolm Formation bedrock. A portion of the central section is underlain by the Dalreoch Formation, while the southern third lies mainly over the Portpatrick Formation, with smaller pockets of the Glenwhargen Formation and Moffat Shale Group.

Superficial Geology

8.13 According to BGS 1:50,000 scale Superficial Geology mapping, the Study Area is predominantly underlain by Till (Devensian) and peat, which are present throughout. In broad terms, till is more extensive across the northern section of the Study Area, whereas

peat is more prevalent in the central section. The southern section also includes areas underlain by hummocky (moundy) glacial deposits. Localised areas of alluvium are present in close proximity to the Duisk River (upstream of the Muck Water Confluence), the River Cree, and both rivers' respective tributaries.

Surface Water

8.14 There are a number of watercourses within the Study Area and several locations where watercourses may cross the OHL and UGC route. The main watercourses are listed below from north to south including their SEPA Water Framework Directive (WFD) status where available:

- River Stinchar (Duisk River to Water of Gregg) (ID: 10466) had a 'High' overall WFD status in 2024;
- River Stinchar (d/s Duisk River) (ID: 10465) had a 'Good Ecological Potential' overall WFD status in 2024;
- Cross Water (ID: 10472) had a 'Good' overall WFD status in 2024;
- Muck Water (ID: 10471) had a 'Good' overall WFD status in 2024;
- Feoch Burn/Carnmock Burn/Roughlea Burn (ID: 10473) had a 'Good' overall WFD status in 2024;
- River Cree (u/s Carrick Burn) (ID: 10522) had a 'Bad' overall WFD status in 2024;
- River Cree (u/s Minnoch conf) (ID: 10521) had a 'Moderate' overall WFD status in 2024;
- Duisk River (u/s Muck Water Confluence) (ID: 10470) had a 'Good' overall WFD status in 2024;
- Lavery Burn (ID: 10471) had a 'Good' overall WFD status in 2024;
- Carrick Burn/Corwar Burn (ID: 10525) had a 'Poor' overall WFD status in 2024;
- Water of Minnoch (River Cree to Water of Trool) (ID: 10520) had a 'Good' overall WFD status in 2024;
- River Cree (u/s Newton Stewart) (ID: 10520) had a 'Good' overall WFD status in 2024.

8.15 Throughout the Study Area, there are also many named and unnamed small burns and tributaries.

Water Supplies

SEPA Abstractions

8.16 Based on the EASR register provided by SEPA, there are four registered authorisations within the Study Area, all with unknown activities.

Scottish Water Abstractions

8.17 Based on Scottish Water abstractions dataset, no SW abstractions are present within the Study Area.

Private Water Supplies

8.18 Data taken from the Private Water Supply Risk Assessment in August 2024 for Glenvernoch Wind Farm and data received from Dumfries and Galloway Council in 2024 indicates there are 13 Private Water Supplies (PWS) located within the Study Area. These are predominantly localised around the River Cree, within the central and southern sections of the Study Area. A list of the PWS details are listed below:

- Brigend PWS (BNGR NX347762) - spring.
- Cairnderry PWS (BNGR NX323793) - unknown source type.
- Creedbank Cottage PWS (BNGR NX347770) - unknown source type.
- Creebank Farmhouse PWS (BNGR NX345753) - unknown source type.
- Dalnaw PWS (BNGR NX322769) - unknown source type.
- Garchew Farm (BNGR NX339756) – well and spring.
- Larg Bargrennan (BNGR NX360740) – unknown source type.
- Limetree (BNGR NX347766) – unknown source type.
- Longwood (BNGR NX350766) – unknown source type.
- Marybank Smokehouse (BNGR NX341784) – unknown source type.
- Old Schoolhouse (BNGR NX349766) – unknown source type.

8.19 In accordance with the SEPA 'Guidance on Assessing the Impacts of Development on Groundwater Abstractions' (2024) and prior to construction, all groundwater abstractions within 250 m of the grid connection will be identified and subject to a qualitative impact assessment to determine potential impacts as well as the requirement for mitigation.

<u>Flood Risk</u>

8.20 SEPA flood mapping indicates that parts of the Study Area are at high risk of river flooding. These areas are generally confined to the margins of watercourses, principally the River Stinchar at Pinwherry, with flood extents largely constrained to the watercourse channels. Areas of high surface water flood risk are also identified across the Study Area and are

typically associated with small burns and watercourses, as well as localised around larger standing waterbodies (e.g. Loch Ochiltree, Loch Maberry and Loch Dornal).

Hydrogeology

8.21 According to the BGS 1:625,000 scale Hydrogeology Map the Study Area is underlain predominately by the Kirkcolm Formation bedrock, with the northernmost section underlain by Tappins Group bedrock. The Kirkcolm Formation and Tappins Group bedrocks are both identified as low productivity aquifers, which have highly intruded greywackes with limited amounts of groundwater in near surface weathered zone and secondary fractures. The flow of groundwater is virtually all through fractures and other discontinuities.

8.22 The Study Area is underlain in the south by the Galloway groundwater body, which is classified by SEPA, under the WFD, (ID: 150694) as having a 'Good' overall status in 2024, and the South Ayrshire Hills groundwater body in the north, which is classified by SEPA, under the WFD, (ID: 150660) as having a 'Good' overall status in 2024.

Groundwater Dependent Terrestrial Ecosystems (GWDTE)

8.23 SEPA's guidance ('Assessing the Impacts of Developments on GWDTE', 2024) on assessing the impacts of developments on GWDTE requires assessment of GWDTE located within 250 m of excavations greater than 1 m and within 100 m of excavations less than 1 m. Excavations associated with the grid connection may include foundations for wood poles, the UGC and temporary access routes. In general, it is likely such excavations will be <1.0 m and therefore there would be some interaction with superficial and near-surface groundwater where present, and very limited interaction with deeper bedrock groundwater.

8.24 National Vegetation Classification (NVC) details which would indicate potential GWDTE communities are not currently available for the Study Area. However, a review of the Scottish Wetland Inventory indicates that wetlands in the central section of the Study Area are predominantly mapped as marshy grassland and wet modified bog. Smaller areas of the same wetland types are also present in the northern section of the Study Area.

8.25 Following the establishment of the final alignment NVC surveys would be undertaken to identify potential GWDTE communities within 250 m of the grid connection. The assessment of GWDTE would be prepared prior to construction and would be with reference to the SEPA guidance (2024).

Designated Sites

8.26 According to the NatureScot Sitelink interactive map, there is a minor area in the northern middle section of the Study Area that covers the Feoch Meadows SSSI, and a very minor area in the southernmost section of the Study Area that covers the Wood of Cree SSSI. Feoch Meadows SSSI and Wood of Cree SSSI have both been identified as biological and therefore are not considered relevant to this report.

8.27 According to SEPA Drinking Water Protected Areas (DWPA) map, there are no DWPAs within the Study Area.

Peat, Carbon Rich Soils and Soils

8.28 According to the James Hutton Institute National Soil Map of Scotland, the Study Area is predominantly underlain by brown earth soils. Across most of the southern half of the Study Area, brown forest soils and blanket peat are found. To the north of the Study Area, there are also minor areas of peaty gleys, noncalcareous gleys, and peaty podzols.

8.29 The NatureScot Carbon Soils Map (2016) indicates that Class 5 soils are predominantly located along the southern edge of the Study Area, with minor pockets of Class 1 and Class 3 soils also present throughout (see Figures 8.1 and 8.2). This broadly aligns with the soil types shown on the James Hutton Institute National Soil Map of Scotland. In addition, large areas of mineral and 'unknown' soils are mapped locally along the river corridor.

8.30 No peat survey information is available for the Study Area. Where peat is indicated according to desktop mapping such as areas of Class 1-5 carbon soils, blanket peat, peaty gleys or peaty podzols, peat depth and condition surveys should be completed with reference to Scottish Government guidance (2017).

Baseline (South Option - Glenvernoch Wind Farm to Newton Stewart GSP)

Bedrock Geology

8.31 According to the British Geological Survey (BGS) 1:50,000 scale Bedrock Geology mapping, the bedrock geology underlying the grid connection route, from north to south, is mapped as the Portpatrick Formation (wacke) across the northern part of the Study Area, followed by a thin deposit of the Moffat Shale Group (mudstone) included. The Shinnel Formation (wacke) underlies the majority of the Study Area from the northern to the southern end of the Study Area.

Superficial Geology

8.32 According to BGS superficial geology mapping, the superficial deposits underlying the underground cable route are, from north to south, mapped as alluvium (silt, sand and gravel), peat, Till (Devensian) (diamicton) and glaciofluvial deposits (gravel, sand and silt). These deposits occur as localised pockets of limited extent throughout the Study Area.

Surface Water

8.33 Several watercourses are located adjacent to, and intersect, the route. The main watercourses are listed below from north to south, together with their Water Framework Directive (WFD) status where available:

- River Cree (ID: 10520) had a 'Good' overall WFD status in 2024; and
- No WFD status is available for Castle Stuart Burn, Cordorcan Burn, Washing Burn, Coldstream Burn or Challoch Burn.

8.34 Additional small watercourses also drain east to west and discharge to the River Cree.

Water Supplies

SEPA Abstractions

8.35 Based on the EASR register provided by SEPA, there are three registered authorisations within the Study Area, with two being used for agriculture and one being used as a drinking water abstraction.

Scottish Water (SW) Abstractions

8.36 Based on Scottish Water abstractions dataset, no SW abstractions are present within the Study Area.

Private Water Supplies (PWS)

8.37 Data taken from the Private Water Supply Risk Assessment in August 2024 for Glenvernoch Windfarm and data received from Dumfries and Galloway Council in 2024 indicates there are five PWS located within the Study Area:

- Barclyde (PWS) (BNGR NX392694) – unknown source type.
- Glenhappie PWS (BNGR NX374713) – unknown source type.
- Lynchett Cottage (PWS) (BNGR NX382673) – unknown source type.
- North Lodge, Penninghame PWS (BNGR NX379705) – unknown source type.
- Old Hall (PWS) (BNGR NX405660) – unknown source type.

8.38 In accordance with the SEPA 'Guidance on Assessing the Impacts of Development on Groundwater Abstractions' (2024) and prior to construction, all groundwater abstractions within 250m of the grid connection will be identified and subject to a qualitative impact assessment to determine potential impacts as well as the requirement for mitigation.

Flood Risk

8.39 According to SEPA flood mapping the grid connection is shown to have a high risk of flooding from the River Cree which runs parallel to the cable route, however the river flooding is constrained by the river channels and road margins. The flood extents do not directly intersect the cable route or the A714.

8.40 Whilst outside the Study Area, Newton Stewart is also identified by SEPA as a Potentially Vulnerable Area (PVA) on account of historic flooding from the River Cree, with significant flooding experienced in 2012 and 2015. A Flood Prevention Scheme (FPS) is currently being progressed by D&GC.

8.41 The future flood maps indicate there would be a slight increase in the flood risk area extent within the Study Area on the River Cree.

Hydrogeology

8.42 The groundwater and hydrogeology of the route is mapped as Shinnel formation and Glen Lee formation. This is classed as a low productivity aquifer. Flow is virtually all through fractures and other discontinuities. Highly indurated rocks with limited groundwater in near surface weathered zone and secondary fractures.

8.43 The Study Area is underlain in the south by the Galloway groundwater body, which is classified by SEPA, under the WFD, (ID: 150694) as having a 'Good' overall status in 2024, and the South Ayrshire Hills groundwater body in the north, which is classified by SEPA, under the WFD, (ID: 150660) as having a 'Good' overall status in 2024.

GWDTE

8.44 SEPA's guidance ('Assessing the Impacts of Developments on GWDTE', 2024) on assessing the impacts of developments on GWDTE requires assessment of GWDTE located within 250m of excavations greater than 1m and within 100m of excavations less than 1m. Excavations associated with the grid connection may impact the UGC and temporary access routes. In general, it is likely such excavations will be <1.0m and therefore there would be some interaction with superficial and near-surface groundwater where present, and very limited interaction with deeper bedrock groundwater.

8.45 National Vegetation Classification (NVC) details which would indicate potential GWDTE communities are not currently available for the Study Area. A review of the Scottish Wetland Inventory indicates there are no wetlands present within the Study Area.

8.46 Following the establishment of the final alignment NVC surveys would be undertaken to identify potential GWDTE communities within 250m of the grid connection. The assessment of GWDTE would be prepared prior to construction and would be with reference to the SEPA guidance (2024).

Designated sites

8.47 According to the NatureScot Sitelink interactive map, there is an area in the northeast section of the Study Area that covers the Wood of Cree SSSI. However, the Wood of Cree SSSI has been identified as biological, and therefore designated sites will not be assessed further in this report.

8.48 SEPA's Drinking Water Protected Areas (DWPA) map identifies two DWPAs within the Study Area: the Cordorcan Burn surface water DWPA (ID: 10915) and the Galloway groundwater DWPA (ID: 150694), both located in the northeast of the Study Area.

Peat and Carbon Rich Soils

8.49 According to the James Hutton Institute National Soil Map of Scotland, the Study Area is predominantly underlain by brown earth soils, with the northwest section underlain by blanket peat.

8.50 The NatureScot Carbon Soils Map (2016) indicates that Class 5 soils are predominantly located in the northwest of the Study Area, with very minor pockets of Class 1 and Class 3 soils also present in the north section of the Study Area (see Figures 8.1 and 8.2). This broadly

aligns with the soil types shown on the James Hutton Institute National Soil Map of Scotland. In addition, large areas of mineral and 'unknown' soils are mapped locally along the river corridor.

8.51 No peat survey information is available for the Study Area. Where peat is indicated according to desktop mapping such as areas of blanket peat, peaty gleys or peaty podzols, peat depth and condition surveys should be completed with reference to Scottish Government guidance (2017).

Issues Scoped Out

8.52 During the operation phase, it is expected that the impacts on surface water quality, including pollution incidents as well as erosion and sedimentation, would be considerably reduced by the absence of construction and completion of reinstatement. Therefore, it is not expected that the operational phase would cause any adverse impacts on the existing surface water quality baseline as a result of operational pollution incidents, including erosion and sedimentation. Therefore, all operational impacts have been scoped out of this assessment.

8.53 Coastal flooding sources, groundwater, and flooding from artificial drainage systems have been scoped out of this assessment, as flood risk is considered negligible. Therefore, no further evaluation is required.

8.54 Geology is typical of wider area with no designated sites of geological interest located within the Indicative grid connection routes or in a location downstream that could be impacted by the Indicative grid connection routes and therefore is scoped out.

Receptor Sensitivity

8.55 Table 12.11 of the EIAR presents receptor sensitivity for the baseline receptors identified within the Glenvernoch Wind Farm Study Area. Based on the assessment of receptors presented in this section, receptor groups for the Study Area are considered to be of the same sensitivity with the exception of geology, which have been scoped out of the need for further assessment. Although new individual receptors are identified, there are no new receptor groups not previously assessed.

Assessment of Effects

8.56 Based on the Baseline Conditions, it is considered that the grid connection may impact upon local hydrology, hydrogeology and geology receptors as a result of:

- Disruption to hydrological flow pathways as a result of construction of watercourse crossings (buried cable crossings or temporary access routes);
- Cable trenches or wood pole foundations disrupting and diverting shallow groundwater flow-paths, potentially impacting GWDTE;

- Sedimentation and release of pollutants as a result of runoff from construction areas discharging into the hydrological and hydrogeological environment including impacting PWS; and

- Impacts associated with the disturbance of peat and carbon rich soils, including peat stability.

8.57 The assessment is applicable to both grid connection options (the northern Pinwherry route and the southern Newton Stewart GSP route) and assumes that only one of them would be built. This is due to the consistency in the occurrence of hydrology, hydrogeology and geology receptor groups and the corresponding anticipated adverse effects between grid connection options.

8.58 Given the reliance of the assessment on desktop information and the current uncertainty in the design alignment, mitigation measures have been identified, and the corresponding likely significance of effects has been assessed on a Significant or Not Significant basis. In doing so, professional judgement has been applied and assumes both an optimised design approach and the successful implementation of mitigation.

Embedded and Good Practice Mitigation

Embedded Mitigation

8.59 An iterative process of corridor and route selection would be undertaken by SPEN to identify the optimal alignment for the grid connection. The importance of geology, hydrology and hydrogeology will be a key consideration throughout. Peatland areas, watercourses and waterbodies, designated sites, and private water supplies, will all have a considerable influence on the design and will prioritise avoidance in the first instance.

8.60 Sufficiently detailed surveys in relation to peat and hydrology would be undertaken as dictated by key guidance documents to inform related assessments and final mitigation requirements. Specific assessments in relation to hydrology, hydrogeology and geology are expected to include;

- Schedule of Watercourse Crossings detailing areas of interaction of the grid connection with watercourses shown on a 1:50,000 scale OS map. The schedule would include proposed crossing methodology aligned with industry good practice guidance;

- Private Water Supply Risk Assessment completed with reference to SEPA's guidance for all groundwater abstractions within 250 m of excavations >1m and 100m of excavations <1m;

- Soil and Peat Management Plan to detail how the NPF4 Mitigation Hierarchy has been applied as part of the design evolution in aiming to avoid and minimise interaction with peat and carbon rich soil. The SPMP will also detail anticipated volumes for peat excavation and proposal for reuse as well as industry best practice handling, storage and reuse methods;

- Peat Landslide Hazard Risk Assessment completed with reference to industry best practice informed by a robust peat survey.

Good Practice Mitigation

8.61 At this stage, mitigation measures are identified at a high level and would be refined once the final alignment is confirmed by SPEN. Mitigation is expected to include the application of standard good practice measures to manage drainage and construction runoff, protect surface water features and minimise disturbance to the geological and hydrological environment. It is expected that this good practice mitigation would be included within a Construction Environmental Management Plan (CEMP) and would ensure the works are undertaken in accordance with relevant good practice guidance. Likely details to be provided in the CEMP are presented in Chapter 12 of the EIA in paragraphs 12.135 to 12.140.

8.62 It is anticipated that the implementation of the CEMP would be managed on site by a suitably qualified and experienced Environmental Clerk of Works (ECoW), with support from other environmental professionals as required. The ECoW would have authority to stop any works that are, or have the potential to, impair the water environment, geology or soils.

Construction Phase Effects

8.63 During the construction phase of the grid connection, there is the potential for adverse effects on the hydrology, hydrogeology, geology and soils environment. The assessment results assume that all necessary surveys, assessments and management plans are completed prior to construction. It also assumes the successful implementation of the embedded and good practice mitigation measures.

Pollution incidents, erosion and sedimentation

8.64 Construction activities involving earthmoving operations (such as excavation of cable trenches, overhead line foundations or construction of temporary access routes / watercourse crossings) would generate loose sediment, which could potentially gain access to surface watercourses and waterbodies through entrainment in surface runoff. This could adversely affect downstream watercourses through changes to habitat quality and water quality, including designated sites if hydrologically connected. Surface water quality could also be impacted in the event of contamination from fuels or oils used during construction. Silt laden or contaminated surface water could also infiltrate impacting groundwater quality.

8.65 Measures to safeguard surface water quality and groundwater quality would be outlined in the CEMP. Surface water from areas around cable trenches would be prevented from entering watercourses by appropriate use of peripheral bunding, silt fencing and cut-off drains. These measures would also help to divert clean water away from working areas. A Pollution Prevention Plan (PPP) would be prepared for the grid connection, setting out detailed methods for managing pollution risks to watercourses, private water supplies and

groundwater. The PPP would accompany any required applications for registration or authorisation under the Environmental Authorisations (Scotland) Regulations 2018 (EASR).

8.66 Construction activities would be restricted during periods of wet weather, particularly for any work occurring within 50m of a watercourse to minimise mobilisation of sediment in heavy rainfall.

8.67 A water quality monitoring programme would be established. Details would be agreed with SEPA but are likely to include visual checks for entrained sediment and in situ measurements of pH, temperature and specific conductivity. Any change during construction compared with baseline conditions could indicate an incident and would trigger further investigation to identify the source.

8.68 Taking into account embedded and good practice mitigation, no significant adverse effects arising from pollution incidents, erosion or sedimentation are anticipated.

Disturbance, Loss and Compaction of Peat, Carbon Rich Soils and Soils

8.69 The grid connection corridor contains pockets of peat and carbon rich soils. Where peat is encountered during construction, excavation may result in carbon losses through drying, oxidation and erosion, with potential mobilisation to the atmosphere or surface waters. Disturbance, handling and reinstatement may also degrade peat structure, reducing the effectiveness of reinstatement and the delivery of peatland ecosystem services. Dewatering and compaction of peat and peaty soils during construction may exacerbate erosion risk, alter peatland hydrology and water levels, and adversely affect hydrologically dependent peatland habitats.

8.70 The incorrect handling of other soils could reduce future functionality and result in increased soil erosion, soil loss and/or reduced function. Such effects are applicable to excavated material as well as in-situ peat in adjoining areas through compaction of peat, peaty soils and other soils by heavy machinery.

8.71 During construction mitigation would follow the NPF4 mitigation hierarchy by prioritising avoidance of deep (>1m) peat and peatland habitat through route refinement and micrositing; minimising unavoidable disturbance through limiting the working corridor and applying best practice peat handling, storage and pollution prevention measures; and restoring affected areas through reinstatement of peat and surface restoration to support recovery of peatland condition and function. Prior to construction peat surveys would be conducted with reference to Scottish Government guidance. If peat is identified surveys would be followed by the preparation of a soil and peat management plan (SPMP).

8.72 Where required, the use of trackway panels and bog mats would minimise requirements for temporary stone tracks would help to minimise the volume of excavated material and the duration of storage during construction.

8.73 Assuming the completion of suitable peat surveys and preparation of the SPMP by SPEN (if required), no significant adverse effects with respect to the disturbance of peat or carbon rich soils are anticipated.

Peat Stability

8.74 Owing to the presence of peat within the grid connection there is potential for peat instability and associated arising effects including adverse impacts peat loss as well as secondary effects on water quality.

8.75 Prior to construction a Peat Landslide Hazard Risk Assessment (PLHRA) wouldl be prepared by SPEN in accordance with Scottish Government guidance (2017). The PLHRA should be informed by peat surveys undertaken with reference to Scottish Government guidance (2017) and should consider peat depth, habitat condition, quality and stability.

8.76 Assuming the completion of the PLHRA and the identification and implementation of appropriate mitigation measures (including avoidance of areas of instability in the first instance) associated with peat stability, no significant adverse effects are anticipated.

Modifications of Surface Water and Groundwater Flow Pathways

8.77 Changes to overland drainage pathways would arise principally from excavation, dewatering, installation of the sections of underground cable, and reinstatement of the worked area. These activities have the potential to alter surface water and groundwater flow pathways within and downgradient of working areas. Further impediments to surface water discharge may also occur at watercourse crossings.

8.78 Measures to minimise impacts on surface water and groundwater flows would be outlined in the CEMP. Excavations would remain open for as short a time as practicable. Dewatering would also be minimised and carefully timed to avoid very wet weather when water ingress would be higher. Excavations would be undertaken using standard best practice, with every effort taken to cause the least disturbance possible to the surrounding area and minimise the effect on surface water flows or shallow groundwater. This includes ensuring the appropriate replacement of soil and subsoil horizons in the order they were excavated to maintain surface and near-surface hydrological connectivity, and use of cross drainage in areas of flush habitats.

8.79 Excavation machinery would avoid tracking over drains/small watercourses except at designated crossing locations, and excavated material would be stored at least 10m away from all drains or watercourses to avoid obstruction.

8.80 Where structures are buried beneath drains or watercourses these would follow industry best practice methods and comply with required General Binding Rules under EASR. The requirement for erosion protection measures in or adjacent to watercourses would be identified and implemented during construction.

8.81 Where potential GWDTE communities are identified these and their likely contribution zones would be avoided by the grid connection (where practicable), or subject to assessment in accordance with SEPA guidance (2024) to inform mitigation requirements. These may include the deployment of mitigation design to maintain flow continuity such as cross drainage.

8.82 Following completion of construction, any temporary access arrangements or drainage infrastructure would be removed and the ground reinstated to natural pre-development condition.

8.83 Assuming all receptors (including GWDTE) are sufficiently identified and assessed as well as the implementation of embedded and good practice mitigation, no significant adverse effects arising from the modification of surface water and groundwater flow pathways are anticipated.

Flood Risk

8.84 As part of the detailed site design detailed method statement would be prepared which would have regard to areas of known and potential flood risk. This would include temporary works in flood risk areas, i.e., the crossing of watercourse valleys and channels.

8.85 The CEMP would incorporate appropriate mitigation to time these works so that the likelihood of them being carried out during periods of high rainfall or river discharge is minimised. An emergency response plan for working in these areas would also be prepared and would include managing flood risk. This will include signing up to receive SEPA flood alerts.

8.86 No permanent culverts are required and apart from wood poles for the overhead line, no other permanent above ground structures are required. The design has also minimised the need for any temporary culverts or upgrade works on existing watercourse crossings. In the event that temporary culverts or upgrade works are required, these would be authorised and regulated in accordance with EASR.

8.87 Given the safeguards detailed above flood risk to the development would be mitigated and flood risk downstream of the development would not be increased. No significant adverse effects are anticipated.

Private Water Supplies

8.88 There are a number of abstractions and PWS along the cable route.

8.89 Further investigation of the source and abstraction location prior to construction will be required. Evaluation of the risk to the PWS from construction using the investigation results. In the event the source could be potentially impacted by the grid connection, bespoke mitigation should be designed and implemented by SPEN resulting in a risk rating no greater than 'low' according to SEPA's guidance (2024). Mitigation measures may include demarcation of the source, development of specific drainage and dewatering plans and the establishment of an emergency action and contingency plan.

8.90 Inclusion of all relevant mitigation in the CEMP. If required, water quality and water quantity monitoring to be undertaken as per SEPA's guidance (2024).

8.91 Taking into account embedded and good practice mitigation, no significant adverse effects on PWS are anticipated.

Cumulative Assessment

8.92 A cumulative assessment has been undertaken on a qualitative screening basis, considering the grid connection as part of the Proposed Glenvernoch Wind Farm (noting that only one grid connection option would be constructed) and in combination with other consented, in-construction and reasonably foreseeable wind farm and associated grid connection developments in the wider area. The grid connection effects identified in this chapter are localised, temporary and largely controllable through embedded design measures and good practice mitigation (including those secured through the CEMP and related management plans). On this basis, the addition of the grid connection would not give rise to significant cumulative effects.

Summary

8.93 This desk-based assessment has identified the principal geological, hydrological and hydrogeological features and constraints relevant to the indicative grid connection routes. Outline details of potential effects reflecting the current uncertainty in design details have been identified and described, with no significant adverse effects anticipated (subject to appropriate surveys, good practice mitigation and avoidance of sensitive areas where possible).

8.94 It is incumbent upon SPEN to undertake sufficiently detailed surveys and corresponding assessments to inform future mitigation requirements.

9 FORESTRY

Introduction

9.1 This section presents an assessment of the likely significant environmental effects of the grid connection on forestry. It also describes the baseline conditions that currently exist and any mitigation measures that are likely to be set out in a future planning consent for the grid connection, in line with SPEN's established construction practices.

9.2 Only the northern route, which includes overhead line elements, is considered in this assessment. The southern route would utilise an underground cable and follow public roads for its entire length. Aside from the possible need to clear or trim isolated trees within the road corridor, no significant effects are predicted in relation to forestry for the southern route and it is scoped out of this appraisal. Similarly, no significant effects are predicted for the underground elements of the northern route, so this is also scoped out of the assessment.

Scope and Methodology

9.3 Forestry Commission Scotland (now Scottish Forestry) issued a document entitled *The Scottish Government's Policy on Control of Woodland Removal* in 2009, which provides guidance on the control of woodland removal and the process for managing the implementation of the woodland removal policy in respect of forestry removal on development sites. The principal aims of the Control of Woodland Removal Policy are to provide a strategic framework for appropriate woodland removal and to support climate change mitigation and adaptation.

9.4 The Control of Woodland Removal Policy is built on the following principles:

- A strong presumption in favour of protecting Scotland's woodland resource;
- Woodland removal should be allowed only where significant and clearly defined additional public benefit can be demonstrated. A proposal for compensatory planting may add additional public benefit;
- Approval for woodland removal should be conditional on the undertaking of actions to ensure full delivery of the defined additional public benefits;
- Planning conditions are used to mitigate the environmental impacts arising from development; and
- Where felling is permitted but woodland removal is not supported, conditions conducive to woodland regeneration should be maintained through adherence to good forestry practices as defined in the UK Forestry Standard.

9.1 An iterative process of corridor and route selection would be undertaken by SPEN to identify the optimal alignment for the grid connection. A key consideration in this process will be to minimise the amount of permanent felling required to construct the grid

connection. Despite this, it is likely that the grid connection would still involve the permanent removal of woodland for the purposes of conversion to another type of land use. Under these circumstances, the Scottish Government's Control of Woodland Removal policy requires that compensatory planting should be required.

Baseline Conditions

9.2 The overhead line Area of Search for the northern route (as illustrated on Figure 9.1) includes large areas of commercial plantations and areas of ancient woodland. In accordance with Holford Rule 5, which seeks to avoid routing through woodland or commercial forestry, avoidance of these woodland blocks would be a strong influence on the eventual design of the northern grid route, should it be progressed by SPEN.

9.3 The indicative northern route shown on Figure 9.1 has been selected because it largely avoids these woodland blocks: first, by undergrounding the first section of the route along the A714 within the road corridor; and second, by routing the overhead elements to the south of the A714 to avoid the woodland blocks in the vicinity of Barhill. This route avoids all of the ancient woodland in the area and does not go directly through any of the major woodland blocks. It does however go through some smaller areas of woodland, and some felling would be necessary to provide the clear swathe needed to accommodate the overhead line. It is likely that detailed routing carried out by SPEN would seek to further minimise the amount of felling required.

Assessment of Effects

9.4 The study area for the proposed overhead line element of the northern route covers all woodlands within a wayleave corridor width of 30m either side of the route corridor (total wayleave corridor width of 60m).

9.5 The northern overhead line would impact on the following areas of forestry:

- Individual trees on field boundaries between the A714 and the Duisk River – 0.1ha.
- Areas of scrub and individual trees in the vicinity of where the overhead line would cross the Cross Water – 0.7ha.
- Commercial plantation at Arecleoch Forest, in the vicinity of Barrhill railway station (the majority of which has recently been clear felled) – 4.6ha.
- Individual trees on field boundaries to the east and west of Forest Road, west of Bents Farm – 0.1ha.
- Areas of scrub and individual trees in the vicinity of where the overhead line would cross the Burn of Lig – 0.2ha.
- Newly planted commercial woodland in the area between Balliard Farm Cottage and the A714 – 5.1ha.

- Individual trees within the highway corridor on the A714, east of High Alticane and west of Drumgrier – 0.1ha.
- Individual trees in the vicinity of where the overhead line would cross the Duisk River to the south of Drumspillan Hill – 0.1ha.
- Individual trees on field boundaries between Drumspillan Hill and Pinwherry Substation – 0.3ha.

9.6 The total area of felling within the overhead route corridor is therefore 11.3ha. The likely impact of this is Minor (Not Significant) given the relatively small area of permanent woodland loss taking into account the scale of the woodland resource in the wider area.

9.7 SPEN's standard preference for timber harvesting would likely be whole tree harvesting. However, where ground conditions do not allow for this, then the method employed is likely to be based on the use of harvesters which will process every tree to very small top diameters leaving only small volumes of timber on soft areas and brash to support the harvesting equipment. All works would only be undertaken after assessment of the felling site's capacity to sustain such a process and with due consideration to operator safety.

Mitigation Measures

9.8 As the grid connection would involve the permanent removal of woodland for conversion to another type of land use, compensatory planting would be required in line with the requirements of the Scottish Government's Control of Woodland Removal policy. It is anticipated that the compensatory planting requirement will be in the region of 11.3ha, plus an additional 10% for designed open ground.

9.9 Timber extraction would be carried out making optimum use of existing tracks wherever possible. Site refuelling and maintenance areas would be sited outside the watercourse buffer areas and best practice measures would be taken to mitigate risks of spillages.

9.10 All forestry waste materials would be managed in accordance with SEPA's guidance notes – Land Use Planning System, SEPA Guidance Note LUPS-GU27 – Use of Trees Cleared to Facilitate Development on Afforested Land and the SEPA (2017) Guidance WST-G-027 version 3 Management of Forestry Waste.

Summary

9.11 Compensatory planting would be provided for any areas of felling, ensuring there would be no net loss of forestry. Given that there would be no overall loss of woodland the overall effect would be not significant.

10 TRAFFIC AND TRANSPORT

Introduction

10.1 This section presents an assessment of the likely significant environmental effects of the grid connection on traffic and transport. It also describes the baseline conditions that currently exist and any mitigation measures that are likely to be set out in a future planning consent for the grid connection, in line with SPEN's established construction practices.

Scope and Methodology

10.2 The most identifiable traffic and transport characteristics associated with the grid connection would be the transportation of plant and construction materials to overhead line or underground cable locations, access to the wind farm substation, and to the point of connection to the electricity grid. A small amount of traffic would also be generated by construction workers making their way to and from the overall Site at the start and end of the working day. Construction of the grid connection is therefore expected to result in a temporary increase in traffic flows on the local road network.

10.3 This assessment therefore considers the following:

- The transport routes for vehicles accessing the construction areas associated with the grid connection;
- The potential impact of increased traffic along the access routes, including HGVs and staff movements; and
- Any traffic management measures required to support the construction of the grid connection.

10.4 The nature of construction of a grid connection means that the majority of the journeys to the Site during the construction stage are expected to be by vehicle.

10.5 On the basis of a high-level desktop study, the professional judgement of the competent consultant team and experience from other relevant projects and policy guidance, the following effects have been scoped out of this assessment, and only the construction stage has been assessed:

- Operational Stage – Once operational, the amount of traffic associated with the grid connection would be minimal, relating to maintenance only. The effect of vehicle movements during the operational phase would be negligible, therefore the operational phase has been scoped out of this assessment;
- Decommissioning Stage – At some point in the future, the grid connection may be decommissioned although given the nature of the development, it is likely that underground cables would remain in the ground following decommissioning. Should full decommissioning be required, traffic associated with this stage is anticipated to be slightly less than that generated during construction and the effects of decommissioning have been scoped out of this assessment.

Baseline Conditions

10.6 The southern grid connection route would follow the local road network from the Proposed Development via the A714 and the U52W Barnkirk Road to the west of Newton Stewart to the Newton Stewart GSP. The northern grid connection route would follow the A714 from the site north to approximately Killantringan Farm before becoming an overground route west then north to the Pinwherry Primary Substation.

10.7 The route for general construction HGVs to both route options has been identified as:

- From the A75 onto the U52W Barnkirk Road west of Newton Stewart (to avoid the town centre) then continuing north on the A714 to the site; and
- For the northern grid connection route, vehicles would continue along the A714 from the site to the Pinwherry Primary Substation

10.8 The northern grid connection route overhead line section may also require access via the B7027.

10.9 The study area therefore comprises:

- The A75 (T) (in the vicinity of Newton Stewart, 5km east and west of U52W junction);
- U52W Barnkirk Road;
- The A714 between U52W Barnkirk Road and Pinwherry; and
- The B7027 from Barrhill approximately 5km south.

Road Access

A75

10.10 The A75 is a trunk road in Scotland, linking Stranraer on the west coast with the A74(M) at Gretna, close to the border with England and the M6 motorway. This strategic route connects southern Scotland / northern England with Northern Ireland via the ferry port at Cairnryan.

10.11 The A75 is typically a two-way single carriageway of approximately 7.3m in width, with a few dual carriageway sections and sections with a third overtaking lane. The road is subject to the national speed limit, with the exception of a few sections outwith the study area where the road passes through settlements.

10.12 Within the study area, the A75 routes in a primarily east / west direction from Twynholm in the east to Dunragit in the west, bypassing both of those settlements and also bypassing the settlements of Cardoness, Creetown, Newton Stewart and Glenluce.

U52W Barnkirk Road

10.13 Barnkirk Road is a minor road which bypasses Newton Stewart to the west of the town by connecting the A75 in the south with the A714 in the north. The 2.4km route is proposed to

be used by construction traffic to avoid routing heavy goods vehicles through the centre of Newton Stewart, as has been done for previous windfarms in the area.

10.14 Barnkirk Road is a two-way single carriageway road of approximately 5.5m in width and is subject to the national speed limit.

A714

10.15 The A714 routes in a north / south direction from Girvan on the west coast of Scotland, through the centre of Newton Stewart and ends just north of the village of Braehead, a total distance of 61.2km.

10.16 In the context of the study area, the A714 routes south from the village of Pinwherry, through the centre of Newton Stewart to the south of the town where it connects with the A75 by means of a roundabout.

10.17 The A714 is a two-way single carriageway of approximately 6.5m in width and is subject to the national speed limit, with the exception of through Newton Stewart where the speed limit reduces to 30mph.

10.18 It is proposed that all construction traffic be routed via the U52W Barnkirk Road to avoid travel through the centre of Newton Stewart.

B7027

10.19 The B7027 routes in northwest / southeast direction from Barrhill to Challoch, just north of Newton Stewart, a total distance of 24.0km. Within the study area the road is generally a single carriageway without a centreline marking. The carriageway is generally 4.5m in width and is subject to a 60mph speed limit outside of Barrhill.

Road Access

10.20 Baseline traffic data for the study area road links has been obtained from the following sources, and National Roads Traffic Forecast (NRTF) low growth factors have been applied where necessary to formulate 2026 baseline flows:

- Traffic data for counters 1, 2, 3 and 4 have been obtained from the Glenvernoch Wind Farm Environmental Impact Assessment Volume 1, Chapter 11.
- Traffic data for counters 5 and 6 have been obtained from Department for Transport's Road Traffic Statistics website.

10.21 The 2026 baseline traffic flows within the study area are reported in Table 10.1 below. No data is available for the B7027.

Table 10.1: 2026 Baseline Traffic Flows Within Study Area

Counter Location	Average Daily Traffic (ADT)	HGV	Percentage HGV
1. A75 west of A714	4,038	1,296	32.1%

2. A75 east of A714	4,434	1,561	35.2%
3. U52W Barnkirk Road	1,044	237	22.7%
4. A714 at site access	1,179	284	24.1%
5. A714 east of Barrhill	715	102	14.3%
6. A714 west of Barrhill	1,064	102	9.6%

10.22 It is considered highly unlikely that there would be any significant effects on the road network outside of the study area as traffic would be heavily diluted across the road network beyond these points.

Road Safety

10.23 Department for Transport (DfT) Road Safety data has been reviewed to examine the recent collision history on the surrounding road network. Data was extracted for collisions that have occurred in the past five years for which data is available (2020-2024) in the Study Area.

10.24 The definitions of the levels of severity are as follows:

- Slight – any injury which is neither serious nor fatal;
- Serious – injury for which the person is detained in hospital, or any of the following injuries (whether or not the person is detained in hospital): fractures, concussion, internal injuries, crushing, severe cuts and lacerations, severe general shock requiring treatment, or any injury causing death 30 days or more after the accident; and
- Fatal – a fatal injury or the person dies within 30 days of the accident.

10.25 The results of this investigation are indicated in Table 10.2.

Table 10.2: Road traffic collision statistics

Location	Slight	Serious	Fatal	Comment
A75 East	4	3	-	No apparent clustering
A75 West	3	2	-	No apparent clustering
A714	2	4	-	No apparent clustering
U52W Barnkirk Road	1	-	-	No apparent clustering
B7027	-	-	-	No collisions during study period

10.26 On review, there does not appear to be any road safety issues which would raise concerns with regard to bringing the Proposed Development forward, particularly as the grid connection will not intensify the use of the public road network once operational. While it is noted that a small number of collisions have occurred within the study area these are isolated incidents and no accident hotspots have been identified.

Construction Traffic

10.27 From the Glenvrnoch wind farm substation, the connection would head towards the Glenvernoch site access. From here the route would either head south following the A714 and U52W underground for approximately 8.5km or would head north underground alongside the A714 for 15.5km and then becoming overground turning west then north for a length of 11.5km.

10.28 Delivery of construction materials to the underground cable locations would be achieved by access from public roads. It has been assumed at this stage that no new vehicular access points would need to be provided for access.

10.29 It is anticipated that construction of the grid connection would follow the below sequence of activities:

- Preparation of any construction compounds required for ancillary equipment;
- Felling of any isolated self-seeded trees;
- Delivery of underground cables, construction materials and ancillary equipment;
- Excavation of cable trenches;
- Cable installation; and
- Clearance and reinstatement.

10.30 The works are anticipated to follow the order detailed above, but certain activities may be carried out concurrently to reduce the overall length of the construction programme. Site restoration would be undertaken as early as possible in development areas.

10.31 In line with a typical Construction Traffic Management Plan (CTMP), it is likely that construction activities would be undertaken by SPEN on Monday to Friday between 07:00 and 19:00. There may be a requirement to work on Saturdays (between 07:00 and 12:00), however no Sunday working would be undertaken. Shorter construction hours may be operated during winter periods.

10.32 For the southern grid connection route, based on the buried grid connection route running for 8.5km in length it is predicted that a total of approximately 970 construction trips would be generated for the works.

10.33 For the northern grid connection route, based on the buried grid connection route running for 15.5km in length and the overhead line route running for 11.5km it is predicted that approximately 1,790 and 1,998 construction trips would be generated, respectively, for a total of 3,788.

10.34 The construction programme is anticipated to take approximately twelve months. For the purposes of this assessment, it is assumed that the number of construction trips would be distributed evenly between each month and that each trip would be made by HGV.

10.35 The approximate number of HGV movements associated with the construction programme is provided in Tables 10.3 and 10.4 for the southern and northern grid

connection routes, respectively. The approximate number of HGV movements per week and day is also indicated, based on a four-week month and a five-day working week.

Table 10.3: Construction HGV trips by month – Southern Route

Time Period	Month												Total
	1	2	3	4	5	6	7	8	9	10	11	12	
HGVs per month	81	81	81	81	81	81	81	81	81	81	81	81	970
HGVs per week	20	20	20	20	20	20	20	20	20	20	20	20	-
HGVs per day	4	4	4	4	4	4	4	4	4	4	4	4	-

Table 10.4: Construction HGV trips by month – Northern Route

Time Period	Month												Total
	1	2	3	4	5	6	7	8	9	10	11	12	
HGVs per month	316	316	316	316	316	316	316	316	316	316	316	316	3,788
HGVs per week	79	79	79	79	79	79	79	79	79	79	79	79	-
HGVs per day	16	16	16	16	16	16	16	16	16	16	16	16	-

10.36 Assuming all months over the course of the twelve-month construction period generate the same volume of traffic, approximately 81 two-way HGV trips are estimated per month for the southern grid connection route and 316 per month for the northern grid connection route.

10.37 For the southern grid connection route, assuming four weeks per month, this equates to approximately 20 two-way HGVs per week, and four per day. i.e. approximately two inbound and two outbound HGV trips per day.

10.38 For the northern grid connection route, assuming four weeks per month, this equates to approximately 79 two-way HGVs per week, and 16 per day. i.e. approximately eight inbound and eight outbound HGV trips per day. It is important to note that in either case this represents a minimal number of trips over a temporary period.

10.39 In addition to the HGV movements indicated in Tables 10.3 and 10.4, a maximum of 30 inbound and 30 outbound vehicle trips are anticipated daily, associated with construction staff. This is based on a worst-case scenario of no car sharing, when in reality, construction workers are likely to travel in shared vehicles such as vans or minibuses.

Assessment of Effects

10.40 The main potential transport impact of construction of the grid connection would be increased traffic flows, or changes to the traffic composition, as a result of traffic movements during the construction period. These traffic impacts may affect existing road users and residents with properties along the road corridors that are used to access the Site. Any traffic impacts would be temporary and limited to the construction phase.

10.41 Future year baseline traffic flows have been calculated for 2030 (assumed year that construction would begin) by applying the NRTF low growth factor for 2026 to 2030 to the 2026 baseline traffic data. The 2030 traffic flows are indicated in Table 10.5 below.

Table 10.5: Future Year 2030 Traffic Flows

Counter Location	2026		2030		Percentage HGV
	ADT	HGV ADT	ADT	HGV ADT	
1. A75 west of A714	4,038	1,296	4,119	1,322	32.1%
2. A75 east of A714	4,434	1,561	4,523	1,592	35.2%
3. U52W Barnkirk Road	1,044	237	1,065	242	22.7%
4. A714 at site access	1,179	284	1,203	290	24.1%
5. A714 east of Barrhill	715	102	729	104	14.3%
6. A714 west of Barrhill	1,064	102	1,085	104	9.6%

10.44 In order to assess the impact of construction traffic, it is necessary to determine the distribution of generated trips. As the origin of construction materials has not yet been identified, the HGV trips have been distributed as per the Glenvernoch Wind Farm EIA, with 100% of HGV trips assumed to originate from the A75 from the west and 100% from the A75 from the east. 100% of trips have been applied to the U52W Barnkirk Road and A714, as all construction vehicles will travel on the A714 to access the Site. For the overhead section of the northern route, it has been assumed that 50% of trips would access from the B7027 and 50% from the A714 at Pinwherry.

10.45 The assumptions at the A75 are effectively theoretical as you cannot have 100% of traffic coming from both directions but the purpose of the assessment is to consider the potential worst-case scenario on each affected road link.

10.46 Tables 10.6 and 10.7 indicates the percentage increases in HGV and total traffic associated with the construction of the grid connection on the study area road links, based on four and 16 HGV movements per day for the southern and northern routes, respectively. It is noted that it is not possible to calculate the increase in vehicle trips on the B7027 due to the lack of a suitable traffic counter but we anticipate that the volumes and percentage impacts would be similar to the U52W Barnkirk Road.

Table 10.6: Peak Daily Construction Traffic Impact – Southern Grid Connection Route

Road Link	Increase in Total Traffic	Increase in HGV Traffic	% Increase in Total Traffic	% Increase in HGV Traffic
1. A75 west of A714	64	4	1.5%	0.3%
2. A75 east of A714	64	4	1.4%	0.3%
3. U52W Barnkirk Road	64	4	6.0%	1.7%
4. A714 at site access	64	4	5.3%	1.4%

Table 10.7: Peak Daily Construction Traffic Impact – Northern Grid Connection Route

Road Link	Increase in Total Traffic	Increase in HGV Traffic	% Increase in Total Traffic	% Increase in HGV Traffic
1. A75 west of A714	76	16	1.8%	1.2%
2. A75 east of A714	76	16	1.7%	1.0%
3. U52W Barnkirk Road	76	16	7.3%	6.6%
4. A714 at site access	76	16	6.3%	5.5%
5. A714 east of Barrhill	64	4	8.8%	3.8%
6. A714 west of Barrhill	64	4	5.9%	3.8%

10.47 Tables 10.6 and 10.7 indicates that traffic associated with construction of the grid connection would increase the baseline total traffic and HGV traffic levels by a negligible amount (less than 10%) along each study area road link.

10.48 Considering the anticipated low daily construction trip generation, it can be concluded that traffic impact and resultant effects of the construction phase of the grid connection would be negligible. The level of increased trip generation does not trigger the need for any detailed assessment of environmental effects in line with the thresholds contained within the ISEP guidelines.

Mitigation Measures

10.49 A Construction Traffic Management Plan (CTMP) would be prepared for the grid connection as a good practice measure by SPEN. The CTMP would be produced and agreed with DGC. The CTMP would identify measures to reduce the number of construction vehicles as well as considering reducing or avoiding the impact of vehicles through construction programming / routing and identification of an individual with responsibilities for managing traffic and transport impacts and effects.

10.50 The CTMP would be developed during the detailed design phase of the project. It would therefore have the benefit of the detailed construction planning stage to allow for detailed estimates of traffic movements per tasks and vehicle type to be understood. It would be possible to set these vehicle movements against the fully developed construction programme, allowing mitigation efforts to be focused on the activities and locations that require them the most.

10.51 The key objectives of the CTMP would include:

- Reducing the number of construction vehicles through coordinated delivery schedules, consolidated ordering, and efficient use of transport resources;
- Avoiding or minimising traffic impacts by implementing designated access routes, avoiding peak traffic periods, and using appropriate vehicle types suited to the road conditions;

- Assigning responsibility for traffic, transport and access management to a dedicated individual (e.g. a Site Liaison Officer), who will oversee implementation, monitor compliance, and act as a point of contact for stakeholders;
- Managing staff travel, with a focus on reducing single-occupancy car journeys by promoting car sharing, using minibuses where feasible, and providing on-site parking to avoid roadside congestion; and
- Ensuring safety and communication, including driver inductions, signage, speed control measures, and engagement with local residents and authorities.

10.52 The following is a summary of mitigation measures which could be included in the CTMP:

- The main contractor will develop a logistics plan highlighting access points for the project, welfare, storage, and compound locations which would be enforced following full Site establishment.
- All contractors will be provided with a Site induction pack containing information on delivery routes and any restrictions on routes.
- Approved haul routes will be identified and protocols put in place to ensure that HGVs adhere to these routes and do not pass through areas to be avoided.
- Temporary construction signage would be erected along the identified construction traffic routes to warn people of construction activities and associated construction vehicles.
- Road safety briefings will be delivered to on-site personnel and to HGV drivers serving the development so that there is awareness raising around any sensitive locations on the local road network.
- Specific training and disciplinary measures would be established to ensure the highest standards are maintained to prevent construction vehicles from carrying mud and debris onto the carriageway, wheel wash facilities will be established if necessary.
- All materials delivery lorries (dry materials) would be sheeted to reduce dust and stop spillage on public roads.
- Vehicles will be fitted with identification numbers to allow the public to identify any vehicles that may be speeding or causing specific issues and drivers will be required to pass through sensitive areas at low speed.
- Under no circumstances will HGVs be allowed to lay-up in surrounding roads. All personnel in the team will be in contact with each other and with Site management, who in turn will have mobile and telephone contact with the subcontractors.
- Any construction material 'lay down' areas will allow for a staggered delivery schedule throughout the day, avoiding peak and unsociable hours (i.e. before 06:00 and after 22:00).
- On-site waste will be minimised through recycling and re-use where possible.
- Car parking for the workforce will be provided entirely within the confines of the Site boundary and will not be permitted on the adjacent unclassified road network, so as to minimise the effect on existing road users. Car sharing will be promoted to construction staff by the contractor during the induction process.

- The CTMP will be monitored by the Site Liaison Officer, who in turn will report to The Roads Authority (DGC) in relation to any required changes to the CTMP.

Cumulative Assessment

10.53 Cumulative effects have been considered for other developments which may utilise any sections of the road network required for the Proposed Development. Operational developments have been discounted as they have negligible operational traffic and therefore have no cumulative traffic effect.

Glenvernoch Wind Farm Cumulative Summary

10.54 The 2024 Glenvernoch Wind Farm Traffic and Transport EIAR chapter considered several potential cumulative developments and concluded that "it is highly unlikely that the peak construction period associated with another wind farm development in the area would overlap with the peak construction period of the Proposed Development as the applications are at different stages in the planning process and each development has varying lengths of construction periods. The high traffic generating activities, such as the importation of stone and concrete, only occur over a few months of the whole construction period for each development. It is unlikely that the local capacity for concrete and stone production could supply several developments at once, therefore, high traffic generating activities would naturally be staggered."

10.55 The A75 strategic trunk road network has a large carrying capacity which is capable of accommodating temporary spikes in total traffic and HGV levels. The A75 has an approximate carrying capacity of 57,600 vehicles/24hr which, including Glenvernoch Wind Farm peak month construction traffic, is only 8.3% fulfilled (as a worst-case scenario). Taking this into account, it is considered that cumulative effects along the A75 will effectively be absorbed and will not give rise to any adverse effects.

10.56 The U52W Barnkirk Road is a good standard single carriageway road with a large capacity, of which only approximately 3.0% is utilised with the worst-case month of Glenvernoch Wind Farm construction development traffic included. As a result, it is considered that the cumulative traffic impact along the U52W Barnkirk Road will be diluted across the network and not give rise to any significant environmental effects.

10.57 The A714 is a good standard single carriageway road with a large capacity of which only approximately 3.4% is utilised with the worst-case month of Glenvernoch Wind Farm construction development traffic included. As a result, it is considered that the cumulative traffic impact along the A714 will be diluted across the network and not give rise to any significant environmental effects.

Glenvernoch Wind Farm and Grid Connection Cumulative

10.58 The addition of up to an extra 16 HGV trips and 60 staff vehicle trips per day in addition to the Glenvernoch Wind Farm construction traffic would not result in any material impact on the A75, U52W Barnkirk Road and A714 roads, based on the standard and capacity of those roads.

Additional Potential Cumulative Developments

10.59 In the intervening years since the 2024 Traffic and Transport EIAR chapter for Glenvernoch Wind Farm, planning applications for new developments which may have the potential for cumulative effects have been submitted. Operational and under construction developments have been discounted as they have no potential for cumulative construction traffic effects.

10.60 Table 10.8 summarises the developments within the vicinity of Glenvernoch Wind Farm and Grid Connection which have been identified as having the potential for cumulative traffic effects. A review of available information from the Traffic and Transport chapters within the relevant EIA Reports has been undertaken to establish the likely construction traffic routes for each development and where there is potential for overlap.

Table 10.8: Peak Daily Construction Traffic Impact – Northern Grid Connection Route

Development	Status	Turbine Count	Potential Overlap in Construction Route	Potential Cumulative Effect
Chirmorie Wind Farm	Consented	21	A75, U52W, A714	Yes – on U52W and A714
Garvilland Wind Farm	Consented	5	A75	No – A75 only
Artfield Forest Wind farm	Consented	12	A75	No – A75 only
Blair Hill Wind Farm	Consideration	22	A75	No – A75 only
Shennanton Wind Farm	Consideration	8	A75	No – A75 only

10.61 Table 10.8 indicates that the only potential cumulative effects on the U52W Barnkirk Road and A714 are with Chirmorie Wind Farm. Information provided in the Chirmorie Wind Farm Access Proposal Transport Assessment indicates that the peak month of the 10 month construction period would be month eight, during which 46 two-way HGV movements and 82 two-way car / LGV movements are expected on the U25W and A714 per day.

10.62 It is unlikely that the peak months of construction for multiple developments would coincide. It should also be noted that Chirmorie Wind Farm has received consent for a variation whereby access would be facilitated from the A77. In this instance there would be no cumulative effects with Glenvernoch Wind Farm or the grid connection works.

10.63 A review of the theoretical road capacity was carried out in the Chirmorie Wind Farm Access Proposal Transport Assessment which indicates a 12-hour theoretical capacity on the U25W Barnkirk Road and A714 of 21,600 vehicles. The 2022 baseline plus Chirmorie construction traffic is estimated to equal 817 at the U52W and 934 at the A714 which leaves 96.2% and 95.7% spare capacity, respectively. If the peak Glenvernoch Wind Farm and Grid Connection traffic was to coincide with Chirmorie this would total less than 1,200 daily vehicle movements (depending on the connection route) on the U52W Barnkirk Road or

A714 (including baseline traffic), which means the roads would still have approximately 94% spare capacity.

10.64 A CTMP would ensure that there is communication between other construction sites to minimise impacts and would, in turn, ensure that larger traffic generating activities (such as stone importation or concrete pours) are staggered.

Cumulative Summary

10.65 Should construction timescales coincide for several schemes, a co-ordinated delivery schedule would be undertaken as part of the CTMP for each development to reduce the risk of potential significant cumulative effects. Specific detail relating to the overall increase in traffic volume would be addressed in the CTMP to minimise effects from increased traffic volumes.

10.66 The CTMP for each development would ensure that there are open lines of communication with TS, relevant local authorities and other stakeholders and developers as required to monitor the progress of the construction stages.

Summary

10.67 Based on this assessment it is not predicted that the grid connection would give rise to any significant traffic impacts (or associated environmental effects) on the study area road network and could be managed through a CTMP.

10.68 The construction phase of the grid connection is anticipated to last twelve months. During this time, there are estimated to be approximately 970 or 3,788 two-way HGV vehicle trips associated with the construction phase, depending on the chosen route. Construction of the grid connection would also generate approximately 60 daily non-HGV staff trips (worst case).

10.69 Following completion of the construction phase, the grid connection would require only very infrequent servicing/ maintenance visits which likely be facilitated by Light Goods Vehicles (LGVs) in order to transport the relevant technical equipment.

10.70 A Construction Traffic Management Plan (CTMP) would be produced and agreed with DGC prior to works commencing and would provide measures to minimise and control construction traffic impacts from the construction phase of the grid connection.

11 CUMULATIVE ASSESSMENT

Introduction

11.1 This section presents a cumulative assessment of the grid connection route in combination with the wind farm and other relevant cumulative schemes.

11.2 An assessment of cumulative effects should focus on whether there are any potential cumulative impacts which are reasonably foreseeable and which are likely to influence the decision making of the proposed development, rather than an assessment of every potential cumulative effect[3] which in practice means focussing on other nearby development proposals and the effects that might arise from the combined influence of those developments.

Scope and Methodology

11.3 The following scenarios are considered in the cumulative assessment:

- Scenario 1: likely significant environmental effects of the indicative grid connection routes;
- Scenario 2: likely significant environmental effects of the indicative grid connection routes in combination with Glenvernoch Wind Farm; and
- Scenario 3: likely significant environmental effects of the indicative Glenvernoch grid connection routes in combination with the wind farm and other relevant cumulative schemes.

11.4 Operational developments are included in the baseline. Consented developments which are expected to be constructed form part of the future baseline and are also included as such. However, where there is some uncertainty regarding the future construction of consented developments, they may be considered in the third scenario of the cumulative assessment.

11.5 Proposals in planning are considered in the third scenario where there is good reason to assume that the timing of decisions may be similar and significant cumulative effects are likely.

11.6 Proposals in scoping are not considered within the cumulative assessment, as there is no certainty that these proposals will progress to planning submissions and the nature of the proposed schemes may be subject to change.

11.7 The potential future grid connections associated with wind farm projects are considered in the third scenario where details of those connections are publicly available. Where no

[3] GLVIA page 121, paragraph 7.5

details are publicly available the potential future grid connections are not considered within the cumulative assessment.

11.8 Table 11.1 provides a list of developments within 20km of the Proposed Development that are included in the cumulative assessment for all topics except transport. Table 10.8 provides list of developments included within the cumulative assessment of transport.

Table 11.1: Other Wind Farm and Grid Connection Developments within 20km of the Proposed Development

Development	Status	Distance and direction to Glenvernoch Wind Farm
Glenvernoch Wind Farm	In Planning	0km
Airies Wind Farm	Operational	8km southwest
Kilgallioch Wind Farm	Operational	8km west
Artfield Fell Wind Farm	Operational	13km southwest
Balmurrie Fell Wind Farm	Operational	14km southwest
Glenchamber Wind Farm	Operational	14km southwest
Mark Hill Wind Farm	Operational	14km northwest
Mark Hill Grid Connection	Operational	14km northwest
Arecleoch Wind Farm	Operational	16km northwest
Arecleoch Grid Connection	Operational	14km northwest
Carscreugh Wind Farm	Operational	16km southwest
Barlockhart Wind Farm	Operational	19km southwest
Kilgallioch Extension	Under Construction	9km west
Arecleoch Extension	Under Construction	15km northwest
Stranoch 2	Under Construction	16km west
Chirmorie Wind Farm	Consented	14km northwest
Stranoch and Chirmorie Grid Connections	In Planning	14km northwest
Garvilland Wind Farm	Consented	17km southwest
Gass Wind Farm	Consented	11km southwest
Barlockhart Moor Extension	Consented	19km southwest
Knockodhar Wind Farm	In Planning	17km northwest
Blair Hill Wind Farm	In Planning	5km east
Craig Nab Wind Farm	In Planning	14km southwest
Shennanton Wind Farm	In Planning	6km southwest
Whiteminwhill Wind Farm	Scoping	10km northwest
Greyland Energy Park	Scoping	18km southwest

11.9 Table 11.2 provides the cumulative assessment on an individual topic basis across the three separate scenarios. Only those topics scoped into the assessment of the grid connection route are considered.

Table 10.2: Cumulative Assessment

Topic and Receptor	Scenario 1 Glenvernoch Wind Farm	Scenario 2 Glenvernoch Wind Farm and Grid Connection	Scenario 3 Glenvernoch Wind Farm, Grid Connection and other Cumulative Developments
Landscape and Visual Landscape character and visual receptors	**Landscape Character** **Construction Phase:** Major/ moderate significant effect to the part of LCT 174: Plateau Moorland with Forest where the Proposed Development would be located in. Moderate/ minor non-significant effect to parts of surrounding LCTs, including LCT 181: Rugged Uplands with Forest, LCT 172: Upland Fringe, and LCT 168: Drumlin Pasture in Moss and Moor Lowland **Operational Phase:** Major significant effects extending to approximately 4km at LCT 174: Plateau Moorland with Forest, and LCT 160: Narrow Wooded Valley. Major/ moderate significant effects extending to	No change	No change

	approximately 6km from the Proposed Development on LCT 172: Upland Fringe, and LCT 168: Drumlin Pasture in Moss and Moor Lowland **<u>Visual Receptors</u>** **Construction Phase:** Moderate non-significant temporary effect from several locations. **Operational Phase:** Significant effects from 8no. of the 20no. LVIA Viewpoints. Major significant effects at three viewpoints - Viewpoint 1: Southern Upland Way (Hill of Ochiltree), Viewpoint 4: Southern Upland Way (Bargrennan), and Viewpoint 19: The minor road.		
<u>Cultural Heritage</u> Non-designated assets	Assessment of effects on non-designated assets were scoped out due to the fact that their setting did not include the Proposed Development Area, nor were views that may potentially contain the Proposed Scheme an important element	No change	No change

	of the key character of these assets.		
Ecology Valued Ornithological Receptors (VORs) Valued Ecological Receptors (VERs)	At most, Minor adverse effect on VORs. At most, Moderate / Minor adverse effect on VERs.	No change	No change
Geology, Hydrology and Hydrogeology Pollution incidents, erosion and sedimentation	At most, Minor (not significant) adverse effect.	No change	No change
Geology, Hydrology and Hydrogeology Disturbance, Loss and Compaction of Peat, Carbon Rich Soils and Soils	Minor adverse effect	No change	No change
Geology, Hydrology and Hydrogeology Peat Stability	Minor adverse effect	No change	No change
Geology, Hydrology and Hydrogeology Surface Water and Groundwater Flow	At most, Minor adverse effect	No change	No change

Geology, Hydrology and Hydrogeology Flood Risk	Negligible impact	No change	No change
Geology, Hydrology and Hydrogeology Private Water Supplies	Negligible adverse effect (not significant)	No change	No change
Traffic and Transport	At most, Moderate / Minor (not significant)	No change	No change

12 NON-TECHNICAL SUMMARY

Introduction

12.1 This Additional Information (AI) is submitted in support of an application for consent under Section 36 of the Electricity Act 1989 by Energiekontor UK Ltd ("the Applicant") to the Energy Consents Unit (ECU) for thirteen wind turbines and associated infrastructure ("the Proposed Development") on land at Glenvernoch ("the Site"). The application was accompanied by an Environmental Impact Assessment Report ("the EIAR") as required under the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 ("the EIA Regulations").

12.2 Regulation 19 of the EIA Regulations directs that, in order to ensure the completeness and quality of the EIAR, the Scottish Ministers must (having regard in particular to current knowledge and methods of assessment) seek from the developer supplementary information about any matter in schedule 4 which in the opinion of Scottish Ministers is directly relevant to reaching a reasoned conclusion on the significant effects of the development on the environment.

12.3 This AI has been prepared by the Applicant with specialist input to provide details of the potential grid connection for the Proposed Development, together with assessment of the potentially significant environmental effects associated with the grid connection. The AI is based on the information that is known at the time of writing.

12.4 For the avoidance of doubt, permission is not sought for the grid connection itself as part of this application. The connection will be subject to its own separate consenting process in the future and would be constructed, owned and operated by SPEN.

12.5 It should be stressed at the outset that the final details of the grid connection are not currently known. A number of ongoing initiatives relating to electricity network planning may influence the eventual point of connection, connection date, connection voltage, routeing of the connection, and the balance of underground cable and overhead line.

Indicative Grid Connection Details

12.6 Glenvernoch wind farm does not benefit from a Gate 2 grid connection offer, therefore the grid connection corridor for the Proposed Development is unknown. As such, the approach taken to assist this assessment has been to identify the two nearest substations to the site (one to the north and one to the south) and identify a potential route corridor for each from the Glenvernoch substation. It should be stressed however, that these route corridors are hypothetical until SPEN has confirmed how the transmission network will be extended to reach the PoC at Glenvernoch wind farm.

12.7 The nearest grid connection point to the south is the Newton Stewart GSP, located approximately 8km south of the site via the local road network. The nearest grid connection point to the north is the Pinwherry Primary Substation, approximately 19km north west of the site via the local road network.

12.8 It is assumed that given the proximity to the Newton Stewart GSP, then a route to connection here could be achieved entirely via underground cabling at 132kV voltage along the local road network via the A714 and U52W Barnkirk Road.

12.9 With regard to the Pinwherry Primary Substation, as this is 13 miles north west via the local road network, the route to connection would likely be a mix of underground cabling along the local road network via the A714 and overhead lines at 132kV voltage.

Overhead Lines

12.10 With an overhead line, conductors (or wires) are suspended at a specified height above ground and supported by wooden poles, spaced at intervals. Conductors can be made either of aluminium or steel strands.

12.11 Wood poles can be used for single circuit lines operating at 33kV and 132kV. Wood poles are fabricated from pressure impregnated softwood, treated with a preservative to prevent damage to structural integrity.

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

12.13 There are three types of pole:

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

12.14 Span lengths between poles average between 80m and 120m but can go up to 120m. The average height for a pole varies from 14m to 16m. New wood poles are dark brown in colour and weather over the years to a light grey.

Underground Cables

12.15 With an underground cable, the conductors are encased in insulated material and buried in a backfilled trench of suitable depth and width. The number of cables, and the depth and width of the trench, depends on a range of factors including voltage, number of circuits and the rating of the cables to be installed.

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

12.17 Open cut trenching is the most frequently used construction method for cable installation. However, in crossing under watercourses or motorways for example, a trenchless technique such as directional drilling may be used. Works at each section commonly consist of the excavation of the cable trench by mechanical excavators, the storage of excavated material, cable laying, the backfilling of the trench and surface reinstatement. Sections of cable are joined together at cable jointing pits, with the location of these dictated by a number of factors including cable size/length and ongoing access requirements. Manhole covers above jointing pits enable access just below the surface for routine maintenance. Underground cables are marked on service maps provided to other utilities and are installed with surface marker tape to warn of their presence below the ground. If lines are decommissioned, cables can either be left in situ or removed carefully by opening up the ground.

12.18 The connection works period would be unlikely to take longer than 12 months in total and works would be subject to SPEN's established construction methodology to avoid or minimise any adverse construction effects. Temporary traffic management measures would be deployed as necessary where works are due to take place within or adjacent to the public highway.

Environmental Effects Scoped In

12.19 Based on the currently understood parameters of the likely grid connection and the associated high level of uncertainty, a proportionate assessment of environmental effects is provided for the following topics:

- Landscape and visual amenity;
- Cultural heritage and archaeology;
- Ecology;
- Geology, hydrology and hydrogeology;
- Forestry; and
- Traffic and transport.

12.20 These topics are considered separately in the following sections of this AI.

Environmental Effects Scoped Out

12.21 The following topics are scoped out of the assessment as it is considered that no significant environmental effects are likely:

- Air quality – Due to the short term and localised nature of the construction and decommissioning phases, any temporary impacts to air quality, including from construction traffic, are likely to be minimal and locally concentrated. Operational impacts are expected to be negligible as the activities associated with

maintenance will be sporadic. Consequently, no significant effects are predicted in relation to air quality.

- Construction and operational noise – Due to the short term and localised nature of the construction and decommissioning phases of the grid connection, any temporary noise created (including from construction traffic) is likely to be minimal and locally concentrated. During operation, overhead lines can create audible noise depending on the operating voltage and the type of conductor system used. For connections at 132kV and below however, audibility of noise would be limited to an observer directly below the line. Consequently, no significant effects are predicted in relation to noise.

- Land quality and contamination – During construction and maintenance of the grid connection there could be a potential risk of accidental fuel or oil spills from the operation of plant and machinery, which could potentially lead to pollution of nearby watercourses or sensitive habitats. To mitigate this, SPEN would follow its established construction guidance and would be regulated under the consent for the grid connection. Relevant Guidance for Pollution Prevention (GPP) documents will also be strictly followed to minimise risks. The use, storage, transport and handling of materials on site will comply with relevant legislation and best practice, including adherence to Control of Substances Hazardous to Health (COSHH) regulations and the appointed contractor will prepare and adhere to a Materials Management Plan (MMP) to mitigate any potential risks effectively. Given these robust preventative measures to manage and mitigate potential impacts, no significant effects are predicted in relation to land quality and contamination.

- Material assets and waste – The grid connection is not anticipated to generate significant quantities of waste during construction or operation. SPEN would adopt their established practices in effective waste management to promote the reduction, reuse and recycling of waste material. Mitigation measures would be put in place to further minimise the potential environmental effects associated with waste storage and transportation. Consequently, no significant effects are predicted in relation to material assets and waste.

- Climate – It is considered unlikely that the grid connection would lead to significant effects on climate or the ability of receptors to adapt to climate change.

- Population and human health – Given that no significant effects are predicted in relation to noise, air quality and socio-economics, and that noise and dust nuisances will be adequately mitigated through the implementation of good practice construction methods and mitigation, it is considered that no significant effects are likely to occur in relation to population and human health.

- Major accidents and disasters – The grid connection is not located in an area with a history of natural disasters and the operation of the connection would be managed in line with the requirements of a number of health and safety related regulations. Consequently, no significant effects are predicted in relation to major accidents and disasters.

- Light, heat and radiation – Electromagnetic fields are produced by electrical charges. Exposure guidelines developed by the International Commission on Non-Ionising Radiation Protection (ICNIRP) ensure the protection of human health from dangerous levels of occupational and public exposure. These guidelines have been adopted by Public Health England, which the Sottish Government follows on matters relating to electromagnetic fields. The grid connection voltage and equipment is considered by the Government to be inherently compliant with exposure limits due to design. During construction, temporary pollution from light and heat sources would be minimised through adherence to standard best practice construction practices and working hours that would be implemented by the appointed contractor. Consequently, no significant effects are predicted in relation to light, heat and radiation.

- Socio-economics, recreation and tourism – The construction and decommissioning phases are anticipated to cause minimal disturbance to recreational activities, localised to small working areas as construction progresses. Post-construction, use of the land would continue as normal with the exception of the occasional need for maintenance. Due to the relatively short construction period and the scale of the grid connection, impacts to employment and local income generation are not anticipated to be significant, and there would be a small but not significant benefit due to the capital expenditure associated with the grid connection. Consequently, no significant effects are predicted in relation to socio-economics, recreation and tourism.

Assessment of Effects

Landscape and Visual

12.22 The potential grid connection (as illustrated on **Figure 5.1**) is considered to result in very small changes to landscape and visual effects compared with the Proposed Development as assessed in the original LVIA. The landscape and visual effects resulting from the addition of the grid connection would be highly limited in extent or nature and not result in any additional significant landscape and visual effects.

12.23 Indeed, from many locations within the 20km LVIA study area, the route of the overhead line would be difficult to perceive. Whilst recognised that individual poles may be more apparent in localised locations, in the main, this is not considered to alter the judgements on the effects from the Proposed Development as set out in the original LVIA in any substantive manner as the proposed wind turbines would represent the principal source of landscape and visual change, introducing large-scale vertical elements within the receiving landscape.

12.24 In this context, there is not considered to be any evidence from a landscape and visual perspective that would suggest that the addition of a grid connection would result in any significant effects upon landscape and visual receptors that are materially different to those already identified for the Proposed Development in the original LVIA.

12.25 A detailed LVIA of the final route would be required to be conducted through extensive field survey, consultation, mapping, and visualisations to inform the future Section 37 application for the grid connection.

Cultural Heritage

12.26 At this stage, there is not considered to be any evidence to suggest that the addition of a grid connection would result in any significant effects upon cultural heritage or archaeology.

12.27 While there are potential for below ground impacts associated with the proposed underground connections, and elements of infrastructure associated with the proposed overhead connection, it is not anticipated that any effects would be greater than **Minor adverse**, at most. It is also anticipated that that any impacts could be largely avoided design measures, or could be mitigated through archaeological survey and/or monitoring.

12.28 A detailed Cultural Heritage Assessment of the final route would be required to be conducted through field survey, consultation, mapping, and potentially visualisations to inform the Section 37 application for consent.

Ecology

12.29 No likely significant effects on ecology, biodiversity and ornithology are predicted as a result of the northern grid connection route or the southern grid connection route. The mitigation measures outlined follow SPEN's established construction practices and are likely to be proposed on a precautionary basis as part of any future planning application for the defined grid connection route once it is known. Subject to mitigation measures, no likely significant residual effects are predicted

Geology, Hydrology and Hydrogeology

12.30 The desk-based assessment identified the principal geological, hydrological and hydrogeological features and constraints relevant to the indicative grid connection routes. Outline details of potential effects reflecting the current uncertainty in design details have been identified and described, with no significant adverse effects anticipated (subject to appropriate surveys, good practice mitigation and avoidance of sensitive areas where possible).

12.31 It is incumbent upon SPEN to undertake sufficiently detailed surveys and corresponding assessments to inform future mitigation requirements.

Forestry

12.32 Compensatory planting would be provided for any areas of felling, ensuring there would be no net loss of forestry. Given that there would be no overall loss of woodland the overall effect would be not significant.

Traffic and Transport

12.33 Based on this assessment it is not predicted that the grid connection would give rise to any significant traffic impacts (or associated environmental effects) on the study area road network and could be managed through a CTMP.

12.34 The construction phase of the grid connection is anticipated to last twelve months. During this time, there are estimated to be approximately 970 or 3,788 two-way HGV vehicle trips associated with the construction phase, depending on the chosen route. Construction of the grid connection would also generate approximately 60 daily non-HGV staff trips (worst case).

12.35 Following completion of the construction phase, the grid connection would require only very infrequent servicing/ maintenance visits which likely be facilitated by Light Goods Vehicles (LGVs) in order to transport the relevant technical equipment.

12.36 A Construction Traffic Management Plan (CTMP) would be produced and agreed with DGC prior to works commencing and would provide measures to minimise and control construction traffic impacts from the construction phase of the grid connection.

Cumulative Effects

12.37 While the final grid connection route remains unknown, it is anticipated that once it has been defined and is under construction, cumulative effects arising from the grid connection may overlap with the construction of the Proposed Development. In particular, there is potential for temporary cumulative effects where activities occur at the same time and place (for example, construction traffic on the local road network and short-term effects associated with ground disturbance, habitat disturbance and pollution risk). However, given the lack of any likely significant effects identified for the indicative grid connection routes presented in this assessment, in no case would the likely significant effects identified for other cumulative developments – including Glenvernoch Wind Farm – be increased by the in-combination effects with the grid connection once it is defined.

Appendix 3.1 – 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.

Note of Rule 1

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

(b) Areas of high amenity value require to be established on a project-by-project basis considering Schedule 9 to The Electricity Act 1989, Scottish, English and Welsh planning policies, Circulars and Planning Advice and the spatial extent of areas identified.

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

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

Rule 2: Avoid smaller areas of high amenity value, or scientific interest by deviation; provided that this can be done without using too many angle towers, i.e. the more massive structures which are used when lines change direction

Note on Rule 2

(a) Small areas of highest amenity value not included in Rule 1 as a result of their spatial extent should be identified along with other areas of regional or local high amenity value identified from development plans.

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

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

Rule 3: Other things being equal, choose the most direct line, with no sharp changes of direction and thus with few angle towers.

Note on Rule 3

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

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

Rule 4: Choose tree and hill backgrounds in preference to sky backgrounds, where 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

Notes on Rules 4 and 5

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

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

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

woodland or commercial forestry, discussions should be undertaken with the relevant forestry regulator.

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

Rule 6: In country which is flat and sparsely planted, keep the high voltage lines as far as possible independent of smaller lines, converging routes, distribution poles and other masts, wires and cables, so as to avoid a concatenation or 'wirescape'.

Note on Rule 6

(a) In all locations minimise confusing appearance.

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

Rule 7: Approach urban areas through industrial zones, where they exist; and when pleasant residential and recreational land intervenes between the approach line and the substation, go carefully into the comparative costs of undergrounding, for lines other than those of the highest voltage.

Note on Rule 7

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

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

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

Explanatory Note on Rule 7

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

Supplementary Notes

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

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

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

1 Interpretation of The Holford Rules 1 and 2

1.1 Introduction

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

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

1.2 Designations

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

1.3 Amenity

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

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

1.4 Hierarchy of Amenity Value

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

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

1.5 Major and Smaller Areas

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

1.6 Conclusion

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

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

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

Environmental and Planning Designations – Examples of designations to be taken into account in the routeing of new high voltage transmission lines

1. Major Areas of Highest Amenity Value

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

- Special Areas of Conservation
- Special Protection Areas
- Ramsar Sites
- National Scenic Areas (Scotland)
- Areas of Outstanding Natural Beauty (England and Wales)
- National Parks
- Wild Land Areas
- National Nature Reserves

- Sites of Special Scientific Interest
- Scheduled Monuments
- Listed Buildings
- Conservation Areas
- World Heritage Sites
- Gardens and Designed Landscapes
- Historic Battlefields
- Heritage Coasts

2. Other Smaller Areas of High Amenity Value

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

- Areas of Great Landscape Value
- Regional Scenic Areas
- Regional Parks
- Country Parks

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

3. Flora and Fauna

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

4. Area of Historic, Archaeological or Architectural Value

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

- Scheduled Monuments
- Listed Buildings, especially Grade A and Grade B
- Conservation Areas
- Gardens and Designed Landscapes

- Registered Historic Landscapes

5. Green Belts

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

Further Notes on Clarification to The Holford Rules

Line Routeing and People

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

The following notes are intended to reflect this.

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

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

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

Supplementary Notes on the Siting of Substations

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

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

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

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

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

(f) When siting substations take account of the impacts of line connections that will need to be madeAppendix 3.1 – The Holford Rules