SP Energy Networks

Euchanhead Overhead Line Grid Connection

Routeing and Consultation Document

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EXECUTIVE SUMMARY

SP Energy Networks (SPEN) has been contracted by National Grid Electricity Transmission (NGET) to connect the proposed Euchanhead Renewable Energy Development (RED) to the national grid. SPEN proposes to achieve this by providing a grid connection between the planned Euchanhead RED substation and the consented Lorg Wind Farm substation, which will be connected to the grid. These renewable energy developments are located in Dumfries and Galloway, between the towns of Carsphairn and Sanquhar, near the council boundary with East Ayrshire.

The wood poles will likely be H poles (rather than single poles) of between 11 and 18 m high, with a typical height of 13m, with typical spans of 90 m, although the design parameters will depend on terrain and altitude and may be subject to change within agreed limits of deviation.

This document presents information on the approach taken in the identification of route options for the proposed connection, appraisal methodology, and the findings of the appraisals and assessments, concluding in the selection of the preferred option.

The purpose of this document is two-fold:

- To present the information and route options that have been identified by SPEN for the planned Euchanhead RED to the consented Lorg Wind Farm substation, and
- To elicit comments from and participation of the key stakeholders, to inform SPEN further and aid in the selection of a proposed OHL grid connection route.

The approach to developing and assessing the route options follows SPEN's two stage approach to routeing , as follows:

- Stage 1: Development and appraisal of route options to select a preferred route including consultation with key stakeholders to establish a proposed route.
- Stage 2: Once a final proposed route has been selected, the project will move forward into the consenting process under the Electricity Act, 1989.

Stage 1 is currently underway, with a preferred route having been identified which provides a technically feasible and economically viable continuous overhead line between the planned Euchanhead collector point and the consented Lorg Wind Farm substation whilst taking into consideration environmental, technical and economic constraints. This means that the proposed route would be the one that on balance, causes the least disturbance to the environment and the people who live, work and enjoy outdoor recreation within it. SPEN attach great importance to the effect the work could have on the environment and local communities and are keen to engage with key stakeholders so that views can be taken into account through the development of the project.

SPEN would like to request comments and input from key stakeholders to the route selection for the Euchanhead OHL grid connection. All comments and input are highly valued and appreciated. It would be appreciated if the following could be taken into consideration when commenting:

- Are there any comments regarding the rationale for the project, as set out within this route selection consultation document?
- Are there any comments regarding the approach to the selection of the preferred route as set out in this route selection consultation document?

- Are there any factors that may have been overlooked, or given either too much or insufficient consideration during the route selection process?

All comments received will inform further consideration of the preferred route alignment and the selection of a proposed route alignment, which will be taken forward for more detailed environmental assessment prior to submission of an application for consent. The applications will be developed for submission in late 2022 / early 2023.

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1 INTRODUCTION

1.1 Project background

SP Energy Networks (SPEN) has been contracted by National Grid Electricity Transmission (NGET) to connect the proposed Euchanhead Renewable Energy Development (RED) to the national grid. SPEN proposes to achieve this by providing a grid connection between the planned Euchanhead RED substation and the consented Lorg Wind Farm substation, which will be connected to the grid. These renewable energy developments are located between the towns of Carsphairn and Sanquhar in Dumfries and Galloway , as can be seen on Figure 1 in Appendix 1. The Lorg Wind Farm application boundary straddles the boundary between East Ayrshire and Dumfries and Galloway.

Should the Euchanhead RED be granted consent, its point of connection (POC) will be located at national grid reference (NGR) E267463, N603248, and the Lorg substation collector point will be located at NGR E267639, N599635. Based on these fixed start and end points, a study area was delineated within which it was anticipated it would be possible to identify and appraise several options for routeing an overhead line. The locations of the POCs and the study area boundary can be seen on Figures 1 and 2 in Appendix 1.

The study area falls in the Southern Uplands, and will be near three wind farms which were at the following development stages at the time of writing of this report:

- Lorg Wind Farm:
    - An application for nine wind turbines, three of which would be 130 m to tip, and the remaining six would be 149.9 m to tip, was consented in 2018 by Dumfries and Galloway (planning application reference 15/P/2/0337) and East Ayrshire (planning application reference 15/0935/PP/) Councils (Planning application reference no. 15/P/2/0337[1]).
    - A Scoping Report was submitted to the Scottish Ministers in July 2021 for a new >50 MW proposal for this wind farm. The scoping layout shows twelve wind turbines up to 200 m to tip, ten of which would be located within Dumfries and Galloway, and two within East Ayrshire.
- Euchanhead Renewable Energy Development (Reference no. ECU00002141[2]) – an application for Section 36 consent under the Electricity Act 1989 was submitted to the Scottish Minsters by the developers at the end of October 2020 and is currently still in the planning system;
- Sanquhar II Community Wind Farm (Case reference: WIN-170-2006) – this application for Section 36 consent under the Electricity Act 1989 was refused but has been referred to the Planning and Environmental Appeals Division of the Scottish Government and will be subject to a public enquiry commencing October 2021[3], although this date is subject to change and is to be confirmed.

[1] https://eaccess.dumgal.gov.uk/online-applications/applicationDetails.do?activeTab=summary&keyVal=ZZZW6HGBTA134 [Accessed 04/06/2021]

[2] https://www.energyconsents.scot/ApplicationDetails.aspx?cr=ECU00002141&T=0 [Accessed 04/06/2021]

[3] https://www.dpea.scotland.gov.uk/CaseDetails.aspx?ID=121337 [Accessed 02/06/2021]

Although these wind farms and renewable energy developments are at this stage still in the planning system, it is anticipated that Euchanhead RED grid connection will be required to be constructed and ready for connection by 2026. Due to the close location of the study area to three proposed renewable energy developments, significant, recent and detailed environmental information is publicly available for most of the study area, and has been sourced from the Environmental Impact Assessment Reports and Further Environmental Information Reports that were submitted as part of the planning applications (see also Section 6 - References). However, to ensure that sufficient detailed and up to date information is available for the study area, several additional environmental surveys and desk-based assessments were conducted, and together with the existing information from the surrounding renewable energy developments and technical constraints have been used to identify and appraise six potential route options for the proposed overhead line grid connection. This document presents the potential route options, information that was used to identify and appraise each route option, and the preferred route, all of which have been identified taking economic, technical and environmental factors into consideration.

SPEN's approach to routeing of connection infrastructure includes consultation with stakeholders and the wider public to establish a proposed route which would be taken forward into the EIA screening phase. The purpose of this document is therefore two-fold:

- To present the information and route options that have been identified by SPEN for the planned Euchanhead OHL grid connection, and
- To elicit comments and feedback from, and participation of, the stakeholders to inform SPEN further and aid in the selection of a proposed grid connection route.

SPEN are committed to minimising the potential impacts of the planned Euchanhead OHL grid connection both on the receiving environment and the people who live, work and enjoy outdoor recreation within or near the study area. Best practice requires environmental impacts to be managed as proactively as possible, and SPEN are committed to doing so through design as far as practicable. Consistent with this, SPEN are keen to engage with key stakeholders, with views taken forward to the next stage in the consenting process.

1.2 Project description

1.2.1 Grid connection design and infrastructure

SPEN's 'Approach to Routeing and Environmental Impact Assessment' document for major electrical infrastructure (2020) seeks a continuous overhead line solution for all transmission connections and only where there are exceptional constraints are underground cables considered an acceptable design option. Such constraints can be found in urban areas and in rural areas of the highest scenic and amenity value.

On this basis, the key design assumption is that the Euchanhead grid connection will be a continuous overhead line (OHL) connection throughout. Should the appraisal identify any areas where a proposed OHL is likely to give rise to unacceptable effects, alternative routes will be considered and only once all reasonable OHL alternatives have been exhausted would SPEN consider the use of underground cable. If, in

certain circumstances, it is determined that an underground cable is required instead of an overhead line, the approach is to minimise the length of underground cable necessary to overcome the constraint to overhead line routeing, consistent with a balance between technical and economic viability, deliverability and environmental considerations. It is not uncommon for a length of cable to be required to enter or exit a substation.

SPEN has identified that the planned grid connection will require a 132 kV OHL connection and will transmit electricity generated at the planned Euchanhead RED from the POC at the planned Euchanhead substation, delivering it to the collector point at the consented Lorg Wind Farm substation. The POC and collector points are shown on the figures in Appendix 1.

1.2.2 OHL infrastructure

The design parameters and constraints of the 132 kV OHL have been preliminarily identified as set out in Table 1.1, below:

Table 1.1: Technical constraints directing the design of the proposed OHL

Technical constraint	Description	Details
Design	OHL Design	Trident 132 kV H-Pole
	Structure height	Typical 13 m, max. 18 m, min. 11 m
	Span lengths	Typical 90 m, max. 110 m, min. 70 m
	Corridor required for construction	Typical 60 m
Environmental	Slope angle tolerance for design	<22°
	Maximum altitude for design	<500 m AOD
		At altitudes over 400 m AOD, spans will be required to be shorter than average, typically less than 80 m.
Infrastructure	Stand-off required from wind turbines	Falling distance (tip height) + 10 %
	Stand-off required from other infrastructure as appropriate	Stand off from other infrastructure would require advice from the appropriate body.

The size of poles and span lengths will vary depending on several factors, in line with industry standard ENA Specification 43-50 ISSUE 2. The OHL route is above 400 m AOD and will therefore be likely to require construction using H poles (rather than single poles), with a span length of around 70 m – 110 m and pole heights ranging from 11 m – 18 m with a typical height of 13 m. This has been used as the basis for identification of the preferred route, however, the precise pole configuration, height and the spans will be determined after a detailed line design following confirmation of the proposed route.

The wood pole will support three conductors (wires) in a horizontal flat formation. Figures 1.1 to 1.3, below, show some examples of typical trident wood poles, section

and terminal structures, and it is anticipated that similar poles and structures would be used for the Euchanhead OHL grid connection.

Subject to confirmation of the proposed route for the new OHL, detailed survey work will be carried out to inform the proposed positions and heights of each individual wood pole.

Figure 1.1: Example of a typical intermediate section of a trident wood pole supporting a 132 kV overhead line (SPEN, 2021)

Figure 1.2: Example of a typical 132 kV H-pole trident overhead line (SPEN, 2021)

Figure 1.3: Example of typical terminal structures of a trident 132 kV overhead line (SPEN, 2019)

1.2.2.1 Construction of OHL infrastructure

OHL construction typically follows a standard sequence of events as follows:

- Prepare access to the pole locations;
- Erect wood poles;
- String conductors; and
- Reinstate pole sites and any other disturbed ground.

Temporary accesses will be constructed, as necessary, and laydown /storage areas established to facilitate development depending on ground conditions, it may be possible to access work locations by tracked/low ground pressure vehicles, however trackway panels or temporary stone roads may be required in some circumstances. Following commissioning of the overhead line, all equipment and temporary access of construction areas will be removed with the land being reinstated to the satisfaction of the landowner.

For wood pole line construction, the 'poles' are typically erected using normal agricultural machinery such as an excavator with a lifting arm. A tracked excavator and low ground-pressure vehicles, (e.g. tractor, ATV, quad bikes) are used to deliver, assemble and erect each wood pole structure at each location. The erection of the wood poles requires a typical excavation of 3 m^2 x 2 m deep. The excavated material is segregated into appropriate layers and used for backfilling. It is relatively rare for concrete or other backfill to be used in the foundations of wood poles. This would normally only be used where ground conditions are particularly unstable (identified by site investigations). An excavator is typically used to hoist the assembled structure into position and once the structure has been braced in position the trench is backfilled.

Stringing of conductors. The conductors would be winched to/pulled from section poles; these poles therefore require access for heavy vehicles to transport the conductor drums and large winches. Where the overhead line crosses a road a scaffold tunnel would be used to protect the vehicles from the works. Existing distribution lines would be either switched off, deviated or protected using 'live line' scaffolds. Reinstatement of pole sites and removal and reinstatement of temporary infrastructure sites.

In all cases, every effort is made to cause the least disturbance to landowners and local residents during construction. Following completion all ground disturbance resulting from the construction of the new line is reinstated.

1.2.2.2 Maintenance of OHL infrastructure

Once operational, the OHL would be monitored and inspected by SPEN overhead linesmen, most likely patrolling on foot. Where maintenance is required, SPEN standard procedures would be followed, but would limit the use of vehicles to low ground pressure vehicles and would adhere to the same principles of reinstatement of disturbed ground to the satisfaction of the landowner, and in compliance with conditions imposed by any consent / licence granted by the authorities prior to the commencement of construction. Information pertaining to any sensitive environmental aspects along the route of the OHL and any consent and/or licence conditions will be passed on to SPEN field operatives ahead of maintenance patrols and repair work to minimise potential impacts during the operational phase of the OHL.

1.2.3 OHL routeing approach

As mentioned previously, the purpose of this document is to identify and appraise route options for the Euchanhead OHL grid connection. These route options are discussed in detail in Section 4 of this report, but it should be noted that SPEN adopts a structured approach to OHL routeing that takes account of established practice for line routeing, consultation with stakeholders, technical requirements and potential environmental effects. SPEN's approach to overhead line routeing is set out in SP Energy Networks document titled, "Approach to Routeing and Environmental Impact Assessment" (February 2020).

SPEN's overall approach is based on the premise that the major effect of an overhead line is visual and SPEN's approach to OHL routeing is to reduce the degree of visual intrusion as far as practicable by careful routeing. A reduction in visual intrusion can be achieved by routeing the line to fit the topography, by using topography and trees to provide screening and/or background, and by routeing the line at a distance from settlements and roads. In addition, a well-routed line considers other environmental and technical considerations and would avoid, wherever possible, the most sensitive and valued natural and man-made features. SPEN's approach to routeing has been followed to identify potential route options for the planned Euchanhead OHL grid connection. Section 2 of this report discusses the methodology used to identify possible route options.

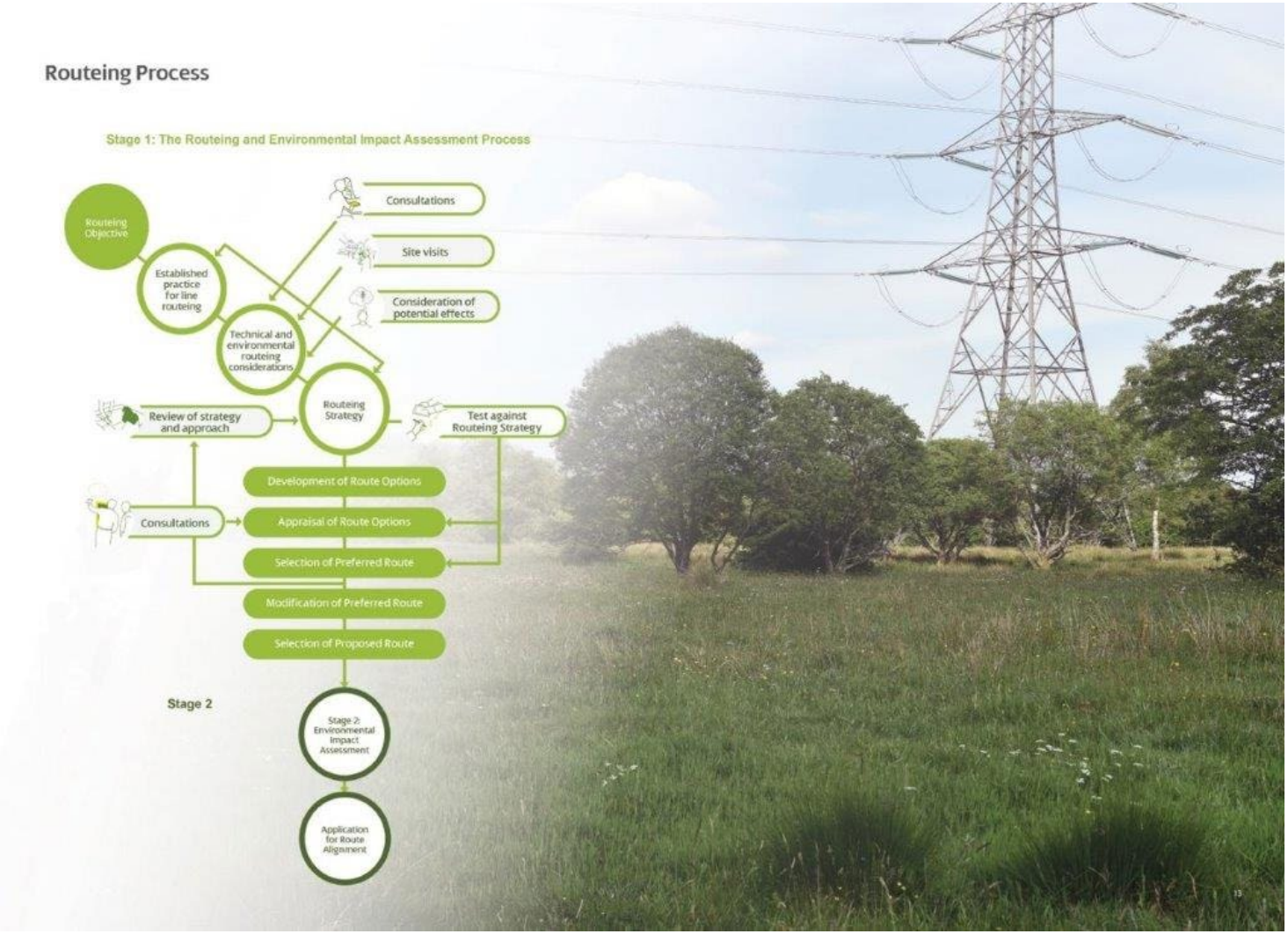

Figure 1.4: Routing process diagram (SPEN, 2020)

1.3 Legal and planning context

1.3.1 Overarching legislation

The overarching legislation applicable to the planned Euchanhead OHL grid connection is the Electricity Act 1989. Scottish Power Transmission's licensed businesses are authorised to transmit and distribute electricity within its network areas under the Electricity Act 1989. As such, SPEN has a statutory obligation to carry out the duties outlined within the Electricity Act 1989.

As a transmission licence holder for southern Scotland, SPEN are required under Section 9(2) of the Electricity Act 1989 to:

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

Under Schedule 9 of the Electricity Act 1989, SPEN has a duty to ensure that all its developments: "have regard to the desirability of preserving natural beauty, of conserving flora, fauna and geological of physiological features or special interest of protected sites, buildings, objects of architectural, historical or archaeological interest; and to do what it reasonably can to mitigate any effects which the proposals would have on the natural beauty of the countryside or any such flora, fauna, features, sites, buildings or objects."

SPEN recognises that its installations, whether overhead or underground, can have an effect on the environment, and seek to minimise this through careful routeing and execution of its projects. At this early stage, the design of the planned Euchanhead OHL is directed by the consideration of both technical and potential environmental constraints to identify possible routes for the OHL, as presented in this consultation document.

1.3.2 Consenting Requirements

Once the route options have been identified and appraised (see Section 4 of this report), and a final proposed route has been selected, the project will move forward into the consenting process under the Electricity Act, 1989.

1.3.2.1 Electricity Act 1989

Section 37 of the Electricity Act 1989 requires that, except for certain specific examples, all electricity lines exceeding 20 kV will require consent to be granted by the Scottish Ministers. This 'Section 37 consent' gives approval to install, and keep installed, an overhead electricity line. As the planned Euchanhead OHL grid connection will be a 132 kV line, consent will be required under Section 37 of the Electricity Act 1989.

1.3.2.2 The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2019

The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2019 require that, before consent is granted for certain developments, an Environmental Impact Assessment (EIA) must be undertaken. The EIA Regulations set out the types of development that are always subject to an EIA (Schedule 1

developments) and other developments which may require an EIA if they exceed certain thresholds and are likely to give rise to significant environmental effects (Schedule 2 developments). The planned Euchanhead OHL grid connection currently falls under Schedule 2:

"(2) an electric line installed above ground -

(c) the purpose of which installation is to connect the electric line to a generating station the construction or operation of which requires consent under Section 36 of the Electricity Act 1989."

It is SPEN's intention to submit an EIA screening application to the Scottish Ministers as part of the application for consent under Section 37 of the Electricity Act (1989) for the Euchanhead OHL grid connection. The screening response may confirm that EIA is not a requirement. In this context an environmental appraisal would be undertaken to support the Section 37 application instead.

1.3.2.3 Town and Country Planning (Scotland) Act 1997 and The Planning etc. (Scotland) Act 2006

Section 57 of the Town & Country Planning (Scotland) Act 1997 as amended by The Planning etc. (Scotland) Act 2006 provides that ''Planning permission may also be deemed to be granted in the case of development with government authorisation''. In certain circumstances, deemed planning permission may include works that are 'ancillary' or necessary to the operation of the overhead line such as cable sealing end compounds.

Some forms of development, including underground cables, are typically classed as 'permitted development' under the Town and Country Planning (General Permitted Development) (Scotland) Order 1992 (as amended). Developments classified as permitted development may automatically be granted planning permission, by statutory order, and do not require submission of a planning application to the local planning authority.

Sections 25 and 37 (2) of the Town and Country Planning (Scotland) Act 1997 (as amended by the Planning etc. (Scotland) Act 2006) require that planning decisions are made in accordance with the development plan, unless material considerations indicate otherwise. The Dumfries and Galloway Local Development Plan (LDP) 2 (adopted in October 2019)[4] and Policies are discussed below in Section 1.3.3.

1.3.3 Planning considerations

The proposed Euchanhead OHL development will contribute to energy infrastructure, without which new renewable energy generation projects would be unable to contribute towards achieving these targets.

Sections 25 and 37 (2) of the Town and Country Planning (Scotland) Act 1997 (as amended by the Planning etc. (Scotland) Act 2006) require that planning decisions

[4] Dumfries and Galloway Local Development Plan 2, adopted October 2019. https://www.dumgal.gov.uk/media/21885/Adopted-Local-Development-Plan-2/pdf/Adopted_LDP2_OCTOBER_2019_web_version.pdf?m=637060550180970000 [Accessed 06/06/2021]

are made in accordance with the development plan, unless material considerations indicate otherwise.

1.3.3.1 *Local Development Plan and Policy*

The Dumfries and Galloway LDP 2 does not directly identify electricity transmission, but addresses renewable energy generation and infrastructure development within the council. Policies IN1 and IN2 of the Dumfries and Galloway LDP2 states that the council will support renewable energy generation and/or storage proposals and wind energy proposals that are located, sited and designed appropriately. The acceptability of any proposed development will be assessed against several criteria, including landscape and visual impacts and cumulative impacts, to name but two.

The Dumfries and Galloway Council's Wind Energy Supplementary Guidance[5] discusses electricity cable connections in paragraphs Q5 and Q6, stating (amongst others) that where power lines cannot be undergrounded careful consideration should be given to the visual impacts of any pylons and the suitability of any route. Paragraph Q7 also highlights the need to consider the visual impact of the grid connection, especially where overland pylons are proposed.

It is therefore reasonable to expect the Euchanhead OHL grid connection to be supported by the local authority, providing the environmental impacts of the project can be demonstrated to be acceptable to the consenting authority.

1.3.3.2 *Other policy material considerations*

Policy within the following are also considered material considerations:

- The National Planning Framework 3 (NPF3) (2014);
- Scottish Planning Policy (SPP) (2020);
- The Climate Change Scotland Act (2009), as amended by the Climate Change (Emissions Reduction Targets)(Scotland) Act 2019;
- The Future of Energy in Scotland (2017);
- Planning Advice Notes (PANs); and
- Scottish Government Web-based renewable energy advice.

In October 2020, the UK government announced its commitment towards net zero emissions by 2050. This forms part of the government's "wider efforts to ensure the UK meets the legally binding target of reaching net zero emissions by 2050 and build back greener from coronavirus". The Scottish Government's Energy Strategy (January 2021), highlights the vital role that energy networks will play in meeting Scotland's decarbonisation and net zero targets. It also identified that infrastructure capable of delivering net zero needs to be delivered recognising and rewarding the impact of efficient, timely investment on our economy, on the development of skilled jobs, and the development of a dynamic supply chain, while ultimately providing a good deal for energy consumers. The Scottish Government's Climate Change Plan Update (December 2020) identified that the transition of our energy system to net zero

[5] Dumfries and Galloway Council Local Development plan 2 Wind Energy Development: Development Management Considerations Supplementary Guidance – February 2020. https://www.dumgal.gov.uk/media/22639/Wind-Energy-Development-Development-Management-Considerations/pdf/Wind_Energy_SG_Final_PDF_February_2020_Version.pdf?m=637184984806630000 [Accessed 03/06/2021]

presents Scotland's businesses with many opportunities to create a competitive advantage whilst creating jobs.

The connection of renewable energy developments such as the Euchanhead RED the grid would ensure that the energy generated by the RED is able to contribute to the target of net zero carbon emissions.

2 ROUTEING METHODOLOGY

The methodology used to identify route options for the planned Euchanhead OHL grid connection is discussed below and is consistent with SPEN's approach to routeing (see Section 1.2.3 of this report). SPEN's guidance broadly recommends that projects should adhere to the following process:

- Set the Routeing Objective;
- Utilise established practice for OHL routeing;
- Consider potential effects, taking account of technical & environmental routeing considerations;
- Develop project specific Routeing Strategy;
- Develop Route Options;
- Appraise route options and select preferred route;
- Consult on the preferred route
- Modify the preferred route, if necessary or required; and
- Select the proposed route.

The proposed route selection is then taken forward to the next stage in the consenting process and is used as a basis for an application for consent. The way in which the routeing assessment has been undertaken is described in the sections below.

2.1 Routeing Objective

The objective of the route selection process is to identify a technically feasible and economically viable OHL route for a continuous 132 kV overhead line connection between the planned Euchanhead RED point of connection and the consented Lorg Substation collection point, which causes least disturbance to people and the environment and the people who live, work and enjoy recreation within it.

2.2 Established Practice for Overhead Line Routeing

SPEN standardise their route planning methodology by using established standard industry practice for the routeing of overhead lines; guidance on this was first developed by the late Lord Holford in 1959, known as the Holford Rules. The **Holford Rules** were reviewed circa 1992 by the National Grid Company (NGC) Plc (now National Grid Transmission (NGT)) as owner and operator of the electricity transmission network in England and Wales, with notes of clarification added to update the Holford Rules. A subsequent review of the Holford Rules (and NGC clarification notes) was undertaken by Scottish Hydro Electric Transmission Limited (SHETL) in 2003 to reflect Scottish circumstances. A summary of the Holford Rules is presented in Box 2.1, below.

Other guidance that is available regarding the routeing of overhead lines is the Forestry Commission Guidelines. The Scottish Government's policy on control of woodland removal: implementation guidance (February 2019) states that "electricity operators are expected to avoid areas of woodland and forestry when they identify route corridors for new connections or upgrades and when a proposed line requires to go through forestry, considerations should be given to forest design guidelines. Mitigation measures must be fully assessed in the EIA Report and both replanting and

off-site compensatory planting must form part of the assessment". Furthermore, these guidelines state that overhead lines should be routed to follow open space and to run alongside, not through, woodland, unless there is no alternative. The Forestry Commission (now **Scottish Forestry**) produced the guidelines in 2014 regarding forestry design, where forests could be designed with open spaces to allow for the integration of OHL wayleaves. Furthermore, the Scottish government published implementation guidance on the control of woodland removal in February 2019, which also references the 2014 design guidelines.

Box 2.1: Holford Rules

Rule 1	•Avoid altogether, if possible, the major areas of highest amenity value, by so planning the general route of the line in the first place, even if the total mileage is somewhat increased in consequence.
Rule 2	•Avoid smaller areas of high amenity value, or scientific interest by deviation; provided that this can be done without using too many angle towers, i.e. the more massive structures which are used when lines change direction.
Rule 3	•Other things being equal, choose the most direct line, with no sharp changes of direction and thus with few angle towers.
Rule 4	•Choose tree and hill backgrounds in preference to sky backgrounds, wherever possible; and when the line has to cross a ridge, secure this opaque background as long as possible and cross obliquely when a dip in the ridge provides an opportunity. Where it does not, cross directly, preferably between belts of trees.
Rule 5	•Prefer moderately open valleys with woods where the apparent height of towers will be reduced, and views of the line will be broken by trees.
Rule 6	•In country which is flat and sparsely planted, keep the high voltage lines as far as possible independent of smaller lines, converging routes, distribution poles and other masts, wires and cables, so as to avoid a concatenation or 'wirescape'.
Rule 7	•Approach urban areas through industrial zones, where they exist; and when pleasant residential and recreational land intervenes between the approach line and the substation, go carefully into the comparative costs of undergrounding, for lines other than those of the highest voltage.

As mentioned previously, SPEN's approach to routeing OHLs is primarily based on the idea that any major effect of an overhead line will be visual, and that the degree of visual intrusion can be reduced by carefully routeing the development. Techniques to reduce visual intrusion of OHLs include using the topography and trees to provide screening and background, as well as ensuring the OHL is routed at a distance away from settlements and roads where possible. Particularly sensitive and valued natural and man-made features should also be avoided, with a well-routed OHL also taking into account any other technical and environmental considerations.

2.3 Routeing Considerations

Overhead lines are linear elements in the landscape. They are likely to affect, to varying degrees, visual and other environmental aspects of the area through which they run. This part of the process predominantly comprises information gathering and consideration of the potential for effects.

The initial stage is to determine a study area and gather baseline information within this area through desk-based studies, site visits, and consultations in order to identify potential constraints and opportunities to routeing.

To define a route that meets the requirements of the Electricity Act 1989, a balance must be struck between three sets of considerations:

- Environmental;
- Technical; and
- Economic.

2.3.1 Environmental Considerations

Statutory duties imposed by Schedule 9 of the Electricity Act 1989 require licence holders to seek to preserve features of natural and cultural heritage interest and mitigate where possible, any adverse effects which a development may have. Experience across the electricity industry shows that an overhead transmission line is likely to affect to varying degrees the following:

- Visual amenity and landscape character;
- Ecology, ornithology and nature conservation;
- Hydrology, hydrogeology, geology (such as carbon-rich soils and deep peat) and water resources;
- Cultural heritage including archaeology;
- Forestry and woodland (including areas of ancient and native woodland); and
- Recreation and Tourism.

Other considerations which may affect routeing to a greater or lesser degree include:

- Planning allocations and major applications;
- Noise and Statutory nuisance;
- Traffic (access for construction);
- Land use; and
- Socio-Economics.

2.3.2 Technical Considerations

Technical considerations potentially include the existing electricity transmission network and other existing infrastructure, access requirements, altitude and slope gradient, and physical constraints such as water bodies, peat and the existence of wind farms.

These technical considerations are not considered as being absolute constraints but are a guide to routeing. The approach taken is to identify preferred environmental options informed by a staged review of technical aspects.

2.3.3 Economic Considerations

In compliance with Schedule 9 of the Electricity Act 1989 the routeing objective requires the proposed connection to be economical. It is understood that this is interpreted by SPEN as meaning that as far as possible, and all other things being equal, the connections should be as direct as possible, and the route should avoid areas where technical difficulty or compensatory schemes would render the connection uneconomical.

2.4 Consideration of potential effects, technical & environmental routeing options

2.4.1 Study Area

A study area was defined for this routeing process, large enough to accommodate the identification of several potential route options. The study area for the proposed development was defined through:

- Identification of the start and end points for the connection, which represent the fixed geographical elements of the route. In this case, these comprise the planned Euchanhead RED POC and the consented Lorg Wind Farm substation collector point;
- Identification of the technical and environmental drivers which exist in the area between these two points. These drivers include topography, landscape character and areas of environmental value and historical interest.

The study area is shown on Figures 1 and 2 in Appendix 1.

The boundary of the study area was delineated based on several high-level constraints. These include:

- The location of the two connection points;
- Topography, altitude and slopes;
- Presence of numerous watercourses in the valley to the north-west of the study area;
- The presence of residential receptors;
- Extensive coniferous forestry plantations; and
- Planned infrastructure constraints associated with Lorg Wind Farm and Euchanhead RED including wind turbines, tracks and substations.

2.4.2 Background Information

Following the establishment of the study area, an initial evaluation of environmental and technical constraints was undertaken. Key constraints were initially mapped for the study area using Geographical Information Systems (GIS), and collated from sources in the public domain and via external consultation with stakeholders where required. This data was supplemented where required by field survey. Constraints and potential issues considered when collecting background information have been outlined within Table 2.1.

Table 2.1: Key constraints

Consideration	Constraints/Issues
Environmental	Ecology
	Ornithology
	Landscape (designations and character)
	Visual amenity
	Archaeology and cultural heritage
	Recreation and tourism
	Hydrology, hydrogeology and geology (including peat)
	Residential dwellings and land use
	Traffic and transport
	Other land uses (e.g., forestry, transmission lines, mineral operations, windfarms, agricultural, and roads)
Technical	Slope/gradient (topography)
	Existing, consented and planned infrastructure
	Altitude
	Ground Conditions
	Presence of large waterbodies
Economic	Ensure viability – as far as reasonably possible, the line should be direct and avoid areas where technical difficulty or compensatory requirements would render the scheme unviable on economic grounds.

3 TECHNICAL AND ENVIRONMENTAL ROUTEING CONSIDERATIONS

3.1 Environmental and Technical Baseline

3.1.1 Environmental baseline

Baseline information that identifies key environmental constraints was used as the basis of analysis and to inform the identification and appraisal of route options. The details of the environmental baseline data sources and information are presented in Appendices 3 and 4. Some of the key points summarising the environmental baseline are:

- Ecology and ornithology:
  - Designations (see Figure 3 in Appendix 1):
    - There are no statutory sites within the study area or a 2 km area of search;
    - The closest internationally designated conservation area, the Upper Nithsdale Woods special area of conservation (SPA), designated for its Tilio-Acerion forest, is ± 10 km from the study area;
    - The Afton Uplands provisional Local Wildlife Site (pLWS), designated for its range of upland mire, montane heath and grassland habitats, is located approximately 1 km to the west of the study area;
    - There is one ancient woodland to the south east within 2 km of the study area;
    - The study area lies within the Galloway and Southern Ayrshire biosphere reserve; and
    - The study area overlaps with two red squirrel priority woodlands, suggesting areas of local importance for Red Squirrel (*Sciurus vulgaris*).
  - Habitats:
    - There are 14 habitat types within the study area (see Figure 13 in Appendix 1);
    - Five of the habitat types within the study area are groundwater dependent terrestrial ecosystems (GWDTE) and are considered to be of moderate (Modified bog and Marshy grassland) and high (Blanket bog, Flush and Wet heath) sensitivity (refer to Figures 10 and 13 in Appendix 1);
  - Protected species – Mammals:
    - The desk study revealed records of three types of bats, European Otter and Mountain Hare, Red Squirrel and Brown Hare within 2 km of the study area;
    - No Otter or Water Vole were observed in the study area but there is potential suitable habitat within the study area. Otter has been recorded within the study area during previous surveys;
    - No evidence of Badger or Red Squirrel was observed during the walkover, but there is suitable habitat in the forested and felled habitats for red squirrel and pine marten.

- Protected species – Reptiles and Amphibians:
  - The desk study revealed no records of reptiles within 2 km of the study area;
  - No reptiles were observed during the site walkover survey but there are suitable habitat areas for Common Lizard and Adder, particularly in un-forested and felled areas;
- Protected species – Invertebrates:
  - The desk study found records of 10 notable terrestrial invertebrate species, one of which is specifically protected in The Wildlife and Countryside Act 1981 as amended by The Wildlife and Natural Environment (Scotland) Act 2011;
  - The habitats and watercourses within the study area offer limited potential for Fresh Water Pearl Mussel, although surveys undertaken in 2020 did not record the presence of this species within the study area.
  - Heath and bog habitats are likely to support a range of moth and butterfly species.

- Ornithology:
  - The desk study found records of 37 notable bird species within 2 km o the study area, of which the following are of particular risk of collision with overhead line equipment:
    - Black Grouse;
    - Red Grouse;
    - Goshawk;
    - Golden Eagle;
    - Short Eared Owl;
    - Red Kite;
    - Barn Owl;
    - Common Sandpiper;
    - Pink-footed Goose;
    - Snipe,
    - Curlew,
    - Golden Plover and
    - Woodcock.
  - The *open moorland* areas within the study area provide suitable habitat on site for the following species (* indicates those species that were observed during the 2020/2021 bird surveys that were undertaken for this project) :
    - Golden Eagle[6];
    - Hen Harrier*;
    - Merlin*;
    - Peregrine*;
    - Red Kite*; and
    - Short Eared Owl[6].
  - The *forested areas* within the study area provide suitable habitat on site for the following species (* indicates those species that were

[6] Observed within the Euchanhead OHL study area during previous survey work undertaken for Sanquhar II Community Wind Farm and Euchanhead RED.

observed during the 2020/2021 bird surveys that were undertaken for this project):

- Goshawk* - there was a historic nest near the bothy but the trees have since been felled by wind;
- Merlin;
- Red Kite;
- Barn Owl.

- Waterfowl (* indicates those species that were observed during the 2020/2021 bird surveys that were undertaken for this project):
  - Pink-footed Geese* (these were observed migrating at high altitude with little risk of disturbance by overhead line equipment);
  - Goose species – suitable foraging habitat provided by valley mire and sheep-grazed grassland;
  - Wader species (open upland areas on site provide suitable wintering and breeding habitat for waders):
    - Common Sandpiper*;
    - Snipe*; and
    - Woodcock*;
    - Curlew[6];
    - Red Grouse[6];
    - Black Grouse.

- Landscape:
  - There are no designated landscape areas within the study area;
  - Part of the East Ayrshire Sensitive Landscape Area (SLA) is located approximately 1 km to the west of the site, but there is limited visibility with the SLA;
  - Majority of the site falls within the Southern Uplands with Forest landscape character area (see Figure 5 in Appendix 1). This landscape character area is considered to have low sensitivity to the proposed overhead line development;
  - Narrow section along the Water of Ken forms part of the Narrow Wooded River Valley landscape character area. This landscape character area is considered to have medium to low sensitivity to the proposed overhead line development;
  - Several existing wind farms are visible from the unforested areas of the study area, and there is the potential for cumulative impacts from future wind farms (the consented and planned wind farms around the study area are discussed in more detail in Section 1.1);
  - The rolling nature of the landforms, together with the considerable areas of forestry within the north, west and south of the study area screens longer distance views within the study area.
  - There are 2 residential receptors within the study area and 4 within 2 km of the study area. These are considered to have a high susceptibility and sensitivity to the proposed development. Effects would decrease with distance from the proposed development and it may be possible to route the proposed development with little overall visual impact on residential receptors.

- No significant transport routes within study area. Road users within the study area would be considered to have a low susceptibility and sensitivity to the proposed development.
- People using the site recreationally would be more sensitive to the proposed development in outside the forested areas, and less sensitive in forested areas. Users of the core paths would be considered to have a sensitivity to the proposed development that lies between the two.

- Geology, peat, hydrology and hydrogeology:
  - There are no special designations relevant to geology, hydrogeology and hydrology have been identified within 5 km of the study area;
  - Bedrock geology:
    - Bedrock geology is dominated by Ordovician strata, with the northern part of the study area underlain by the Kirkcolm Formation, and the southern part underlain by the Portpatrick Formation. These bedrock formations are divided just to the north of the central part of the study area by a fault orientated in a north east – south west direction.
    - There are several igneous intrusions of Lower Devonian Age consisting mainly of microcrystalline granitic and microdioritic dyke suites.
    - There are also a number of small faults co-located with the prominent Leadhills Fault, trending in a similar direction.
  - Superficial geology:
    - Correlates largely with the geography of the site;
    - On hilltops and slopes to the north and south, peat is the dominant superficial deposit;
    - The central regions of the study area at the lower topography, running roughly along the Water of Ken, Is dominated by Quarternary diamicton till and consists of a mixture of clays, silts, sands and gravels.
    - Some minor fluvial and alluvial deposits occur along the watercourses within the study area;
    - Steeper slopes are largely without superficial deposits, in particular along the steep banks of the water Water of Ken.
  - Geomorphology:
    - A cave known as Whig's Hole is present on the south-western shoulder of Altry Hill and is visible on the 1:25 000 Ordnance Survey map (see also Figure . This cave is a natural sea cave or beach cave and occurs at around 420 m AOD.
  - Soils:
    - Soils consist mainly of podzols, gleys and peat.
    - The mineral soils types occur in the central lowlying areas of the site and along the river valleys;
    - Peat, peaty gleys and peaty podzoles occur in the northern and south-western regions of the study area on hilltops and slopes;
    - The Carbon and Peatland 2016 map (SNH, 2016) shows the presence of:
      - Class 1 carbon-rich soils which are likely to be of high conservation value (Class 1 and 2 soils have been

identified as environmental constraints of high sensitivity on Figures 10 and 11 in Appendix 1);

- Class 3 carbon-rich soils and some deep peat occur in the south western and some small areas in the northern parts of the study area, but the vegetation cover in these areas does not indicate priority peatland habitat.
- The remainder of the study area is covered in Class 4 and 5 carbon-rich soils, and there are also areas where no carbon soils are present.

- Hydrogeology:
  - The study area is underlain by a Low productivity aquifer, and while secondary fractures and near-surface weathered zoners may increase intergranular permeability, flow and storage will generally be confined to fractures;
  - The glacial till within the study are will have varying permeabilities depending on their composition and connectivity; sand and gravel will have higher permeability than clay and silt;
  - Peat bodies within the study area will hold significant amounts of groundwater, but these will be very slow moving and only likely to contribute limited baseflow to local burns, except if there are peat pipes present.
  - The groundwater in the area has a moderate to high vulnerability to individual events where potentially contaminating substances are involved.
- Hydrology:
  - The study area is drained by the:
    - Water of Ken - drains the majority of the study area, has several tributaries including:
      - Fortypenny Burn;
      - Pulmmulloch Burn; and
      - Pot Burn.
    - Polskeoch Burn - drains the north-eastern part of the study area; Rashy Burn is a tributary.
  - Private Water Supplies (PWS):
    - Polskeoch PWS – springs located near Polskeoch Farm;
    - Dalgonar PWS - watercourse PWS located downstream of the study are along Dalgonar Cleuch.
  - Flood risk:
    - River flooding confined to main channels of the Water of Ken and Polskeoch Burn. Main channels have a 10% chance of a flood event in a given year.
    - Some very small areas at high risk of surface water flooding scattered across study area, mainly associated with Polskeoch Burn.
    - A small region near the south eastern edge of the study area is indicated to be at high risk of surface water flooding.

- Traffic and Transport:

- There are currently no roads or tracks within the study area, other than forestry tracks and the Southern Upland Way.
- Access to the study area can currently be gained using the following three options (see also Figure 16 in Appendix1):
  - Access to the northern part of the study area can be gained via the A76, a single two-way carriageway highway between Kilmarnock and Dumfries, and partial use of the existing access tracks to Hare Hill Wind Farm and the proposed Euchanhead RED. Part of this route uses forestry tracks through the Polskeoch forest and is only accessible using 4x4 vehicles or on foot. However, it is understood that this route would be upgraded as part of the construction of the Euchanhead RED and Sanquhar II Community Wind Farm, should these be approved.
  - Alternatively, access can be gained to the northern part of the study area from the U432n Euchan Water to the south of Sanquhar, which is accessed via the C128n Blackaddie Road in Sanquhar. This route also uses forestry tracks which can currently only be accessed using 4x4 vehicles or on foot.
  - Access to the southern part of the study area can be gained via the C35S leading northwards from B729 at Smittons Bridge following the Water of Ken, and utilising the links constructed for other nearby wind farms under construction (e.g. Windy Rig Wind Farm) and which will be upgraded further northwards towards the study area as part of the construction of the consented Lorg Wind Farm.

- Land use and Recreation:
  - Existing land use:
    - Land in the southern portion of the study area consisting mainly of open moorland habitats is used mainly for rough sheep grazing;
    - Land in the northern portion of the study area is used predominantly for rough grazing; and
    - Visitors to the study area have the ‘right to roam’ under the Land Reform (Scotland) Act 2003, and this, together with the ‘wildness’ of the open moorlands, rivers and forested areas, the presence of several core paths, heritage assets and pathways and nearby artistic sculptures, has made the site accessible and appealing for informal recreational purposes.
  - Planned land use:
    - Several renewable energy developments are either planned or have received consent but are yet to undergo construction within and immediately adjacent to the study area (see Figure 9 in Appendix 1). These include:
      - Lorg Wind Farm:
        - Consented in 2018 for 9 wind turbines (six 149.9 m to tip, three 130 m to tip) and ancillary infrastructure, located to the east of Altry Hill;
        - New scoping report submitted (July 2021) for 12 turbines (up to 200 m to tip), two of which are to be located in East Ayrshire, and ten in Dumfries and Galloway;

- Euchanhead Renewable Energy Development (planning application submitted October 2020). This will include 21 turbines and ancillary infrastructure, and will be located within the forestry areas in the northern part of the study area and adjacent to the north east and east of the study area; and
- Sanquhar II Community Wind Farm (referred to the Planning and Environmental Appeals Division). This will include 50 turbines, although none of them will be located within the study area. However, there are several turbines located close the study area boundary and could influence route selection.

▪ Planning applications that had recently received permission at the time of writing (see Figure9 in Appendix 1) include:
- A forestry track just to the north of the Southern Upland way where it passes by the Polskeoch Farm property; and
- A met mast near Euchanhead T16, located just to the east of the study rea boundary.

o Recreation:
▪ No formal recreational facilities within the study area, although tracks and core paths provide access for informal recreational use including walking, cycling, horse-riding, orienteering and wild camping. Angling could also be undertaken in the watercourses within the study area.
▪ The Southern Upland Way (Core Path 504) is a nationally important and sensitive core path which falls partially within the study area.
- This pathway is the first coast-to-coast pathway across Scotland;
- This track is used for several annual marathon events;
- Scottish Hill Track 83 follows the Southern Upland Way within the study area;
- Part of the Southern Upland Way also forms part of a heritage pathway.

▪ The Lorg Trail (Core Path 215) is also present within the study area and follows along the Valley of Ken before entering the Polskeoch forest plantation in the north of the study area. This trail intersects briefly with the Southern Upland Way near the Polskeoch Bothy.
▪ There are several assets within the study area that may be of interest to recreational visitors including Whig's Hole, Polskeoch Bothy and Allan's Cairn, all of which are of heritage interest. The Polskeoch Bothy is also available for informal recreational amenity (accommodation).
▪ The Striding Arches, a set of four sculptures by Andy Goldsworthy, are located to the south east of the study area and can be accessed from the study area using the Southern Upland Way and then Core Path 51 (Benbuie to Troston Hill).

- Forestry:
o The northern and eastern parts of the study area are covered by forestry plantations. Over 46% of the study area is under commercial forestry.

- Felling has recently been undertaken (April / May 2021) along the southern slope of Polskeoch Rig and along the north east-facing slope of Lorg Hill.

3.1.2 Development and planning baseline

As mentioned previously, three renewable energy developments are planned to be located in close proximity to, and within, the Euchanhead OHL study area (see Section 1.1). It was therefore necessary to establish where the planned infrastructure would be located and identify any constraints relating to the said infrastructure that would need to be taken into consideration during routeing. An infrastructure constraints map was produced (see Figure 9 in Appendix 1) to enable the identification of areas to be avoided or where technical constraints may become an issue (e.g. wake effect) and should be treated as constraints when identifying potential route options for the proposed OHL.

It should be noted that although the developer has been granted consent to construct 6 turbines up to 149.9 m to tip and 3 turbines up to 130 m to tip for Lorg Wind Farm, a subsequent application to increase the tip heights of the 130 m tall turbines to 149.9 m, alter the operational period and submit further environmental information was submitted to the planning authority in August 2019 but was subsequently withdrawn in September 2020. A new scoping report for a >50 MW wind far with a scoping layout of twelve turbines up to 200 m to tip was submitted to the Scottish Ministers in July 2021. Ten of the turbines fall thin Dumfries and Galloway, and two fall within East Ayrshire. However, as the scoping report contains a scoping layout, it is likely that the design of the wind farm will change during the EIA process.

A search for any other planning applications within or near the study area was also conducted to establish whether any other planned developments would need to be taken into consideration during the OHL routeing process. Other than the three surrounding planned wind farms and renewable energy development, there were three planning applications or permitted developments near or within the study area at the time of writing:

- Planning application for a met mast up to 90 m in height at E270007 N600304 (Planning application ref. no: 20/1990/FUL). The purpose of this met mast will be to gather wind data to further inform turbine placement at the Euchanhead RED. The location of the proposed met mast is shown on Figure 9.
- Application for determination of prior approval for a 1.5 km of forestry track (Application reference no. 21/0897/DPA) located near the Polskeoch farm approximately 200 m north of the Southern Upland Way. The track will allow access for harvesting of trees and future restocking, and will be a permanent structure. A decision notice issued by the council on 06 May 2021 confirmed that prior approval for the proposed forestry track was not required as the proposal met the applicable permitted development requirements. However, the track needed to be moved outwith the micrositing allowance of the consented track formation, and hence a further application for determination of prior approval was submitted (see below).
- Application for determination of prior approval for the formation of 1.47 km of track and 30 m turning circle within the Polskeoch forestry Block UN415 (Application reference no. 21/1166/DPA). This application was required to be

submitted because the track previously consented (see bullet above) needed to be moved outwith the micrositing allowance. A decision notice issued by the council on 04 June 2021 confirmed that prior approval for the proposed forestry track was not required as the proposal met the applicable permitted development requirements. The location of the red line boundary of the consented new forestry track is shown on Figure 9.

No other applications for planning consent or determination of prior approval were in the planning system at the time of writing.

3.1.3 Technical baseline

Key technical issues for the OHL route options include:

- Altitude of the OHL – altitudes over 400 AOD generally require shorter spans between poles resulting in an increase in the number of poles required;
- Topography – steeper slopes (in excess of 11%) and undulation of topography. The main concern is that the steeper slopes and significant undulation of the OHL could cause difficulties (safety concerns) during construction;
- The planned location of the wind turbines and related infrastructure at Lorg Wind Farm, Euchanhead RED and the Sanquhar II Community Wind Farm. OHL route options need to take the turbine tip height +10% into account, as well as 3 x the turbine rotor diameter into account. The main concern in this regard is the risk of possible wake effect from the wind turbines to the OHL. The wake effect could cause the overhead lines to sway and could consequently impact on the performance and maintenance requirements of the OHL; and
- Planned new forestry track approximately 200 m north of the Southern Upland Way near Polskeoch farm.

3.2 Routeing Strategy

In accordance with SPEN's approach to routeing, the routeing strategy for the Euchanhead OHL grid connection project is:

- To identify a technically feasible and economically viable route between the Euchanhead Wind Farm connection point and the Lorg substation collector point whilst taking into consideration environmental, technical and economic constraints. The route should, on balance, cause the least disturbance to the environment and the people who live, work and enjoy outdoor recreation within it.
- To help minimise landscape and visual effects, in accordance with the Holford Rules and SPEN's routeing methodology, the proposed overhead line has also sought to avoid high ground and ridgelines, responding to the grain of the landscape, subject to avoiding areas of highest amenity and environmental values as far as practicable (as above). To help assess temporary and permanent cumulative effects, careful consideration has also been given to the relationship of the proposed OHL with other electricity infrastructure within the study area.

In line with the Routeing Strategy the following sequential stages were adhered to, in accordance with SPEN's approach to routeing guidance:

3.2.1 Stage 1: Development of Route Options

Considerations identified in the routeing strategy were applied to the study area to establish a number of possible 'route options'. This process involved designing routes in accordance with the Holford Rules, that best fit the landscape and minimise effects on visual amenity, whilst avoiding wherever possible designated areas of high environmental value and irreplaceable habitat. These areas generally include areas of natural and cultural heritage value designated at a national, European or international level as these are afforded the highest levels of policy protection.

In response to the identification of the key environmental, planning and technical constraints and strategy, a sensitivity weighting (hard constraint, moderate constraint or soft constraint) is defined on an aspect-by-aspect basis, for each environmental feature identified. This is undertaken with reference to Holford Rules 1 and 2 and by using relevant guidance and professional judgement relating to designations and their sensitivities.

> **Holford 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.

In addition, there are constraints which would be considered under Holford Rule 2, which are also included as strategic constraints.

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

To identify route options within the study area the strategic constraints were categorised in terms of their potential to impact on the process of route option identification as follows, and represented visually on a constraints heat map (see Figure 10 in Appendix 1):

Hard Constraint: Feature to be avoided wherever possible. These areas are shown in red on Figure 10 (constraints heat map) in Appendix 1.

Moderate Constraint: Feature normally avoided where other alternative routes/ alignments are available. If no other alternatives available, feature can be passed through with mitigation. These areas are shown in amber on Figure 10 (constraints heat map) in Appendix 1.

Soft Constraint: Feature present that could be relatively easy to mitigate, either by design, micro-siting or construction practices.

Table 3.1, below, details how this categorisation applies to the strategic constraints identified for within the study area.

Table 3.1: Strategic constraint categorisation

Sensitivity	Justification	Examples	Route Identification Response
Hard (red)	Holford Rule 1 features (international and national designations) or environmental features considered particularly sensitive to transmission infrastructure. Technical constraints of key significance.	European designated sites (e.g. Special Protection Areas).	Avoid wherever possible and prioritise for mitigation.
		National Parks.	
		National Scenic Areas.	
		Category A Listed Buildings.	
		Slopes greater than 22°.	
		Turbine tip height +10%.	
		Wind Farm infrastructure (e.g. turbines, met mast, substation)	
		Areas where peat is present at >2 m depth.	
Moderate (amber)	Holford Rule 1 features considered less sensitive to transmission infrastructure; Holford Rule 2 features (regional and local designations).	Geological SSSIs.	Proceed with caution, taking potential mitigation measures into account during design and planning.
		Category B and C Listed Buildings.	
		Local Nature Reserves.	
		50 m buffer areas around water bodies.	
		Ancient woodland areas of natural or semi-natural origin.	
		Turbine micrositing buffer[7].	
		Turbine 3x rotor diameter and micrositing buffer area	
		Areas of potential GWDTE / or sensitive habitat areas.	
		Peat 1-2m depth and archaeological features.	
Soft	Holford Rule 2 features considered not to be sensitive to transmission infrastructure.	Geological Conservation Review Sites.	Some constraints of lesser sensitivity – not expected to be an issue for route identification

[7] Turbine micrositing buffers of 50 m at Lorg Wind Farm and Euchanhead RED, and 100 m at Sanquhar II Community Wind Farm.

Holford Rules 1 and 2 were applied to these site-specific strategic constraints using the following hierarchy to identify and refine potential route options:

- Avoid SACs, Class 1 peat areas, residences, scheduled monuments, listed buildings and non-designated heritage assets of potentially national significance.
- Preferably avoid or limit the distance travelled within SSSI; RSPB Bird Sensitive Areas; SSSI, Native/Nearly-native woodland and 100m buffer to existing and committed residential properties.
- Cultural heritage assets should be considered from a setting perspective where they are of national importance, or where the setting is pertinent to its citation. When assessing the impact on setting, a buffer of 2 km from the cultural heritage asset should be used. Setting effects should be considered within the route option appraisal.
- Where it is possible to do so, avoid or limit the distance travelled within sensitive habitats (e.g. Groundwater Dependent Terrestrial Ecosystems (GWDTEs)), natural or semi-natural forested areas and peat.

A detailed constraints table (attached as Appendix 5) was used to enable areas of high, moderate or low sensitivity to be indicated on the constraints heat map (Figure 10 in Appendix 1) and identify appropriate avoidance buffers to aid the identification of route options for the proposed OHL. In addition, wake effect modelling was undertaken to identify areas where horizontal wear of conductors might be induced by the wake effect caused by wind roses arising due to the circular motion of the turbine blades.

Using the existing environmental, planning and technical information available for the study area (including wake effect modelling) as well as information generated through desk-based studies and field surveys undertaken specifically within the study area of the proposed Euchanhead OHL grid connection, it was possible to delineate several route segments which could be used in different combinations to identify several route options for an OHL between the Euchanhead POC and the Lorg substation collector point. The route segments and route options are discussed in more detail in Section 4.2, below.

3.2.2 Stage 2: Appraisal of Route Options and Selection of Preferred Route

To allow identification of a Preferred Route, an appraisal of the route options identified in Stage 1 was undertaken and is described in this report. The purpose of this is to identify the relative potential of each route option to accommodate an OHL, including a focus on potential landscape and visual impacts of the options as directed by Holford Rules 3 to 7.

The conclusion of this appraisal is the identification of a 'Preferred Route' which is technically feasible and economically viable whilst causing the least disturbance to the environment and to people. Whilst this route has been defined based upon the information available to date, further consultation may lead to technical matters emerging which require a review of the Preferred Route. Where this occurs, a review of the route options would be undertaken to confirm the proposed route. The routeing process is an iterative one.

The appraisal of route options for the planned Euchanhead OHL grid connection was carried out by means of the following key steps:

3.2.2.1 *Step 1: Desk Based and Field Assessments*

Desk-based studies were conducted to determine baseline environmental information and identify potential environmental constraints to inform route option identification and environmental appraisal of those route options. Desk-based studies utilised existing information where available (e.g. environmental information publicly available for Lorg Wind Farm, Euchanhead RED and Sanquhar II Community Wind Farm), background data searches, heritage asset data and information provided by stakeholders such as Dumfries & Galloway Council, SEPA, HES and NatureScot. Where necessary, desk-based information was supplemented with field surveys including monthly ornithology vantage point surveys, monthly winter walkovers, breeding bird surveys, black grouse searches and raptor studies and a preliminary ecological appraisal. Site walkovers were also undertaken to further inform the landscape and general environmental inputs during routeing.

3.2.2.2 *Step 2: Environmental Appraisal*

An appraisal of identified route options was undertaken by each environmental discipline in order to identify a Preferred Route.

The environmental appraisal comprised a qualitative appraisal of each route option, based upon the criteria defined in Part 4.1 and professional judgement. The appraisal considered the potential interaction of the planned OHL with key environmental features and associated sensitivities for each route option (as presented in Appendices 4, 5 and 6) so that these could be directly compared.

3.2.2.3 *Step 3: Selection of the Preferred Route for Consultation*

Following the appraisal of each route option a Preferred Route has been identified based on the comparative merits of each option. The route that has been selected offered the greatest balance of technical, environmental and commercial considerations as far as possible, and offered the greatest potential for mitigation where required. The Preferred Route is based on professional judgement, in consideration of aspects set out above in relation to the overall potential of each route to accommodate the OHL.

The requirements of Stages 1 and 2 above are essentially fulfilled by the contents of this report. Stages 3 to 5 below are those that will completed subsequently and are outlined as follows:

3.2.3 Stage 3: Consultation on the Preferred Route

Having identified the preferred route option in this report, in order to ensure that views and opinions have been gathered from relevant stakeholders to inform the route option selection process, it is required to undertake consultation. The consultation process to be followed, and the stakeholders who will be consulted using this Routeing Consultation Document are identified and discussed in Part 5 of this report.

3.2.4 Stage 4: Modification of the Preferred Route

Following consultation, all responses will be considered and their relevance to the selection of the route options/preferred option assessed/identified. Where relevant to the routeing process, the options will be reviewed in light of such response and necessary adjustments made.

3.2.5 Stage 5: Selection of the Proposed Route and Environmental Screening

Following the consultation period and modification/confirmation of the Preferred Route, a Proposed Route will then be identified for the purposes of obtaining a Section 37 consent. A screening request will be submitted to the Scottish Ministers to determine whether an Environmental Impact Assessment (EIA) will be required for the planned Euchanhead OHL grid connection.

4 ROUTE SELECTION

This section focuses on Stages 1 to 3 of the procedure set out in Section 3.2 above – Routeing Strategy for the selection of a preferred route option for the proposed Euchanhead OHL grid connection.

4.1 Stage 1: Identification of Route Options

The first stage of the procedure requires the identification of potential route options from which a preferred option can then be selected.

Once baseline environmental, planning and technical information had been gathered (discussed in Section 3.1), a constraints heat map was generated (see Section 3.2.1) to provide a georeferenced visual indication of areas to be avoided (red constraints) wherever possible, and areas where caution should be applied or where mitigation may need to be implemented (amber constraints) to minimise potential impacts on sensitive receptors and on the OHL infrastructure itself. The constraints heat map is presented in Figure 10 in Appendix 1.

Areas indicated in red are considered 'hard' constraints or areas of high environmental sensitivity and have been avoided as far as practicable. Within and around the study area, these include:

- Infrastructure and technical:
  - Wind turbines and ancillary infrastructure (e.g. met mast, substation);
  - Settlements and individual properties;
  - Slopes steeper than 22 degrees;
- Ecology and ornithology:
  - 30 m avoidance buffers on watercourses to protect potential protected species habitats.
  - 30 m buffer on known bat roost.
  - 50 m on groundwater dependent terrestrial ecosystems (GWDTE's);
- Landscape and visual:
  - Settlements and individual properties (100 m avoidance buffer)
- Geology and soils:
  - Class 1 and 2 carbon and peatland (50 m avoidance buffer);
  - Peatland (50 m avoidance buffer);
- Hydrology and geomorphology:
  - Sensitive / important water bodies (50m avoidance buffer).
  - Private Water Supplies (150 m avoidance buffer); and
  - Natural cave (Whig's Hole) (10 m red avoidance buffer, 20 m amber buffer).

Amber areas indicate areas of moderate constraint or sensitivity, i.e. areas that would be preferable to avoid, but would be considered if other options are exhausted. Within and around the study area, these include:

- Infrastructure and technical:
  - Micrositing buffers of planned infrastructure (e.g. wind turbines and ancillary infrastructure e.g. met mast, substation, etc.);
  - Proposed new forestry track near Polskeoch Farm;

- Areas where wake effect may be an issue;

- Ecology and ornithology:
  - 30 m buffer on bat commuting habitat;
- Cultural heritage:
  - Non-designated assets (50 or 10 m avoidance buffer, depending on importance and sensitivity);
- Landscape and Visual:
  - Long distance trail (100 m avoidance buffer, primary consideration is location of poles if oversail cannot be avoided);
  - Core path (100 m avoidance buffer, primary consideration is location of poles if oversail cannot be avoided).
- Hydrology:
  - Less sensitive watercourses (20 m avoidance buffer);
  - All other (least sensitive / artificial) watercourses (10 m avoidance buffer);

The nature of the study area and the location of red and amber constraints dictated where an OHL might possibly be located to minimise environmental impacts while also meeting technical requirements and conforming to technical constraints (e.g. slope angle). The presence of nine wind turbines to the east of Altry Hill and potential of the turbines to create a wake effect presented a significant challenge for OHL routeing between the turbines and this area was consequently excluded as a possible route option or part thereof.

Using the environmental and technical constraints as a baseline (see Figure 10 in Appendix 1), it was possible to identify several areas where it would be possible to route an OHL (refer to Figure11 in Appendix 1). Due to the nature of the topography it was possible to identify twelve route segments which could be combined in different sequences to form six potential route options for consideration. The route options have been named Route Option A, B, C, D, E and F for simplicity. The twelve route segments are indicated in Figure 11, and Figures12 a-f in Appendix 1 show the six individual route options that were identified. The route options would have approximate lengths as follows:

- Route Option A - 5.46 km;
- Route Option B - 5.26 km;
- Route Option C - 6.05 km;
- Route Option D - 5.5 km;
- Route option E - 7.95 km; and
- Route Option F - 9.45 km.

4.2 Stage 2: Appraisal of route options and selection of preferred route

4.2.1 Appraisal of technical aspects of route options

An appraisal of each of the route options identified in Section 4.1 was undertaken from a technical perspective by SPEN. Aspects considered included:

- Potential Underground Utilities such as Transmission Cables, Gas Pipelines etc.;

- Potential Overhead Utilities and Crossings points;
- Other OHL transmission route alignments;
- Roads / access tracks;
- Historical / Future Opencast Mining;
- Ground geotechnical characteristics;
- Topography / Terrain;
- Access constraints (construction and maintenance);
- Flood Risk Zones;
- High Altitude Areas;
- Routing adjacent to proposed, planned or known Windfarms; and
- Pollution / Corrosion Zones.

The main points from a technical (engineering) perspective emerging from the technical appraisal include the following:

- Altitude:
  - All of the potential route options will be above 400 m AOD, with all of them being above 500 m AOD near the point of connection at the planned Euchanhead Renewable Energy Development's substation.
  - Generally, within Scotland, altitudes above 200 m AOD are technically, by design, considered to be within an extreme environment due to high wind and ice loading;
  - Spans between support poles would need to be short to take account of the high winds and ice loading;
  - As all of the route options will have sections above 400 m AOD, there is no preference for one potential route option over the others from an altitude perspective.
- Gradient:
  - All of the route options contain areas where the gradient exceeds 22%, and significant sections of the routes have gradients of over 11%.
  - Route options E and F have sections where the slope exceeds 30% and would present more of a technical difficulty during construction. These route options would therefore be less desirable than Route Options A, B, C and D.
  - The use of more straight through pole angle poles would help with challenges presented by the steep gradient(s).
- Buildability / Access Constraints:
  - All route options are remote and can only be accessed by small farm / forestry roads. This applies to all of the route options, with no preference any route option over the others from an access perspective.
- Proximity to other (existing or planned) overhead line infrastructure:
  - Route Options E and F will require the planned 132 kV overhead line to cross the existing 11 kV overhead line providing electricity to Polskeoch farm.
  - The other route options (A, B, C, and D) would not be required to cross any existing or planned overhead lines and would therefore be preferable from this perspective.
- Ground conditions:

- Areas of deep peat would present significant construction challenges, but which could be mitigated by using special foundations for poles in areas of peat.
- Approximately 2.75 km of Route Options E and F would be located within areas of peat, while Route Options C and D would have approximately 800 m of peat, and Route Options A and B would have very small areas of peat near the Euchanhead point of connection.
- Route Options A and B would therefore be preferable from a ground conditions perspective.

- Flooding:
  - Flooding does not present an immediate risk to any of the potential route options, and there is therefore no preference for any of the route options over the others from this perspective.
- Watercourses:
  - All of the potential route options would require watercourses to be crossed.
  - From the environmental appraisal (see Table 4.4, below), the number of watercourse crossings that would be required within each of the Route Options is as follows:
    - Route Option A would require between 3 and 10 watercourse crossings;
    - Route Option B would require between 4 and 9 watercourse crossings;
    - Route Option C would require between 3 and 10 watercourse crossings;
    - Route Option D would require between 4 and 7 watercourse crossings;
    - Route Option E would require between 8 and 13 watercourse crossings; and
    - Route Option F would require between 11 and 18 watercourse crossings.
  - Route Options E and F would therefore be least preferable due to the significantly higher number of watercourse crossings.
- Road crossings: All of the potential route options require crossing of a number of small forestry roads.
- Wind Farms:
  - All corridors travel through the proposed Euchanhead Renewable Energy Development, and are flanked by the proposed Sanquhar II Community Wind Farm to the east and north, and by Lorg Wind Farm to the southeast.
  - Technical considerations when routeing the overhead line include keeping the line out of falling distance and considering the impact within the areas where wake effect might be experienced, and clearance to wind turbines (these were taken into account when identifying potential route options and do not present any significant constraints to any of the route options under consideration).
- Public Service Utilities:
  - No initial pipelines have been noted along the route options, but a utilities search will be required to establish extents of all utility services present within the route options.
- Forestry:

- All routes travel through areas of forestry that may require compensatory planting.
- Forestry has been considered in more detail from an environmental perspective in Part 4.2.2, Appendix 4 and Appendix 6.

- Residential / Industrial Areas:
  - Routes E and F would potentially be in proximity to Dalgonar Farm and Polskeoch Bothy.
  - The potential effects of the overhead line on sensitive receptors, including residential and commercial (e.g. tourist accommodation) properties at Dalgonar, Polskeoch and Lorg Farm, as well as those further away from the study area, have been considered in more detail in Section 4.2, Appendix 4 and Appendix 6 of this report.
- Mineworking areas:
  - No areas of previous mining operations are evident.

4.2.1.1 Summary conclusion of technical appraisal

In summary, Route Options E and F would present greater engineering challenges than the other route options because of:

- The presence of areas steeper than 30%;
- The need to cross an existing 11 kV overhead line;
- The need to cross significantly more watercourses than the other Route Options;
- The presence of significantly greater areas of peat than the other Route Options. The presence of deep peat over approximately 2.75 km of the Route Option is considered to present a high risk;
- The presence of Dalgonar and Polskeoch properties to Route Options E and F, although Route Options C and D would also come in close proximity to the residential buildings at Polskeoch farm.

In addition, Route Options E and F are significantly longer (almost double the length) than the other route options. The increased length would present significantly more technical challenges and would increase the cost of construction significantly, thus potentially influencing feasibility. Therefore, unless any environmental considerations preclude all of the other Route Options (A, B, C and D) from consideration, Route Options E and F are considered to be the least viable of the identified route options.

Route Options C and D have approximately 800 m of peat present, and would pass relatively close to Polskeoch farm. Route Options A and B would therefore be preferable to Route Options C and D from a technical perspective, unless there are any environmental considerations that preclude the selection of both Route Options A and B.

4.2.2 Appraisal of environmental aspects of route options

4.2.2.1 Appraisal Criteria

To enable the three possible route options to be appraised and compared consistently across various environmental disciplines, a set of hierarchical criteria was developed and is presented in Table 4.1, below.

Table 4.1: Appraisal Criteria

Option	Details
Preferred option	Greatest potential to accommodate the infrastructure required within the context of the identified environmental and technical constraints.
Some potential	Some potential to accommodate the infrastructure required within the context of the identified environmental and technical constraints.
Least potential	Least potential to accommodate the infrastructure required within the context of the identified environmental and technical constraints.

Note that these colour codings represent relative weightings. A green colour code does not mean that no environmental issues have been identified, nor does a red colour indicate an insurmountable environmental constraint. The coding enables a qualitative analysis to be undertaken, applying professional judgement and experience on an aspect-by-aspect basis for each environmental feature.

4.2.2.2 Appraisal Methodology

The general methodology followed for the appraisal of the identified possible route options was to gather existing information, generate further site specific information through field surveys (where necessary), apply / overlay this information along each route option, provide an objective, scientific opinion as to the expected effects that the OHL might have on the environmental aspect being assessed, and advise which of the three options would be preferred.

The detailed methodology for appraising the environmental aspects of each route option is discussed below.

Ecology and Ornithology appraisal methodology

A broad habitat walkover survey was carried out between 8th-11th March 2021 by suitably qualified ecologists. The study area was walked and broad habitat types (or mosaics and transitions thereof) were recorded and their potential status with regards to groundwater-dependency was assessed. In addition, the potential for habitats to support protected species such as water vole and otter was also noted.

Ornithological surveys commenced in September 2020 and are currently ongoing. To date, these have included vantage point surveys from locations designed to cover the six route options, winter walkover surveys, breeding bird surveys, raptor nest searches and Black Grouse (*Tetrao tetrix*) lek surveys.

Survey limitations

The results of the habitat survey and assessment work undertaken are representative at the time of surveying. The walkover survey was undertaken outside of the peak flowering season however it is not thought this is a limitation to the identification of broad habitat types.

The ornithological surveys are currently in progress and therefore the ornithology assessment of the site is not complete. This appraisal makes use of the data collected up to May 2021.

Habitat evaluation criteria

The nature conservation value of habitats and species will be assessed according to widely accepted criteria that relates to important factors such as naturalness, extent, rarity and diversity of ecological receptors and follows Chartered Institute for Ecology and Environmental Management (CIEEM) guidance (2018). These and other factors are consolidated into Table 4.2.

Table 4.2: Nature Conservation Evaluation Criteria

Level of Value	Examples (not definitive and often dependent on professional judgement)
International	Internationally-designated or proposed sites (such as SACs) meeting the criteria for international designation; or non-designated sites meeting the criteria for international designation. A significant area of a habitat type listed in Annex I of the Habitats Directive. Sites supporting populations of internationally-important numbers of species/assemblages.
National	Nationally-designated sites (such as SSSIs, National Nature Reserves, Marine Nature Reserves, Nature Conservation Review Grade 1 sites); or non-designated sites meeting SSSI selection criteria. Sites supporting populations of nationally-important numbers, and/or supplying critical elements of their habitat requirements. A site supporting 1 % or more of a national population.
Regional	Sites containing viable areas of threatened habitats of importance within a regional context. A significant area of habitat type listed on the Scottish Biodiversity List (SBL). Sites supporting viable breeding populations of nationally-scarce species on account of their rarity or supplying critical elements of their habitat requirements. Any regularly-occurring population of a nationally-important species that is threatened or rare in the region (e.g. >1 % of the regional population).
Local	Sites meeting the criteria for council area designation (such as Site of Importance for Nature Conservation (SINC)) which may include amenity and educational criteria in urban areas. Designated Local Nature Reserves. Sites containing significant areas of any priority habitat listed on the LBAP. Sites supporting significant populations of species known to be council rarities or included on the LBAP, and/or supplying critical elements of their habitat requirements. A site supporting 1 % or more of a county population.
Site	Undesignated sites, or features or species considered to appreciably enrich the resource within the context of the local area (i.e. approx. 5 km radius from the site area). Examples include species-rich hedgerows and ponds. Individual or small numbers of protected species common to the area. Small areas of LBAP habitat or other habitats of note.
Negligible	Low-grade and widespread habitats or species. A widespread species with minimal use of an area that does not form a significant element of its habitat requirements.

Landscape and Visual Amenity appraisal methodology

The landscape appraisal considers the sensitivity of landscape character affected, the degree to which the route options and potential alignments within the route option would adversely affect landscape receptors, and the degree to which the options conformed to the Holford Rules, particularly rules 4 and 5 (rules 1 to 3 were considered in the identification of route options). Consideration was given not only to the route itself but to the potential requirement for construction access tracks.

Whilst landscape is an important factor in identifying the route options, the difference in effect on landscape between them is relatively limited. The appraisal therefore takes a qualitative approach, drawing out the key differences between the options. Six criteria have been applied at the initial route corridor appraisal stage as outlined below:

- Landscape Sensitivity – To find the best possible landscape 'fit'. To avoid landscapes with greatest potential sensitivity to change (from overhead lines).
- Residential Amenity – To avoid proximity to residential properties as far as possible on the grounds of general amenity including views from private property.
- Visual Amenity – To minimise impacts on public visual amenity, including users of key recreational routes.
- Landscape Designations – To minimise impacts on areas designated for their landscape value.
- Length of corridor – To minimise impacts on the landscape, all else being equal.
- Forestry – Areas of ancient woodland should be avoided and, if possible, impact on other woodland/ forestry types should be kept to a minimum.

When considering these criteria for each route option, an initial judgement has been made with regard to their likely presence within the vicinity of each route and therefore potential susceptibility to the proposed overhead line and likely concerns. A judgement of high indicated that a particular aspect would most likely be adversely affected by the introduction of an overhead line and a judgement of low indicated that the route option would likely avoid adverse effects on this criteria. A judgement of none means that the criteria is not of concern e.g. if there are no residential properties within the vicinity of a route then the likely effects on residential amenity was considered to be 'none'.

Consideration was given to the potential visibility of the OHL from the sensitive visual receptors as shown on Figure 7, which included residential and recreational receptors.

Studies have been undertaken by a number of landscape practitioners[8] in this regard and these suggest that wood poles may be perceived in most circumstances up to a distance of about 1.5 km, and that poles are not generally perceived beyond 6 km. The degree to which poles are perceived depends on whether they are seen against a backdrop or against the sky, the age of the line (new poles are dark and tend to blend in well, whist older poles weather to a light silver-grey and can be more visible in the middle distances), and the design of the pole (H-poles tend to be more noticeable than single poles).

[8] D Horn, I McAulay and M Turnbull (May 2010) High Voltage Wood Pole Transmission and Distribution Main Interconnector Lines in Rural Landscapes: Perceptibility

Taking this into account, and taking account of screening provided by woodland, landform and built form the appraisal identified those receptors that could potentially experience significant adverse effects on visual amenity. This was undertaken through a combination of desk study and fieldwork.

The effects on the views and visual amenity experienced by users of recreational routes and visitors to tourist attractions are assessed. Any temporary diversions during construction would be managed through the construction environmental management process.

Archaeology and Cultural Heritage appraisal methodology

A review undertaken at an early stage of the project identified that there are no designated historic environment assets (such as scheduled monuments or listed buildings) within or near the study area that are likely to be adversely affected by the proposed project.

A review of information available from the Historic Environment Record (HER) maintained by the Dumfries and Galloway Historic Environment Record (DGHER) and the National Record of the Historic Environment (NRHE) maintained by Historic Environment Scotland (HES) identified any known non-designated assets within the study area. Further detailed assessment of the archaeological and cultural heritage baseline of the study area was made during the routeing process through a review of historic mapping and relevant previously published Environmental Statements as follows: Lorg Wind Farm; Euchanhead Renewable Energy Development; Sanquhar II Wind Farm.

There is a robust baseline available for the study area from local authority and national databases and these previous studies, and a lack of designated assets of national or regional importance in the vicinity of the study area. Therefore, an archaeological site visit has not been undertaken at this stage.

Geology, peat, hydrology and hydrogeology appraisal methodology

The assessment has been undertaken through a desk study of existing geological, hydrogeological, hydrological and peat-related features on and surrounding the study area. The existing conditions are identified in the environmental baseline to highlight all potential impacts on the proposed development routes.

All constraints that do not impact any of the route options, such as designated sites and mining operations, have been scoped out for the RCD, leaving a set of main sensitivities that require consideration. These have been identified as:

- Peatland areas (Classes 1 and 2 as priority areas to avoid);
- OHL within 250 m or directly upstream of private water supply (PWS) intakes and infrastructure;
- Surface watercourses and waterbodies; and
- Flood risk;

The main sensitivities have been mapped in GIS alongside the route option sections to identify which route options interact with these sensitivities, cumulating in an overall understanding of each route option's potential impact on geological, hydrogeological, hydrological and peat-related features.

The route options have been assessed to identify which route is preferrable based on its avoidance, or least interaction, with these key sensitivities. Route options that avoid areas of Class 1 and 2 priority peatlands, have a limited number of watercourse crossings, minimal flood risk and lie more than 250 m from PWS intakes are preferred. All proposed route options involve multiple watercourse crossings; therefore, a lower weighting has been given to this as a sensitivity relative to priority peatland and PWS.

Routes with fewer watercourse crossings have been designated as preferred options. Routes with watercourse crossings and either within an area of priority peatland or 250 m of a PWS have been designated as having some potential. Routes with a combination of watercourse crossings, peatland and PWS have been designated as least potential options. However, these are not hard constraints and are dependent on local conditions.

A number of data sources were considered for the assessment; the main sources are detailed below:

- Ordnance Survey topographical mapping, current and historical;
- British Geological Survey geological mapping, superficial and bedrock;
- SEPA flood map and water environment hub; and
- Scotland's Soils mapping;

Traffic and Transport appraisal methodology

Baseline information was gathered using publicly available information and information that was generated for the EIAs supporting the Lorg Wind Farm and Euchanhead Wind Farm consent applications. Aspects that were considered include access to the Lorg Substation connection point, the Euchanhead Wind Farm collector point, and any other access tracks within or in close proximity to the route options under consideration.

Land Use and Recreation appraisal methodology

The baseline conditions relating to land use and recreation were established using publicly available information and the information that was generated as part of the EIA Reports and Further Environmental Information Reports of the Lorg Wind Farm, Euchanhead RED and Sanquhar II Community Wind Farm. The information gathered through the desk-based activities was supplemented by observations made during a site walkover.

Forestry

An initial desk study was carried out to gather all available information prior to the site assessment. This included obtaining all available information on any of the woodlands likely to be affected by the proposed development. The study included capturing any relevant information on SF approved forestry management plans including any planting and felling plans and a search to see whether any of the woodlands were plantations on ancient woodland sites (PAWS) or Ancient Semi Natural Woodlands (ASNW). The main sources in information were:

- Scottish Forestry Map Viewer;
- Forestry Commission National Forest Inventory Woodlands;
- NatureScot Ancient Woodland Inventory;
- Aerial photographs; and
- Ordnance survey maps.

Assessing significance

The significance of the effects has been approached as follows:

- Identifying the existing conditions;
- Assessing the likely effects on the woodlands;
- Confirming whether the effects are positive or negative;
- Assessing the significance of the effects;
- Where there is likely to be a negative effect, decide how best to reduce or mitigate the effect; and
- Consider the long term effect following the application of any mitigation.

Sensitivity

- Highly sensitive woodlands:
    - Ecologically sensitive e.g. Ancient Semi Natural Woodlands;
    - Woodlands subject to other designations e.g. NWSS;
    - Rare or distinctive woodlands;
    - High value from a public recreation point of view; and
    - Vulnerable to small changes.
- Moderately sensitive woodlands:
    - Locally important woodlands;
    - Some public recreation; and
    - Susceptible to moderate changes.
- Low sensitivity woodlands:
    - No local or national importance;
    - Woodlands not used for public recreation; and
    - Woodlands where some change is part of normal forestry management.
- Woodlands with no obvious sensitivity:
    - Woodlands where major changes (e.g. large scale felling) are part of normal management;
    - Woodlands with little landscape value;
    - No public recreation; and
    - No special ecological value.

Magnitude

The following criteria have been used to assess the magnitude of changes from the wayleave clearance:

- **Major** – a significant change to the woodland taking into account the size of the woodland and the scale of the clearance;
- **Moderate** – a small change to the woodlands taking into account the size of the woodland and the scale of the clearance;
- **Minor** – very little change to the woodland taking into account the scale of the size of the woodland and the scale of the clearance; and
- **None** – no change.

Professional judgement has been used to identify the significance of the effect based on Table 4.3 below:

Table 4.3: Significance matrix

Magnitude	Sensitivity			
	High	Moderate	Low	None
Major	Major	Moderate	Minor	None
Moderate	Major	Moderate	Minor	None
Minor	Moderate	Minor	None	None
None	Minor	None	None	None

4.2.2.3 Appraisal Findings and Discussion

Table 4.4, below, provides a summary of the route options appraisal findings. The detailed analysis of the route options is provided in Appendix 6, and is colour coded to show which route is preferred according to the appraisal criteria presented in Section 4.3.1.

Table 4.4: Summary of route options appraisal undertaken by environmental specialists (in Appendix 6)

Route Option A	Route Option B	Route Option C	Route Option D	Route Option E	Route Option F
Ecology					
Route Option A would be the preferred route in regard to habitats as there are fewer mire communities along this route and more grassland communities which may be regarded as being of lesser sensitivity. Limited constraints in terms of protected species other than watercourses which may support Otter and Water Vole, but these include watercourses in Route Options B and C where the routes combine. The route crosses an area of felled plantation which could support Pine	This route offers some potential to accommodate the infrastructure however it covers a broader range of habitats of heightened value including blanket bog, modified bog and marshy grassland. A higher number of watercourse crossings would be required and the route would run in close proximity to the bothy bat roost and evidence of Otter activity.	This route is similar to Route Option A however less preferred as it takes in a larger area of felled plantation which may provide habitat for nesting Pine Marten.	This route offers some potential to accommodate the infrastructure required however perhaps less than Route Option B given the valley mire community at Polskeoch. In addition there is heightened potential for disturbance to Otter due to the crossing of Polskeoch Burn and bats given the proximity to the bothy with this Route Option.	Both routes E and F offer the least potential to accommodate the infrastructure required as they cover the broadest range of habitats including blanket bog communities at Corse Hill. Although such blanket bog communities are considered degraded due to historic drainage, they are still of ecological importance. Numerous watercourse crossings would be required for this route and the route would be in close proximity to both confirmed bat roost locations at the bothy and farmhouse.	Route Option F is the longest proposed route and therefore perhaps has the least potential to accommodate the infrastructure required given the amount of habitat to be impacted, including as with Route Option E, the blanket bog communities at Corse Hill and valley mire at Polskeoch.

Route Option A	Route Option B	Route Option C	Route Option D	Route Option E	Route Option F
Marten. This route is the furthest from the Soprano Pipistrelle maternity roost at the bothy.					
Ornithology					
Route A would be the preferred route in regard to ornithology as it passes through the least amount of open upland habitat and forestry which provide breeding habitat for notable raptor species. This, along with all other routes passes through an area with Hen Harrier activity (route section 5)	This route covers a broader range of habitats and therefore has a higher risk of causing an impact to more bird species, including section 11 where Goshawk have been observed and which was the location of a historic nesting site. Route B also crosses a longer section of upland habitats (section 12) which provide habitat for wader species and raptors.	This route is similar to Route Option A however less preferred as it takes in a larger area of felled plantation which may provide habitat for ground-nesting and forest edge-nesting bird species which may be at collision risk.	This route covers a broader range of habitats than Route Options A and B, including the valley mire at Polskeoth which provides suitable habitat for goose and owl species.	Both routes E and F are the least favoured routes as they cover the broadest range of habitats and therefore have the potential to disrupt the widest variety of bird species. Route E also crosses a longer section of upland habitats (section 12) which provide habitat for wader species and raptors.	Route Option F is the longest proposed route and therefore has the potential to disrupt the largest area of bird habitat. It passes through large sections of forestry, upland habitats and valley mire which provide habitats for a variety of different species. The crossing over the Water of Ken also has the potential to interfere with flightlines as several species of bird have been observed following the path of the river during VP surveys.
Archaeology and Cultural Heritage					
The route option is below the average length of the six routes considered (average: 6.55km).	The route option is the shortest of the route options considered, therefore minimises	The route option is below the average length of the six routes considered (average: 6.55km).	The route option is below the average length of the six routes considered (average: 6.55km).	The route option is above the average length of the six routes considered (average: 6.55km),	The route option is the longest of the route options considered, therefore maximises the potential for impact to

Route Option A	Route Option B	Route Option C	Route Option D	Route Option E	Route Option F
There are no known heritage assets that represent a significant constraint to the OHL development. The known heritage assets that are present within the route option are discrete and can be easily routed to avoid. The nature of the known heritage assets within the route option are not indicative of extensive archaeological potential for hitherto unknown archaeological remains that may be discovered during construction.	the potential for impact to hitherto unknown archaeological remains. There are no known heritage assets that represent a significant constraint to the OHL development. The known heritage assets that are present within the route option are discrete and can be easily routed to avoid. The nature of the known heritage assets within the route option are not indicative of extensive archaeological potential for hitherto unknown archaeological remains that may be discovered during construction.	There are no known heritage assets that represent a significant constraint to the OHL development. The known heritage assets that are present within the route option are discrete and can be easily routed to avoid. The nature of the known heritage assets within the route option are not indicative of extensive archaeological potential for hitherto unknown archaeological remains that may be discovered during construction.	There are no known heritage assets that represent a significant constraint to the OHL development. The known heritage assets that are present within the route option are discrete and can be easily routed to avoid. The nature of the known heritage assets within the route option are not indicative of extensive archaeological potential for hitherto unknown archaeological remains that may be discovered during construction.	therefore increases the potential for hitherto unknown archaeological remains. There are no known heritage assets that represent a significant constraint to the OHL development. The known heritage assets that are present within the route option are discrete and can be easily routed to avoid. The nature of the known heritage assets within the route option are not indicative of extensive archaeological potential for hitherto unknown archaeological remains that may be discovered during construction.	hitherto unknown archaeological remains. There are no known heritage assets that represent a significant constraint to the OHL development. The known heritage assets that are present within the route option are discrete and can be easily routed to avoid. The nature of the known heritage assets within the route option are not indicative of extensive archaeological potential for hitherto unknown archaeological remains that may be discovered during construction.

Route Option A	Route Option B	Route Option C	Route Option D	Route Option E	Route Option F
Landscape					
A shorter than average route that avoids higher ground and runs through the valley of Palvaddoch Burn within commercial forestry and then in the deep river valley of the Water of Ken through an unforested landscape. None of the route is within or would be visible from a designated landscape.	A shorter than average route that initially avoids higher ground and runs through the valley of Palvaddoch Burn within commercial forestry. It then rises towards the shoulder of Altry Hill through an unforested landscape. None of the route is within or would be visible from a designated landscape.	A shorter than average route that generally avoids higher ground. It reaches higher elevations crossing Polskeoch Rig through a landscape of commercial forestry and then descends to the deep river valley of the Water of Ken through an unforested landscape. None of the route is within, or would be visible from, a designated landscape.	A shorter route than average that initially crosses an area of commercial forestry within an undulating landscape. It then rises towards the shoulder of Altry Hill through an unforested landscape. None of the route is within or would be visible from a designated landscape.	A longer than average route that passes in and out of commercial forestry within an undulating landscape before rising towards the shoulder of Altry Hill through an unforested landscape. None of the route is within or would be visible from a designated landscape.	A longer than average route that passes in and out of commercial forestry within an undulating landscape before descending to the deep river valley of the Water of Ken through an unforested landscape. None of the route is within or would be visible from a designated landscape.
Visual Amenity					
The route broadly follows Core Path 215 for much of its length but would initially be screened from receptors within an area of commercial forestry. Although it	The route initially follows Core Path 215 but would be screened from receptors within an area of commercial forestry. The route would likely be visible as it	The route would initially be screened from receptors within an area of commercial forestry. The route would likely be visible for a short section of the SUW and from	The route would initially be screened from receptors within an area of commercial forestry. It would then be visible by receptors as it crosses the SUW in two	The route would initially be screened from receptors within an area of commercial forestry. It would then be visible from property Dalgonar, as it crosses the SUW in	The route would initially be screened from receptors within an area of commercial forestry. It would then be visible from properties Dalgonar and Polskeoch and as it crosses the SUW in two

Route Option A	Route Option B	Route Option C	Route Option D	Route Option E	Route Option F
would be visible from the Core Path 215 and properties Lorg (200 m) and Nether Holm of Dalquhairn (1 km) within the deep river valley, it would be viewed with the rising land of Altry Hill in the background.	approaches the Southern Upland Way (SUW) and from higher ground to the west of the study area as the route ascends the shoulder of Altry Hill, although the latter would be at distances of over 1 km. There would potentially be views of the route with a sky background from users of Core Path 215 and residential receptors at Lorg (500 m) and Nether Holm of Dalquhairn (1 km) from within the deep river valley of the Water of Ken.	residential property Polskeoch (200 m) dependent on forestry felling. It would be visible to receptors using Core Path 215 and properties Lorg (200 m) and Nether Holm of Dalquhairn (1 km).	locations and from higher ground to the west of the study area. There would potentially be views of the route with a sky background from users of Core Path 215 and residential receptors at Lorg (500 m) and Nether Holm of Dalquhairn (1 km).	two locations and from higher ground to the west of the study area. There would potentially be views of the route with a sky background from users of Core Path 215 and residential receptors at Lorg (500 m) and Nether Holm of Dalquhairn (1 km).	locations dependent on forestry felling. It would be visible to receptors using Core Path 215 and properties Lorg (200 m) and Nether Holm of Dalquhairn (1 km).
Hydrology, geology and peat					
Between three and ten watercourse crossings, Section 2 underlain by peaty soils with no national importance, steep slopes on Water of	Between four and nine watercourse crossings, Section 12 passes through area of Class 1 peatland, no PWS	Between three and ten watercourse crossings, small region of high river flooding potential, passes through peaty soils with no national importance,	Between four and seven watercourse crossings, Section 12 passes through area of Class 1 peatland, Sections 7 and 9 within 250 m of Polskeoch PWS	Between eight and thirteen watercourse crossings, Sections 10 and 12 pass through area of Class 1 peatland, Section 10 within 250 m of Dalgonar	Between eleven and eighteen watercourse crossings, small region of high river flooding potential, Section 10 through area of Class 1 peatland, eastern edge of Section 10 within 250

Route Option A	Route Option B	Route Option C	Route Option D	Route Option E	Route Option F
Ken banks, small region of high river flooding potential, no PWS		Section 7 within 250 m of Polskeoch PWS		PWS and Section 9 and a small part of Section 10 within 250 m of Polskeoch PWS.	m of Dalgonar PWS and Section 9 and a small part of Section 10 within 250 m of Polskeoch PWS.
Traffic and Transport					
Route Option A utilises both existing forestry tracks as well as construction access tracks proposed for Lorg and Euchanhead Wind Farms. Additionally, it passes lower down on the topography of the site therefore potentially offering easier access for construction purposes.	Route Option B passes closer to Altry Hill (and therefore would most likely have steeper gradients to traverse) than Route Option A and would possibly be more difficult to access. Additionally, provision of further access tracks would require additional construction traffic for its construction.	Route Option C crosses the Polskeoch Rig (and therefore would most likely have steeper gradients to traverse) than Route Option A and would possibly be more difficult to access. Additionally, provision of further access tracks would require additional construction traffic for its construction.	Route Option D crosses the Polskeoch Rig and passes closer to Altry Hill (and therefore would most likely have steeper gradients to traverse) than Route Option A and would possibly be more difficult to access. Additionally, provision of further access tracks would require additional construction traffic for its construction.	Route Option E crosses the Polskeoch Rig and passes closer to Corse Hill, Carnine and Altry Hill (and therefore would most likely have steeper gradients to traverse) than Route Option A and would possibly be more difficult to access. Additionally, provision of further access tracks would require additional construction traffic for its construction.	Route Option F crosses the Polskeoch Rig and passes closer to Corse Hill and Carnine (and therefore would most likely have steeper gradients to traverse) than Route Option A and would possibly be more difficult to access. Additionally, provision of further access tracks would require additional construction traffic for its construction.
Land Use and Recreation					
Least likely route to be visible from the Southern Upland Way (SUW).	Part of the OHL where it climbs the shoulder of Altry Hill might be visible from the SUW.	Views in forested areas could be screened from view of the SUW if the felled areas are	SUW would be required to be crossed in several locations in all of these route option.	SUW would be required to be crossed in several locations in all of these route option.	SUW would be required to be crossed in several locations in all of these route option. As this is a nationally significant

Route Option A	Route Option B	Route Option C	Route Option D	Route Option E	Route Option F
Views from Lorg Trail (Core Path 215) would be affected, but this is a locally important core path with low tourism economy sensitivity.	Parts of the OHL in the valley of the Water of Ken may be visible against the sky and would be more likely to impact negatively on views from the Lorg Trail.	restocked with plantation trees, although the trees would take time to grow tall enough to provide sufficient screening. Future visibility would fluctuate depending on felling between the OHL and the SUW. Views along the valley of the Water of Ken would be similar to those of Route Option A.	As this is a nationally significant core path, this option should be avoided if possible.	As this is a nationally significant core path, this option should be avoided if possible.	core path, this option should be avoided if possible.
Forestry					
Areas of open ground allowing for felling back to windfirm edge. Short linear route so less forest to fell in comparison to D,E and F	Areas of open ground allowing for felling back to windfirm edge. short linear route so less forest to fell in comparison to D,E and F	Areas already felled within Area 7 and 8 result in no forest loss. Least linear loss of forest	Long linear route in comparison to route option A,B, and C	Route passes through 2 native woodlands Long linear route in comparison to route option A,B, and C	Route passes through 2 native woodlands Long linear route in comparison to route option A,B, and C

4.2.2.4 *Preferred route option*

Analysis of the route options appraisal in Appendix 6, and the summary thereof in Table 4.4. above, revealed the following:

- Route Option A is the most preferred option, having been identified as the preferred option for seven of the nine environmental aspects considered. The remaining two aspects identified this route option as having some potential, as follows:
    - Route Option A has been identified as less preferable than Route Option B from an Archaeology and Cultural Heritage perspective due to being the shorter route. However, as Route Option B would be approximately 250 m shorter than Route Option A, it is not anticipated that this would present a significant constraint to the OHL route;
    - For Forestry, Route Options A and B are considered to have some potential, while Option C is the most preferred due to areas within Route Option C already having recently been felled. However, the removal of trees from Route Options A or B would not present a hard constraint and the lack of trees currently present along parts of Route Option C is not considered to be a significant enough advantage to discount Route Options A or B as potential overall preferred routes.
- Route Option B has some potential to accommodate an overhead line, but was only selected as the most preferable route for one of the nine environmental aspects considered, namely Archaeology and Cultural Heritage. As discussed previously, this route was selected as preferable over Route Options A and C due to the shorter length of the route option, but as the difference in length would be limited to approximately 250 m, this is not considered to be significant.
- Route Option C also has some potential to accommodate an overhead line, having being selected as a preferred route for five of the nine environmental aspects considered. However, although Route Option C has been identified as being preferable to Route Options B, D, E, and F when considering ecological and ornithological aspects, Route Option C is also less preferable than Route Option A due to the following:
    - Route Option C is similar to Route Option A, however, is less preferred as it takes in a larger area of felled plantation which may provide habitat for nesting Pine Marten;
    - Route Option C is similar to Route Option A, however, is less preferred as it takes in a larger area of felled plantation which may provide habitat for ground-nesting and forest edge-nesting bird species which may be at collision risk.
- Route Option D has been identified as having some potential to accommodate an overhead line for six of the nine environmental aspects considered, and as least preferred for the remaining three. The three main aspects influencing the identification of this Route Option as least preferable include its location close to, and possible requirement to cross, the nationally significant Southern Upland Way, and the length of the route which would require more forested areas to be modified than Route Options A, B and C.

- Route Options E and F are the least preferable for seven of the nine environmental aspects considered. In addition, these two route options are least preferable from a technical (engineering and construction) perspective.

In conclusion, when all the environmental aspects and likely effects are considered, on balance, Route Option A would be most preferable from an environmental perspective.

Furthermore, consideration of the technical (engineering and design) aspects of the route options, as set out in Section 4.2.1 of this report, indicates that Route Options A and B would be preferable to Route Options C, D, E and F from a technical perspective.

Taking these factors into account, **Route Option A** has been identified as the overall **preferred route**.

5 CONSULTATION ON THE PROPOSAL AND NEXT STEPS

SPEN is inviting comments on the development proposals described in this document. You may comment in person, at the forthcoming online public exhibition (detailed in the preface to this document), by post or by email.

All comments and input to the route selection for the Euchanhead OHL grid connection are highly valued and appreciated. It would be appreciated if the following could be taken into consideration when commenting:

- Are there any comments regarding the rationale for the project, as set out within this route selection consultation document?
- Are there any comments regarding the approach to the selection of the preferred route as set out in this route selection consultation document?
- Are there any factors that may have been overlooked, or given either too much or insufficient consideration during the route selection process?
- Do you have any other comments about the preferred route of the overhead line?

The online public consultation event will be held from 22nd November2021 to 17th December 2021 at
www.spenergynetworks.co.uk/pages/euchanhead_windfarm_grid_connection.aspx

Please email comments to euchanheadgc@spenergynetworks.co.uk, or post to Euchanhead Overhead Line Grid Connection Project, 55 Fullarton Drive, Glasgow G32 8FA, by the 17th of December 2021. Alternatively, you can submit your comments via the online feedback form on our website (above), also by the 17th of December 2021.

All comments received will inform further consideration of the preferred route alignment and the selection of a proposed route alignment, which will be taken forward for more detailed environmental assessment prior to submission of an application for consent.

6 REFERENCES

6.1 Publications and reports

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6.2 Maps

Cartographer Name	Map Title	Imprint	Source	Link(s)
Ordnance Survey	Kirkcudbrightshire, Sheet 3	Survey date: 1850 Publication date: 1853	NLS	https://maps.nls.uk/geo/explore/#zoom=5&lat=56.00000&lon=-4.00000&layers=1&b=1
Ordnance Survey	Dumfriesshire, Sheet XX	Survey date: 1856 Publication date: 1861	NLS	https://maps.nls.uk/geo/explore/#zoom=5&lat=56.00000&lon=-4.00000&layers=1&b=1

APPENDIX 1
FIGURES

Table A1: List of Figures

Figure No.	Figure Title
1	Location Plan
2	Study Area
3	Ecological Designations
4	Archaeology and Heritage
5	Landscape Character
6	Landscape Designations
7	Visual Receptors
8	Carbon and Peatland
9	Planned Infrastructure Constraints Map
10	Environmental Constraints Heat Map
11	Overhead Line Route Segments
12a-f	Overhead Line Route Options A to F
13	Phase 1 Habitat Survey
14	Soils
15	Watercourses and Private Water Supplies
16	Proposed Access Routes
17	Forestry a) Species Composition b) Forestry Restocking c) Felling Phases d) Forestry Age
18	Preferred Route

APPENDIX 2
HOLFORD RULES

A copy of the Holford Rules (extracted from the SPEN Approach to Routeing and Environmental Impact Assessment document, dated 2020 – see Section 6: References) is attached to this report for ease of reference. How these rules have been applied throughout the routeing strategy and methodology was discussed in Parts 2 and 3 of this report.

Appendix 4

The Holford Rules

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

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

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

The Holford Rules are detailed below[10].

Rule 1 **Avoid altogether, if possible, the major areas of highest amenity value, by so planning the general route of the line in the first place, even if the total mileage is somewhat increased in consequence.**

Note on Rule 1

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

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

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

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

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

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

Note on Rule 2

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

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

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

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

Note on Rule 3

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

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

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Rule 4 **Choose tree and hill backgrounds in preference to sky backgrounds, wherever possible; and when the line has to cross a ridge, secure this opaque background as long as possible and cross obliquely when a dip in the ridge provides an opportunity. Where it does not, cross directly, preferably between belts of trees.**

Note on Rule 4

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

Rule 5 **Prefer moderately open valleys with woods where the apparent height of towers will be reduced, and views of the line will be broken by trees.**

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.

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

Note on Rule 6

(a) In all locations minimise confusing appearance.

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

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

Note on Rule 7

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

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

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

Explanatory Note on Rule 7

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

Supplementary Notes

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

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

(c) Alternative Lattice Steel Tower Designs

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

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Further Notes on Clarification to The Holford Rules

Line Routeing and People

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

The following notes are intended to reflect this.

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

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

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

Supplementary Notes on the Siting of Substations

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

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

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

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

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

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

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Appendix A

Holford Rules

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

1 Interpretation of The Holford Rules1 and 2

1.1 Introduction

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

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

1.2 Designations

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

1.3 Amenity

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

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

1.4 Hierarchy of Amenity Value

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

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

1.5 Major and Smaller Areas

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

1.6 Conclusion

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

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

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

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Appendix B

Holford Rules

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

Major Areas of Highest Amenity Value

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

- Special Areas of Conservation
- Special Protection Areas
- Ramsar Sites
- National Scenic Areas (Scotland)
- Areas of Outstanding Natural Beauty (England and Wales)
- National Parks
- Wild Land Areas
- National Nature Reserves
- Sites of Special Scientific Interest
- Scheduled Monuments
- Listed Buildings
- Conservation Areas
- World Heritage Sites
- Gardens and Designed Landscapes
- Historic Battlefields
- Heritage Coasts

Other Smaller Areas of High Amenity Value

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

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

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

Flora and Fauna

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

Area of Historic, Archaeological or Architectural Value

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

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

Green Belts

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

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APPENDIX 3
ENVIRONMENTAL DATA SOURCES

Table A3: List of environmental data sources

Feature	Abb	Source
Ancient Woodland Inventory	AW	NatureScot
Conservation Areas	CA	Historic Environment Scotland
Core Paths	-	South Lanarkshire Council
Cycle Routes	-	SUSTRANS
Existing Transmission Infrastructure	-	SPEN
Flood Risk Zones	FRZ	SEPA online flood mapping
Geology & Hydrogeology	-	BGS (online)
Geological Conservation Review sites	GCR	Joint Nature Conservation Committee
Historic Environment Record	HER	Dumfries and Galloway Council
Hydrogeology	-	Bgs (ONLINE)
Landscape Character Types (Landscape Character Assessment)	LCT (LCA)	NatureScot
Listed Buildings	LB	Historic Environment Scotland
National Record of the Historic Environment		Canmore (canmore.org.uk)
National Tourist Routes	-	VisitScotland
National Scenic Areas	NSA	Scottish Government
Regional Scenic Areas	RSA	South Lanarkshire Council
OS Maps 1-250k	-	OS Open Data
OS Maps 1-50k	-	Emapsite
Ramsar sites	-	SNH
Residential Settlements and housing allocation areas	-	OS_Address_Layer (downloaded from emapsite)
RSPB Reserves	-	RSPB
Scheduled Monuments	SM	Historic Environment Scotland
SEPA Assessed Watercourses	-	SEPA online river basin management plan mapping
Sites of Special Scientific Interest	SSSI	NatureScot
Scenic Areas	-	South Lanarkshire Council
Special Area of Conservation	SAC	NatureScot
Special Protection Areas	SPA	NatureScot
Soils and peat	-	Scotland's Soils online mapping; James Hutton Institute online mapping
Watercourse catchment areas	-	Flood Estimation Handbook webservice
Wild Land Areas 2014	WLA	NatureScot
Wind Farms	-	NatureScot / Council / Scottish Ministers Energy Consents Unit

APPENDIX 4
ENVIRONMENTAL BASELINE

A4.1 Ecology and Ornithology

The following reports were used to inform these sections:

- Euchanhead Renewable Energy Development. Technical Appendix 8.2: Phase 1 Habitat and NVC Survey (SLR 2020);
- Bat Survey Report- Polskeoch and Euchanhead (RPS 2020);
- Euchanhead Renewable Energy Development. Technical Appendix 8.5: Protected Mammal Survey Report (SLR 2020);
- Euchanhead Renewable Energy Development. Technical Appendix 9.1: Ornithology Technical Report (NRP, RPS 2020);
- Lorg Wind Farm, Protected Species (2013-2104) Baseline Report (Amec Foster Wheeler 2015);
- Lorg Wind Farm, Bat Survey (2013) Report (Amec Foster Wheeler 2015);
- Lorg Wind Farm, NVC Survey (Amec Foster Wheeler 2015);
- Lorg Wind Farm Further Environmental Information – Volume 1- Main Report (e.on 2017);
- Sanquhar II Community Wind Farm – EIA Report – Section 8 Ecology (Community Windpower Jan 2019); and
- Sanquhar II Community Wind Farm – EIA Report – Section 7 Ornithology (Community Windpower Jan 2019).

A 4.1.1 Designated sites

The ecological designations within a 10 km radius of the study area boundary are presented in Figure 3 of Appendix 1.

A4.1.1.1 Statutory Sites

There are no statutory designated sites within 2 km of the study area.

A4.1.1.2 Internationally Designated Sites

There is one internationally designated site within 10 km of the study area, namely the Upper Nithsdale Woods special area of conservation (SAC) that is 9.9 km to the east.

A4.1.1.3 Non-statutory Sites

There is one non-statutory designated site within 2 km of the study area, namely the Afton Uplands provisional local wildlife site (LWS). The Afton Uplands pLWS is an extensive upland site which encompasses a range of upland mire, montane heath and grassland habitats. The site supports alpine clubmoss (*Diphasiastrum alpinum*) and juniper (*Juniperus communis*) and the montane sedge (*Carex bigelowii*) is frequent over the sumit of Craigbraneoch and Blackcraig. The pLWS is 980 m to the west of the study area.

A4.1.1.4 Other Notable Sites

There is one area of ancient woodland within 2 km of the study area, that is 1.67 km to the south-east.

The study area lies within the Galloway and Southern Ayrshire biosphere reserve.

The study area overlaps two red squirrel priority woodlands, suggesting areas of local importance for Red Squirrels (*Sciurus vulgaris*).

A 4.1.2 Broad Habitats

A total of 14 habitat types and were recorded within the study area during the walkover survey and are broadly described below. Refer to Figure 13 in Appendix1.

A4.1.2.1 Acid grassland

The acid grassland recorded across the study area is typical of sloped, sheep grazed upland areas and largely comprises of mat grass (*Nardus stricta*), sheep's fescue (*Festuca ovina*), soft rush (*Juncus effusus*), creeping bent (*Agrostis stolonifera*), *Pleurozium schreberi* moss, and occasional sharp-flowered rush (*Juncus acutiflorus*). Large areas of sheep grazed grassland are present on the southern slopes of Rough Shoulder to the north-east of the study area, at Corse Hill to the north and to the south-west on the western slope of Altry Hill and eastern slope of Lorg Hill.

Occasional areas of tufted hair grass (*Deschampsia cespitosa*) dominated areas are present on the northern slope of Altry Hill.

A4.1.2.2 Amenity

A restricted area of amenity grassland was noted surrounding the farmhouse at Polskeoch however this area was not accessed.

A4.1.2.3 Blanket bog

Blanket bog was noted across several areas of the study area, notably to the north of the study area on the western side of Corse Hill, a limited area of Carnine, a valley mire community at Polskeoch and flat area at Fans of Altry.

The blanket bog community recorded at Coarse hill and Fans of Altry appear to have been subject to draining resulting in hags and gullies. Species typical of these communities include common heather (*Calluna vulgaris*), hare's-tail cottongrass (*Eriophorum vaginatum*), *Sphagnum papillosum, Sphagnum capillfolium, Sphagnum fallax, Cladonia portentosa*, *Pleurozium schreberi* and *Polytrichum commune.*

The valley mire community along the Polskeoch Burn comprises of dominated purple-moor-grass (*Molinia caerulea)* with hummocks of *Pleurozium schreberi* and *Polytrichum commune* with occasional bog asphodel (*Narthecium ossifragum),* hare's-tail cottongrass and *Sphagnum* species. Drainage ditches are present across the area suggesting the water table has been artificially lowered.

A4.1.2.4 Bracken

A limited area of dense bracken (*Pteridium aquilinum*) is present on the south-eastern slope of Lorg Hill.

A4.1.2.5 Broadleaved plantation

Two restricted areas of semi-mature broadleaved planted woodland are present along the Polskeoch Burn. Species present include silver birch (*Betula pendula*), field maple (*Acer campestre*) and alder (*Alnus glutinosa*). Ground flora within these areas typically contained purple-moor grass, tufted hair grass and Yorkshire fog (*Holcus lanatus*).

A4.1.2.6 Coniferous plantation

A large majority of the study area comprises of dense Sitka spruce (*Picea sitchensis*) plantations of various ages, including areas of recently planted plantation in areas of previously cleared plantation. Very limited ground flora is present due to the heavy shading. An exception to this is the area to the south of the Polskeoch Burn where a thick *Sphagnum* layer is present.

A4.1.2.7 Dry heath

A limited area of dry heath vegetation dominated by common heather is present within the Polskeoch Burn valley, to the north of the farmhouse.

A4.1.2.8 Felled plantation

Several pockets of felled coniferous plantation are present within the study area. Some vegetation regrowth was evident including tufted hair grass, heather, Sitka spruce regeneration and some broad-leaved trees.

A4.1.2.9 Flush

A small area of flush exists within the valley mire along the Polskeoch Burn, containing *Sphagnum*, common cottongrass (*Eriophorum angustifolium)* and a *Potamogeton* species.

A4.1.2.10 Marshy grassland

Large areas of the study area comprise of marshy grassland, of particular note around Altry Hill and southern slope of Rough Shoulder where sharp flowered rush and soft rush dominate the vegetation structure.

In addition, swathes of marshy grassland associated with the watercourses and between forest rides are present, also dominated with either sharp-flowered rush or soft rush with occasional herbs present such as creeping buttercup (*Ranunculus repens)*, marsh thistle (*Cirsium palustre)* and marsh Valerian (*Valeriana dioica*).

A4.1.2.11 Modified bog

Large areas of modified bog were recorded across the study area, mostly to the north on Corse Hill and to the south-west on Altry Hill and northern slopes of Cairn Hill. The majority of modified bog saw an increase in purple-moor grass within the sward and limited *Sphagnum* species. Species recorded include hare's-tail cottongrass, deer grass

(*Trichophorum cespitosum*), mat grass, *Pleurozium schreberi* and *Polytrichum commune.*

A4.1.2.12 Neutral grassland

An area of neutral grassland is present within the Polskeoch valley, Yorkshire fog and tufted hair grass dominate the sward, the area then grades into rush pasture forming a mosaic of the two habitats.

A4.1.2.13 Semi-natural coniferous woodland

Within the Polskeoch valley is a small area of semi-natural bog coniferous woodland where mature spruce is present with mire vegetation beneath.

A4.1.2.14 Wet heath

The northern slopes of Black Hill and western slopes of High Countam leading down to Low Countam are characterised by wet heath vegetation, with pockets of blanket bog. The sward comprises of common heather, purple moor grass, hare's tail cottongrass, cross-leaved heath (*Erica tetralix*), deer grass mat grass, bog asphodel and heath rush (*Juncus squarrosus*). Drainage ditches vegetated with *Sphagnum* and occasional hags were recorded.

A4.1.3 Protected Species

A4.1.3.1 Mammals

Desk study

The desk study carried out in March 2021 found records of seven noteworthy mammal species with 2km of the site boundary. Of these, Natterers Bat (*Myotis nattereri*), Common and Soprano Pipistrelle bats (*Pipistrellus pipistrellus* and *Pipistrellus pygmaeus*), European Otter (*Lutra lutra*) and Mountain Hare (*Lepus timidus*) are protected by law under *Schedules 2 and 4* of *The Conservation (Natural Habitats, & c.) Regulations 1994* (as amended). Red Squirrel are protected under The *Wildlife & Countryside Act 1981* as amended by *The Wildlife and Natural Environment (Scotland) Act 2011.* These species are also all listed on the Scottish Biodiversity List, along with Brown Hare (*Lepus europaeus*) which has also been recorded with 2km of the site.

Field Walkover survey

No evidence of Otter or Water Vole (*Arvicola amphibius*) was recorded during the walkover survey however there is suitable habitat for both species along several of the watercourses within the study area including Water of Ken, Polskeoch Burn, Pulmulloch Burn, Pot Burn and Polvaddoch Burn. Previous survey work undertaken for the Euchanhead RED and Lorg Wind Farm confirmed the presence of otter within the study area.

No evidence of Badger (*Meles meles*) or Red Squirrel was recorded during the walkover survey. The forested areas and felled areas could provide suitable habitat for both Red Squirrel and Pine Marten (*Martes martes*). Previous survey work undertaken for Euchanhead RED and Lorg Wind Farm confirmed the presence of presumed Red

Squirrel and Pine Marten within the study area. A number of scats were recorded during the walkover which could be attributed to Pine Marten.

The study area offers a range of habitats suitable for bat species however it is likely that roosting sites are limited given the lack of buildings and mature trees within the study area. In addition much of the study area is likely too exposed for foraging bats. A confirmed Soprano Pipistrelle maternity roost is present within the bothy towards the centre of the study area, confirmed in 2019. In addition an individual pipistrelle (*Pipistrellus* sp.*)* bat was recorded roosting within the farmhouse at Polskeoch in 2019.

Although not a protected species, a high number of Fox (*Vulpes vulpes*) scat was noted during the walkover survey suggesting a relatively high population within the study area. In addition, there were abundant signs of Field Vole (*Microtus agrestis*) and Bank Vole (*Myodes glareolus*) most notably along the small watercourses within the study area.

A4.1.3.2 Amphibians and Reptiles

Desk study

The desk study carried out in March 2021 found no records of reptiles within 2km of the site.

Field Walkover survey

Aquatic features suitable for amphibians are limited across the study area; several bog pools are present to the north of the study area which offer limited potential for amphibians however no evidence was noted during the walkover.

No reptiles were observed during the walkover survey, however there are suitable habitats for Common Lizard (*Zootoca vivipara*) and Adder (*Vipera berus*) across the study area particularly in un-forested areas and felled areas.

A4.1.3.3 Invertebrates

Desk study

The desk study carried out in March 2021 found records of 10 notable terrestrial invertebrate species within 2 km of the site, of which none are specifically protected by The *Wildlife & Countryside Act 1981* as amended by *The Wildlife and Natural Environment (Scotland) Act 2011.*

Field Walkover survey

The habitats and watercourses within the study area offer limited potential for Fresh Water Pearl Mussel (*Margaritifera margaritifera*). Surveys undertaken in 2020 did not record the presence of the species within the study area.

Heath and bog habitats are likely to support a range of moth and butterfly species.

A4.1.4 Ornithology

A4.1.4.1 Desk study

The desk study carried out in March 2021 found records of thirty-seven notable bird species with 2 km of the site boundary. Of these, those of particular risk of collision with overhead line equipment include Black Grouse (*Tetrao tetrix*), Red Grouse (*Lagopus lagopus*), the raptor species: Goshawk (*Accipiter gentilis*), Golden Eagle (*Aquila chrysaetos*), Short Eared Owl (*Asio flammeus*), Red Kite (*Milvus milvus*), and Barn Owl (*Tyto alba*); as well as the wader and waterfowl species: Common Sandpiper (*Actitis hyperleucos*), Pink-Footed Goose (*Anser brachyrhyncus*), Snipe (*Gallinago gallinago*), Curlew (*Numenius arquata*), Golden Plover (*Pluvialis apricaria*) and Woodcock (*Scolopax rusticola*).

Ornithology work carried out to inform the proposed Sanquhar II Community Wind Farm EIA and Euchanhead RED EIA recorded all of the species listed above, as well as Hen Harrier (*Circus cyaneus*), Merlin (*Falco columbarius*), Peregrine (*Falco peregrinus*), Greylag Goose (*Anser anser*), and Dunlin (*Calidris alpina*). There is also a historic Peregrine nesting site within 2 km of the site boundary (details of the exact location are confidential).

A4.1.4.2 Field survey

Open moorland areas of the site, for example the area around the proposed Lorg collector substation, provide suitable foraging habitat for raptor species such as Golden Eagle, Hen Harrier, Merlin, Peregrine, Red Kite and Short Eared Owl. During the 2020-21 vantage point surveys to date (May 2021), Hen Harrier, Merlin, Peregrine and Red Kite have been observed at potential collision risk height in the south west section of the site, between Coranbrae Hill and Lorg Hill. Previous survey work carried out for the Sanquhar II Community Wind Farm EIA and Euchanhead RED EIA also identified Golden Eagle and Short Eared Owl flight activity within the site boundary. The open moorland areas also offer suitable nesting habitat for Hen Harrier and Short Eared Owl.

Goshawk activity has been observed in the forestry in the central areas of the site between Corse Hill and High Countam. There was a historic nesting site in the forestry near Polskeoch Bothy, however this section of trees has since been felled by wind. Forestry edges and rides also offer suitable nesting habitat for Merlin and Red Kite. The valley in the centre of the site between Holm of Dalquhairn and Dalgonar offers suitable habitat for Barn Owl, with several buildings suitable for roosting and nesting, however no evidence of the species has been observed to date.

Waterfowl activity on site during VPs to date has been limited to Pink-Footed Geese migrating at high altitude, which are at little risk of disturbance by overhead line equipment. The valley mire at Polskeoch provides suitable foraging habitat for goose species, as does the sheep-grazed grassland on site. The open upland areas on site provide suitable wintering and breeding habitat for wader species, however, to date, the only species observed during the vantage point and walkover surveys have been Common Sandpiper, Snipe and Woodcock. Previous survey work for the Sanquhar II Community Wind Farm EIA and Euchanhead RED EIA also found Curlew to be present north of the Euchanhead OHL point of connection. These areas are also suitable for Red

Grouse, which have been observed in small numbers, and Black Grouse, particularly at the woodland edges.

A4.2 Archaeology and Cultural Heritage

The project area is located in Dumfries and Galloway, to the south west of Sanquhar. The study area generally comprises upland open moorland with plantation, situated between the high points of Craigstewart/Altry Hill, Polskeoch Rig and Corse Hill/Carnine, and interspersed with numerous steeply incised watercourses such as the Water of Ken.

The proposed grid connection runs between Lorg substation collector point: 267639, 599635 (440m AOD); and Euchanhead Wind Farm point of connection: 267463, 603248 (455m AOD).

There are no designated heritage assets (e.g. scheduled monuments, listed buildings) within the study area. There are 38 known non-designated assets recorded on the Historic Environment Record (HER) and/or National Record of the Historic Environment (NRHE) within the study area. These comprise nine roads/trackways, eight farmsteads/buildings, six cairns, four findspots, three sheepfolds, two enclosures, and one each of a building platform, a memorial stone, ridge and furrow earthworks, a beacon, a cropmark, and a natural feature. These are identified as RSK 1 – 38 in this report.

A review of the First Edition Ordnance Survey historic mapping for this assessment has identified a further 19 non-designated assets comprising 15 sheep rees/folds/shelters, two boundary stones, a cairn and a quarry. These are identified as RSK 39 – 57 in this report.

A further six non-designated assets were identified during the baseline surveys and assessments for the Lorg Wind Farm, and not identified in the data sources listed above, comprising two stone scatters, a cairn, a farmstead, a quarry and a loch. These are identified as Lorg 1 – 6 in this report.

The locations of the identified archaeological and cultural heritage assets are shown on Figure 4 in Appendix 1.

Overall, the upland nature of the landscape within the study area means that past human activity and use of the land is likely to have taken the form of stock-raising and animal husbandry (e.g. sheep), hunting and fishing rather than arable agriculture. Human occupation of the land is more likely to have been of low density and temporary or seasonal (such as the occupation of summer grazings, shielings and bothies) rather than permanent year-round settlement.

A4.3 Landscape and Visual Amenity

The Study Area is entirely within Dumfries and Galloway, with a small area of the 2 km buffer zone in the neighbouring county of East Ayrshire to the north west.

A4.3.1 Landscape Designations and Classifications

There are no designated landscapes of international, national or local importance within the Study Area.

Part of the East Ayrshire Sensitive Landscape Area (SLA) is located within the buffer zone, approximately 0.9 km to the west of the Study Area (see Figure 6 in Appendix 1). The SLA are non-statutory, local designations, described in Policy ENV 7 of the Local Plan as areas the Council will give, "*priority and prime consideration to the protection and enhancement of the landscape in its consideration of development proposals*". The '*Key Characteristics'* and '*Sensitivities*' of specific SLA are set out in the Sensitive Landscape Areas document (published by East Ayrshire Council in March 2015). The Southern Uplands SLA within the buffer area is described within this document as, '*The steep sided, rugged hills of the Southern Uplands form a dramatic backdrop to the adjacent low-lying upland basin, and form an important part of East Ayrshire's southern skyline. The well defined, steep sided hills on the eastern edge of Glen Afton, Blackcraig and Craigbaneoch, are important landmark features and provide for some spectacular views*.' Route Option Segment 2 (see Figure 11 in Appendix 1) lies closest to the SLA, approximately 1 km to the east, but is contained within forestry. Potentially more open route option segments, such as Route Option Segment 4, are located over 2 km to the east of the SLA. The nearest of the hills identified as having, "*spectacular views*", Blackcraig, lies over 3.5 km to the north west of the site from where any distant views would be against the backdrop of forestry. There is, therefore, very limited intervisibility between the study area and SLA and it is not considered further in the report.

A4.3.2 Landscape Character

The Landscape Character of the area was classified in the Scottish Natural Heritage July 2019 mapping of landscape character types within Scotland. The landscape is classified in terms of broad character types and areas referred to as Landscape Character Types (LCT). The 2019 SNH landscape character assessment supersedes the 1998 LUC assessment which is therefore not reviewed.

As illustrated by Figure 5 in Appendix 1, the majority of the Study Area and much of the buffer zone is coincident with LCT 178 Southern Uplands with Forest – Dumfries and Galloway. A small area of LCT 177 Southern Uplands – Dumfries and Galloway is coincident with the eastern part of the study area and the buffer zone to the west and south east. The Southern Uplands LCT 177 continues into neighbouring East Ayrshire as Southern Uplands - Ayrshire LCT 81 within the SLA; as already described there is very limited visibility with the SLA and LCT 81 is not considered further. The other LCTs within East Ayrshire lie outside the 2 km buffer zone and are not considered further. LCT 160 Narrow Wooded Valley – Dumfries and Galloway, covers a narrow strip of land in the south western part of the study area and the buffer zone to the south.

LCT 178 Southern Uplands with Forest – Dumfries and Galloway

The LCT 178 Southern Uplands with Forest is characterised by large smooth domed and slightly conically shaped hills, dissected by steep sided clefts and glens often enlarged by glacial action. This forms a large-scale landscape of often dramatic landform with peaks generally between 200 to 500 m. Landscape character is strongly influenced by extensive conifer plantations, although there are some areas of smaller scale landscapes within steeply sloping valleys or where uplands remain open.

While landscape character is influenced by windfarm development, the vast scale of the landscape and the large tracts of uninhabited upland give a sense of remoteness particularly in the more isolated valleys with no through road. Where forestry permits,

views remain to the surrounding valleys and adjacent hill groups. There are few other man-made features visible, albeit, the landscape does not feel particularly wild.

Within the July 2019 SNH assessment the key characteristics of the LCT are listed as:

- *Large, smooth dome-shaped hills with large dark green forests on slopes and lower summits.*
- *Predominantly simple, gently rolling landform.*
- *Some areas of more complex and smaller-scale landscapes, with steep slopes enclosing heads of valleys and/or where uplands remain open.*
- *Changing landscapes with large scale forestry operations and wind farm development.*
- *Forested areas dominated by Sitka Spruce, interspersed with mixed conifers and broadleaf planting, and undergoing felling and planting in large coupes.*
- *Wind farms are a characteristic in some areas.*
- *Expansive scale.*

This landscape type is of a large scale and is relatively simple in form, texture and colour. The presence of wind farms and afforestation reduces the naturalness of the landscape, although it can feel remote in places. There is some increased sensitivity where forests do not dominate and the introduction of taller structures would be more prominent in the landscape. However, this does not apply within the heavily afforested areas of the landscape and the forestry would often provide a level of screening for the overhead line. The removal of large sections of forestry, particularly in straight lines, can also create adverse landscape impacts and the OHL route should be designed to follow the edge of forestry wherever possible.

Overall, the Southern Uplands with Forests LCT is considered to have a medium to low value and a low susceptibility to a proposed overhead wood pole line and therefore would be considered to have a low sensitivity to the proposed development.

LCT 177 Southern Uplands – Dumfries and Galloway

The Southern Uplands are very similar in character to LCT 178 above with exception of the landcover; the majority of landcover consists of a mosaic of grasses, bracken, rushes and heather. The landscape is again, large scale and sparsely populated with large-scale windfarms locally characteristic.

The July 2019 SNH assessment describes the key characteristics of LCT 177 as:

- *Large, smooth dome-shaped hills, predominantly grass-covered.*
- *Open and exposed character within incised valleys.*
- *Dramatically sculpted landforms and awe-inspiring scale.*
- *Distinctive dark brown/purple colour of heather on some higher areas.*
- *Pockets of woodland in incised valleys.*
- *Stone dykes occasionally define the lower limits.*
- *Legacy of lead and other mining activity, with extensive archaeological remains around the former mining village of Wanlockhead.*
- *Wind farms locally characteristic, away from the more dramatic, scenic and sculptural slopes and skylines.*

Overall, the Southern Uplands with Forests LCT, outside of valued areas, is considered to have a medium value and a (medium to) low susceptibility to a proposed overhead

wood pole line and therefore would be considered to have a medium to low sensitivity to the proposed development.

LCT 160 Narrow Wooded River Valley – Dumfries and Galloway

This LCT is found where glacial and fluvial erosion has been limited to narrow incised channels, such as the Water of Ken to the south west of the Study Area. The upper reaches of the valley are V-shaped, becoming more trough-shaped further downstream. The landscape is small-scale and enclosed, although relatively unwooded within the Study Area.

The July 2019 SNH assessment describes the key characteristics of LCT 160 as:

- *Narrow incised valleys with wooded slopes enclosing pasture floors.*
- *Small pastures and arable fields enclosed by hedges/fences in lower reaches and drystone dykes in upper reaches.*
- *Dominant broadleaf (semi-natural) woodland character with conifers on higher slopes.*
- *Lush trough-shaped river valleys with pasture/arable floors enclosed by deciduous wooded slopes.*
- *Riparian trees and woodlands following meandering river courses in lower reaches.*
- *Narrow lanes following valleys and linking isolated houses, occasional settlements and providing access to higher moorland.*
- *Clusters of prehistoric landscapes and settlement up some valleys, notably in Eskdale.*
- *Numerous arched stone bridges over the rivers.*
- *Intimate unspoilt landscape focusing on river views with some adjacent policy landscape.*

This landscape type is relatively enclosed with woodland belts providing further enclosure and visual screening in places which makes it somewhat suitable to the proposed development.

Overall, the Narrow Wooded River Valley LCT is considered to have a medium value and a medium to low susceptibility to a proposed overhead wood pole line and therefore would be considered to have a medium to low sensitivity to the proposed development.

A4.3.3 Cumulative Context

The wider study area contains a number of existing wind farms, such as Whiteside Hill and Wedder Hill which are visible over a considerable distance, including parts of the Study Area that are not forested.

The proposed Euchanhead RED and consented Lorg Hill wind farm are located within the study area and potentially visible in cumulation with the proposed scheme.

A4.3.4 Visual Envelope

The study area is located almost fully within the Southern Uplands and it is this topography, together with areas of plantation forestry, that define the area of land from which the study area would potentially be visible. The land rises to a high point of 580 m at Corse Hill within the north of the Study Area with two further high points at Carnine (557 m) and Polskeoch Rig (536 m) just to the south. The high ground acts as a visual

screen to the wider study area/buffer zone and although potential development on the high ground could be noticeable, the dense forest cover on the hills acts as a further screen to more local views.

The domed hills to the north of the study area are dissected by a number of incised burns which form tributaries to the Water of Ken that flows in the narrow valley in the south west of the Study Area. The broad ridge of Altry Hill (489 m AOD) separates the central and southern part of the Study Area. The land then falls to Pulmulloch Burn to the east before rising again to High Countam further east and Coranbae Hill to the south. The central, western and southern parts of the study area are generally unforested, with dense forestry wrapping around the eastern edge and along the southern boundary of the Study Area. The more open and unforested areas of the study area afford views to some of the wider peaks with associated wind farms, such as Whiteside Hill and Wedder Hill.

The rolling nature of the landform continues in the buffer zone, and, together with the considerable areas of commercial forestry within the north, west and south, screens longer distance views of the study area.

A4.3.5 Settlements

The study area is typical of the Southern Uplands in having a very sparse level of settlement. What there is consists of a small number of scattered individual properties/ farms along the narrow tracks within the valleys. There are two properties noted within the study area and a further four within the buffer zone as shown on Figure 7 in Appendix 1.

All residential receptors are considered to have a high susceptibility and sensitivity to the proposed development. Effects would decrease with distance from the proposed development and it may be possible to route the proposed development with little overall visual impact on residential receptors.

A4.3.6 Transport Routes

There are no significant transport routes within the study area or buffer zone. Transport routes are limited to stone tracks which link the various properties and provide access through the forested areas. Refer to Section 4.6 for a more detailed description of the transport baseline and potential access routes.

Road users within the study area would be considered to have a low susceptibility and sensitivity to the proposed development from a landscape and visual perspective.

A4.3.7 Tourism and Recreation

As presented on Figure 7 in Appendix 1, there are several core paths (see Section 4.7.2 for a more detailed description of the core paths), broadly aligned in a north south direction to within the eastern and western boundaries of the study area, which continue further into the buffer zone. The core paths are connected by a section of the Southern Upland Way, the UK's first official coast-to-coast long-distance route. Much of these routes are in areas of forestry, although the core path within the south western boundary of the study area and Southern Upland Way within the south eastern boundary of the study area lie outside or to the edge of forestry areas. Depending on the location and existing visual amenity experienced by users of individual core paths the sensitivity of

walkers to the development would vary e.g. users of footpaths within the areas of forestry could be considered to be less sensitive to the development, whereas users of Southern Upland Way may be considered to be more sensitive outside of forestry areas. The users of core paths within the study area, outside of forestry areas, are likely to be considered to have a sensitivity to the development that lies between the two.

A4.5 Geology, peat, hydrology and hydrogeology

A4.5.1 Geology

Bedrock geology

The bedrock geology is dominated by Ordovician strata. There are two main formations within the site: the Portpatrick Formation and the Kirkcolm Formation (BGS, 2021). These formations are divided by the Leadhills Fault which trends north-east to south-west across the study area, just to the north of the central part of the study area.

To the south of the fault, covering the majority of the central and southern region of the study area, is the Portpatrick Formation, a medium- and coarse-grained greywacke sandstone which is commonly thick bedded with many andesitic clasts. The northern region of the site is covered by the Kirkcolm Formation, a medium- to thin-bedded quartzose greywacke sandstone with some thick siltstone intercalations, chert beds, microconglomerate and sedimentary breccio-conglomerate.

To the north-west of the Leadhills Fault, the Moffat Shales Group can be found, trending in the same direction as the fault. The group consists of black and grey silty mudstones and locally thin chert beds.

The bedrock geology has been intruded by various igneous intrusions of Lower Devonian age. These primarily consist of microcrystalline granitic and microdioritic dyke suites.

There are a number of small faults co-located with the prominent Leadhills Fault, trending in a similar direction. Folding structures have also been identified within the site.

Superficial geology

The superficial geology correlates largely with the geography of the site. On the hilltops and slopes to the north and south, peat is the dominant superficial deposit. The central region of the site at lower topography, running roughly along the Water of Ken valley and associated with its tributaries, is dominated by Quaternary diamicton till, consisting of mixed clays, silts, sands and gravels. Some minor fluvial and alluvial deposits are present within the area corresponding to study area watercourses. Steeper slopes are largely without superficial deposits, in particular along the steep banks of the Water of Ken and along steep hillsides to the north.

A4.5.2 Geomorphology

Whig's Hole is a natural sea cave or a raised beach cave located at NS 67036 00044, at approximately 420 m AOD, the entrance to which is located within the steepest part of the south-western facing slope of Altry Hill. There are no other caves or subterranean features recorded within the study area. This cave is not located within any of the identified route segments, but is close to where route segments 4, 5 and 12 meet. An

avoidance buffer (red constraint) of 10 m and an amber buffer (10 m) were applied in Figures10 and 11 in Appendix 1. While the entrance to this cave is within an area that has been identified as steeper than 22 degrees and therefore not technically feasible to construct or locate OHL infrastructure near the cave, the location of this cave has been noted as it is used for recreational purposes, and may also present a technical / safety risk during construction.

A4.5.3 Soils

The National Soil Map of Scotland identifies the main soil types within the study area as predominantly gleys, podzols and peat, with some humus-iron podzols and brown earths (James Hutton Institute, 1981).

In the northern and south-western region on the hill tops and slopes, the podzols and gleys are peaty in nature. In the central lower-lying region and along river valleys, the podzols and gleys are of mineral soil type, with associated minor brown soils. The south-eastern region of the site is dominated by dystrophic blanket peat.

Areas of carbon-rich soil, deep peat and peatland habitats are indicated on the Carbon and Peatland 2016 map (SNH, 2016). The south-central region and northern boundary of the study area have been assigned Class 1, which indicates areas likely to be of high conservation value. A part of the south-western study area and small sections in the northern study area have been assigned Class 3. Class 3 indicates carbon-rich soils and some areas of deep peat but vegetation cover does not indicate priority peatland habitat. The rest of the site is dominated by Classes 4 and 5, and areas with no carbon soils present.

A4.5.4 Hydrogeology

The bedrock underlying the study area is classed as a Low productivity aquifer with limited groundwater flow (BGS, 2021). The near-surface weathered zone and secondary fractures may increase intergranular permeability; however, flow and storage are generally confined to fractures.

The glacial till and alluvium superficial deposits within the study area have a range of potential permeabilities, and their productivity will depend on their composition and connectivity locally, with pockets of sand and gravel having higher permeability and clay and silt having lower permeability.

The peat bodies will also hold significant amounts of groundwater; however, flow within peat is usually very slow and likely to contribute only limited baseflow to local burns. Significant flow can occur through subsurface drainage structures such as peat pipes where these are present.

The groundwater vulnerability is considered to be between Class 3 and 5 (Dochartaigh *et al.*, 2011). Vulnerability Class 5 is described as ‘Vulnerable to most pollutants, with rapid impact in many scenarios’. Class 4 is described as ‘Vulnerable to those pollutants not readily adsorbed or transformed’, and Class 3 is described as ‘Vulnerable to some pollutants; many others significantly attenuated’. This indicates that the groundwater present within the project area has a moderate to high level of vulnerability to individual events where potentially contaminating substances are involved.

A4.5.5 Special Designations

Designated sites of relevance to geology, hydrogeology and hydrology have been identified within 5 km of the study area. Data was collated from NatureScot (2021) and Joint Nature Conservation Committee (JNCC, 2021). Designated sites reviewed include Sites of Special Scientific Interest (SSSI) and Ramsar sites (internationally recognised wetlands). Geological Conservation Review (GCR) sites have also been included for completeness; these do not have a statutory designation but are considered to be important for geological understanding and many are also protected as SSSI.

From this search there were no identified designated sites within the study area or within 5 km of the study area boundary.

A4.5.6 Hydrology

The study area is lies across two watercourse catchments: the Water of Ken and the Polskeoch Burn.

The Water of Ken catchment drains the majority of the study area. It begins in the central region of the study area and flows south-west. The Fortypenny Burn, the Pulmmulloch Burn and the Pot Burn are both major tributaries to the Water of Ken within the study area, draining roughly north-west, north and south-east, respectively, to join the Water of Ken at its headwaters.

The Polskeoch Burn catchment drains the north-eastern part of the study area, draining the area around Carnine hill and then flowing north-east. The Rashy Grain is a tributary to the Polskeoch Burn.

A4.5.7 Private Water supplies

The Environmental Health Department of Dumfries and Galloway Council was contacted to request any information that they hold with regard to private water supplies (PWS) within 5 km of the application boundary. A response was received on 08 March 2021 confirming that their records indicate that there are 17 PWS users and a further eight potential PWS supplies within 5 km of the study area boundary.

Two key PWS have been identified of direct relevance, shown in Table 6.1.

Table 6.1 Private Water Supplies within study area

Name	Location and type	Potential linkage
Polskeoch	NS 68677 02308 Spring	Springs are located on the slopes above the property, towards Carnine. Any routeing across this could influence supply.
Dalgonar	NS 70012 03103 Watercourse	Downstream of study area along Dalgonar Cleuch.

A4.5.8 Flood Risk

SEPA's Flood Map (2021) shows that flood risk is relatively minimal within the study area, with some localised regions of surface water (pluvial) and river (fluvial) flood risk.

River flooding is largely confined to the main channels of the Water of Ken and Polskeoch Burn. The main channels of the watercourses each have a high likelihood of flooding, defined as having a 10% chance of a flood event in a given year.

There are very small areas at high risk of surface water flooding scattered across the study area, particularly in the central region around the low areas to the west of Polskeoch, mainly associated with the Polskeoch Burn. Additionally, a small region near the south-eastern edge of the study area is indicated to be at high risk of surface water flooding.

A4.6 Traffic and transport

There are three main access routes to the study area, shown on Figure 16 in Appendix 1. Currently, access to the northern part of the study area can be gained by road from the A76 (T), which connects Kilmarnock with Dumfries partially utilising an existing access to the Harehill Wind Farm. A76 (T) provides a single two-way carriageway highway subject to a national speed limit, with some reduction (typically to 30/40mph) when passing through some of the small villages/hamlets.

Existing Harehill Wind Farm access tracks do not provide full access to the study area, however as part of the Euchanhead Wind Farm further track extensions and upgrades are proposed and once constructed access to the Euchanhead connection point will be gained.

Additionally, access can be obtained off the U432n Euchan Water to the south of Sanquhar, which is accessed via the C128n Blackaddie Road in Sanquhar with further track extensions and upgrades proposed as part of the Euchanhead Wind Farm application.

No direct access to Lorg substation can be gained at the moment as no tracks passed the Lorg farm are constructed. Access to the Lorg Substation will be gained via tracks that will be constructed as part of the Lorg Wind Farm via the C35S leading northwards from its junction with B729.

A4.7 Land Use and Recreation

A4.7.1 Land use

Existing land use

Land within and around the study area is currently used for rough sheep grazing (see Figures 6.1 and 6.2 below), commercial forestry and informal recreational uses (see Section A4.7.3 for more detail on recreation).

There is a property that appears to be residential, referred to as Lorg farmhouse in the valley along the Water of Ken, and the Polkeoch Farm near the Southern Upland Way. The locations of the residential receptors are shown on Figure 7.

Figure 6.1: Rough sheep grazing in the valley along the Water of Ken and on the western slope of Altry Hill.

Figure 6.2: Forestry plantation at the foot of Lorg Hill viewed from the valley along the Water of Ken.

Planned land use

Planned land uses were discussed in detail in Section 3.1.2 of this report, and include the consented Lorg Wind Farm, proposed Euchanhead RED, proposed Sanquhar II

Community Wind Farm, planned forestry track near Polskeoch Farm and planned Euchanhead met mast. The site boundaries and key planned infrastructure related to these developments are shown on Figure 9 in Appendix 1 and were primary considerations when identifying potential route segments and route options for the proposed Euchanhead OHL grid connection.

A4.7.2 Recreation

There are no formal recreational facilities within the site, although tracks and other paths provide access for visitors to enjoy informal recreational activities including walking, cycling, horse riding, orienteering and wild camping. The majority of the site is subject to the 'right to roam' under the Land Reform (Scotland) Act 2003, meaning that access for recreation (including horse riding and walking) is permitted over most of the study area. The site also has a number of small waterbodies where recreational pursuits such as angling could be undertaken.

Figure 6.3: Altry Hill (right), Lorg Hill (left) and the Water of Ken to the south east of the core path 215 (Lorg Trail).

There are several core paths that fall partly within the study area, including the Southern Upland Way, Lorg Trail, and Corlae core path[9].

[9] Dumfries & Galloway Core Path Routes interactive website: https://info.dumgal.gov.uk/mapviewers/pathsmap.aspx [Accessed 23/06/2021]

A4.7.2.1 Southern Upland Way

The Southern Upland Way (SUW), also known as Core Path 504, is the most noteworthy core path relevant to the study area, and is of national significance. The SUW is one of Scotland's Great Trails, and is Scotland's first official long-distance coast – to - coast route, running for 338 km between the Irish Sea and the North Sea. Figure 6.4, below, captures a small portion of the SUW where it winds between plantation trees, near the intersection of the SUW with the Lorg Trail.

Figure 6.4: Southern Upland Way near its intersection with the Lorg Trail

Several marathon events (50 and 100 mile) take place in the spring and in the autumn, which follow part of the Southern Upland Way within the study area. The events are considered to be of regional importance.

The Polskeoch Bothy is located alongside the SUW at E268547, N601879 (see Figure 6.5, below) and is available for walkers and visitors to the area to use on an informal basis.

Figure 6.5: Polskeoch Bothy at E268547, N601879, alongside the Southern Upland Way

The SUW passes by Allen's Cairn (local value), a monument to Covenanters. In addition, the SUW passes close to one of the Striding Arches which are sculptures created by the renowned sculptor, Andy Goldsworthy. There are four Striding Arches located south of the study area of which the Colt Hill arch is the most northerly; access to this sculpture can be gained via a 600 m spur off the Southern Upland Way. The Striding Arches are promoted by VisitScotland, Dumfries & Galloway, and other tourism websites and are considered to be of regional value and medium sensitivity to the tourism economy. However, these striding arches are outside of the study area and would be largely shielded from the OHL route by the topography of the land between the OHL route segments under consideration (e.g. Altry Hill) and Colt Hill where the sculpture is located.

Scottish Hill Track 83 also follows the Southern Upland Way through the study area.

A4.7.2.2 Lorg Trail

The Lorg Trail, also known as Core path 215, is a 6.4 km trail that starts near the confluence of Coranbae Burn with the Water of Ken and travels north-eastwards following alongside the Water of Ken. The part of this pathway that follows the Water of Ken, also known as DS15, forms part of the heritage path from Sanquhar to Stroanpatrick. This path was marked as a road on Armstrong's map of Ayrshire in 1773. In addition, a detour from this path up the south-western slope of Altry Hill reveals the entrance to Whig's Hole, a natural cave (see also Section 4.5.2-geomorphology) that was used to hide Covenanters during times of persecution (late 1700's) in Scotland, and to provide a place from which the old road from New Cumnock and the path from Sanquhar to Stroanpatrick could be observed[10].

[10] http://www.heritagepaths.co.uk/pathdetails.php?path=368 [Accessed 23/06/2021]

The Lorg trail follows along the Water of Ken, past the Lorg farmhouse and around the foot of Lorg Hill before entering the forestry plantation and coinciding with a short section of the Southern Upland Way near the large rectangular sheep fold (see Figure 6.6, below).

Figure 6.6: Trail marker at the intersection of the Lorg Trail with the Southern Upland Way.

From there, the Lorg Trail passes north-westwards through the plantation along a forestry track on the slopes of Lorg Hill before meeting up with Core Path 443 (Bank Hill to Graystone Hill) at the foot of Polskeoch Rig.

A4.7.2.3 Corlae core path

The Corlae core path, also named Core Path 188, is approximately 3 km long and follows forest tracks and rides from the bottom of the glen to meet up with the Southern Upland Way. Way-walkers can access the bed and breakfast at Holm of Dalquhairn using this path.

A4.7.2.4 Nearby core paths outside of the study area

The Benbuie to Troston Hill (Core Path 51) is 7.7 km arduous forest track that leads from the Southern Upland Way (near Allan's Cairn) to the Striding Arch sculptures.

A4.8 Forestry

A 4.8.1 Forestry study area

The Forestry Study Area (FSA), as shown on Figure 6.7 (below), extends to approximately 306.12 ha and is part of an extensive area of state-owned forestry managed under Scottish Forestry Forest Management Plans. The forests contain a range of woodland types and age classes, predominantly in the range 30 to 50 year age group due to original planting programme but together with areas of unplantable land and open ground. The crops are comprised largely of commercial conifers with areas of mixed broadleaves and open ground. The woodlands are in the production phase with rotational felling and restocking already underway.

A 4.8.2 Baseline conditions

A 4.8.2.1 Baseline Planting Year/Age Class Structure

A summary of the age class structure of the woodlands within the FSA is detailed in Table 6.2 below and in Figure 17d in Appendix 1.

Please note there may be discrepancies in the totals within all tables contained in this assessment. This is due to desktop analysis of 3rd party mapping to which ground truthing has not been undertaken at this stage.

Table 6.2: Baseline planting year / age class structure

Age (Yrs)	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6	Area 7	Area 8	Area 9	Area 10	Area 11	Area 12	Total Area (Ha)	Total Area (%)
1-10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	4.94	2.93	2.90	n/a	10.77	4.0
11-20	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.00	12.48	n/a	n/a	12.48	4.7
21-30	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	3.11	n/a	n/a	3.11	1.2
31-40	0.24	n/a	n/a	n/a	n/a	0.27	7.71	n/a	n/a	69.89	n/a	n/a	78.11	29.2
41-50	4.65	64.66	15.73	15.58	n/a	11.85	n/a	n/a	60.3	10.67	8.19	29.08	163.44	61

Figure 6.7: Photograph of 41 – 50 year old Sitka spruce located within the study area to the south east of Lorg Hill and to the north of Altry Hill (photograph taken 19 May 2021). These trees are currently scheduled to be felled in Phase 2 (2024 to 2028).

A 4.8.2.2 Species Composition

The current baseline species composition of the woodlands within the FSA is shown in Table 6.3 below and in Figure 17a in Appendix 1. The main species are commercial conifers, principally Sitka spruce, which in pure or mixed stands, accounts for approximately 72.6 % of the total FSA. Other conifer woodland and broadleaves form very small components of the woodlands. Open ground accounts for the second largest component at 12.8 %. Felled woodland awaiting restocking forms the next largest component at 9.3 %.

Table 6.3: Baseline species composition

Species Composition	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6	Area 7	Area 8	Area 9	Area 10	Area 11	Area 12	Total Area (Ha)	Total Area (%)
Felled Awaiting restock	n/a	9.75	1.48	n/a	n/a	n/a	11.41	4.72	0.96	n/a	n/a	n/a	28.32	9.3
Sitka Spruce	4.91	58.07	15.47	15.25	n/a	12.22	7.75	n/a	6.37	90.62	11.54	0.01	222.21	72.6
Other Conifers	n/a	n/a	0.44	0.20	n/a	n/a	n/a	n/a	4.73	9.38	n/a	n/a	14.75	4.8
Mixed Broadleaves	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1.38	n/a	n/a	1.38	0.5
Mixed Woodlands	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.00	0.0
Open Ground	0.19	10.65	0.20	n/a	n/a	0.50	2.38	n/a	3.82	19.39	2.17	n/a	39.30	12.8

Figure 6.8: Photograph of 41 – 50 year old Sitka spruce located within the study area to the north of Altry Hill, near the Polskeoch Bothy along the Southern Upland Way (photograph taken 19 May 2021). These trees are currently scheduled to be felled in Phase 2 (2024 to 2028).

Figure 6.9: Photograph of 41 – 50 year old Sitka spruce located within the study area to the south west of Polskeoch farm, to the east of the sheepfold (photograph taken 19 May 2021). These trees are currently scheduled to be felled in Phase 3 (2029 to 2033).

Figure 6.10: Photograph of recently felled woodland on the south eastern slope of Polskeoch Rig, to the north of the existing access track to Polskeoch Farm (photograph taken 19 May 2021).Current plans are to restock this area predominantly with Sitka spruce (see Figure 17b in Appendix 1).

Figure 6.11: Photograph of Mixed broadleaves (see Figure 17a in Appendix 1) to the east of Polskeoch Farm (photograph taken 19 May 2021). This area is indicated on Figure 13 (Phase 1 Habitat Survey) in Appendix 1 as a Broadleaved plantation.

Figure 6.12: View of forestry to the south of Polskeoch Farm (photograph taken 19 May 2021). The larger trees in the valley bottom are 41 – 50 year old Sitka Spruce currently scheduled to be felled in Phase 3 (2029 – 2033). This view also shows the 11-20 year old Sitka spruce and other conifers on the north-facing slope of Wether Hill. These trees are currently scheduled to be felled in Phases 5 (2039-2043) and 8 (2054-2058).

Figure 6.13: View of 1-10 year old Sitka Spruce and other conifers on the north facing slope of Wether Hill (photograph taken 19 May 2021). The track in the foreground is the Southern Upland Way, and the larger trees to either side of the track are 41 – 50 year old Sitka Spruce currently scheduled to be felled in Phase 2 (2024-2028).

A 4.8.2.2Baseline Felling Plan

The baseline felling plan forms part of the current Forest Plans prepared by the forest managers and approved by Scottish Forestry. It considers the requirement to restructure the age class of even aged forests as described above. The baseline felling plan is illustrated in Table 6.4 below and Figure 17c in Appendix 1. The data is summarised in 5-year bands as per standard practice.

Table 6.4: Baseline Felling Phases

Felling Phases	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6	Area 7	Area 8	Area 9	Area 10	Area 11	Area 12	Total Area (Ha)	Total Area (%)
Phase 1: 2019-2023	n/a	n/a	n/a	n/a	n/a	n/a	7.19	n/a	n/a	6.58	5.09	n/a	18.86	6.5
Phase 2: 2024-2028	n/a	24.72	15.08	15.53	n/a	n/a	n/a	n/a	0.47	37.90	3.07	n/a	96.77	33.5
Phase 3: 2029-2033	4.89	10.62	n/a	n/a	n/a	12.10	0.57	n/a	5.54	52.52	n/a	n/a	86.24	29.9
Phase 4: 2034-2038	n/a	n/a	n/a	n/a	n/a	0.04	n/a	n/a	n/a	13.82	n/a	n/a	13.86	4.8
Phase 5: 2039-2043	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	12.40	n/a	n/a	12.40	4.3
Phase 6: 2044-2048	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.00	0.0
Phase 7: 2049-2053	n/a	4.84	1.37	n/a	n/a	n/a	11.11	4.62	0.72	n/a	n/a	n/a	22.66	7.8
Phase 8: 2054-2058	n/a	14.53	0.72	n/a	n/a	n/a	n/a	n/a	491	2.98	2.84	n/a	25.98	9.0
Phase 9: 2059-2063	n/a	12.04	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	12.04	4.02
Natural Reserves	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.00	0.0

A 4.8.2.3Native Woodland Inventory

The Native Woodland Inventory of Scotland shows two areas of native woodland (0.94 Ha and 0.54 Ha). These correspond with two of the Mixed Broadleaves areas to the south east of Carnine (see Figure 17a). Both areas are noted as being pole stage crops of Upland Birchwood as shown in green in Figure 6.13, below.

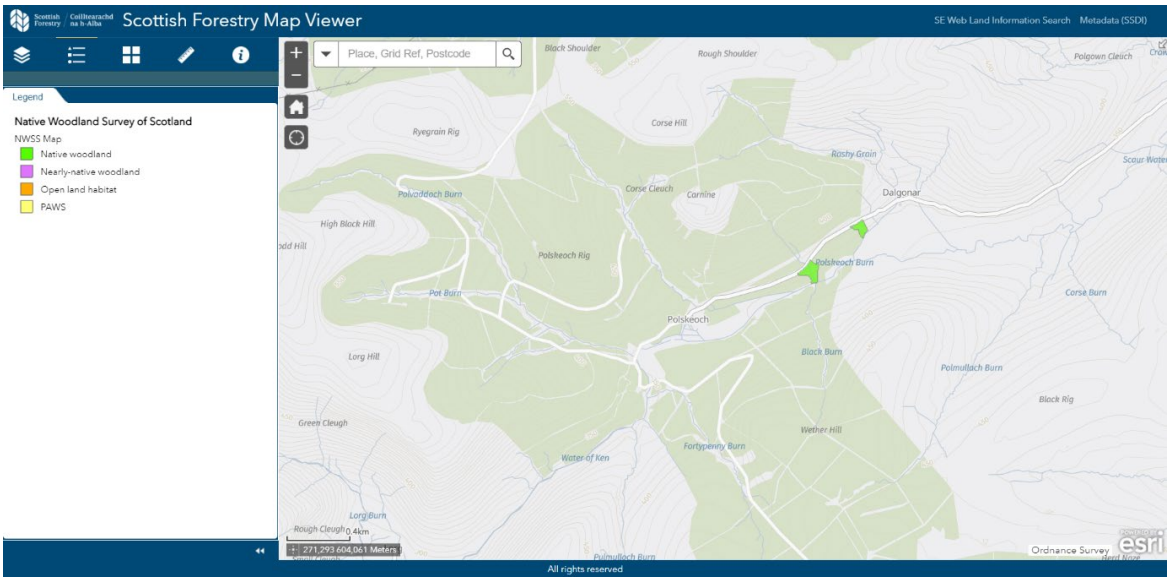

Figure 6.14: Native Woodland Inventory of Scotland[11].

[11] Scottish Forestry Map Viewer. https://scottishforestry.maps.arcgis.com/apps/webappviewer/index.html?id=0d6125cfe892439ab0e5d0b74d9acc18. Accessed July 2021.

APPENDIX 5
ENVIRONMENTAL CONSTRAINT SENSITIVITY ASSESSMENT

The relative sensitivity of the environmental constraints presented in Table A5.1 below was used to inform the heat mapping of hard, moderate and soft constraints discussed in Section 4.1 of this report. Environmental constraints of high sensitivity were treated as hard constraints, of medium sensitivity were treated as moderate constraints and this of low or no sensitivity were considered to be soft constraints.

Table A5: Sensitivity of environmental constraints within the Euchanhead OHL grid connection study area

Constraint	Sensitivity	Buffer (m)
Landscape & Visual		
Sensitive Landscape Area	High	200
Garden and Designed Landscape	High	200
Regional Scenic Area	High	200
Settlements and residential properties	High	100
Long distance trail	High	100
Core path	High	100
Cultural Heritage		
World Heritage Sites	High	100
Properties in Care	High	100
Listed Buildings - A	High	50
Listed Buildings - B	Medium	50
Listed Buildings - C	Low	50
Scheduled Monuments	High	50
Conservation Areas	Medium	50
Inventory Gardens and Designed Landscapes	High	25
Battlefield Inventory sites	High	25
Non-designated assets	Medium or Low	50 or 10
Ecology		
Site of Special Scientific Interest (SSSI)	High	100
Special Protection Area (SPA)	High	100
Special Areas Conservation (SAC)	High	100
Important Bird Area	Moderate	100
Plantations on Ancient Woodland Sites (PAWS)	Moderate	0
Ancient Semi Natural Woodlands (ASNW)	High	50
Carbon and peatland (Class 1)	High	50
Water bodies (Water Vole/otter habitat)	High	30
Woodland	Medium	30

Constraint	Sensitivity	Buffer (m)
Badger sett	High	30
Bat roost	High	30
Bat commuting habitat	Medium	30
Nesting raptor		500m
Eagle nest		1km
Geology, Hydrogeology and hydrology		
Carbon and peatland (Class 1 or 2)	High	50
Private water supply sources	High	150
Waterbodies (rivers, burns, lakes, ponds etc.)	High	20 (50)
Peatland	High	50
Groundwater-dependent terrestrial ecosystems	Moderate	20
Geological Conservation Review Site	Moderate	20
Infrastructure		
Existing HV lines	Medium	70
Settlements and individual properties	High	100
Wind Farm turbine locations	High	Turbine height plus 10% = topple height.
Consented Mineral Sites	High	
Areas of Potential Future Mineral Extraction (low-medium)	Medium	
Traffic and Transport		
Site topography	Low	
Ground conditions	Low	
Core paths	Low	
Closeburn	Low	
Thornhill	Low	
Penpont	Low	
Moniaive	Low	

APPENDIX 6
ENVIRONMENTAL ANALYSIS OF ROUTE OPTIONS

The route options that were identified for the proposed Euchanhead OHL grid connection were discussed in Section 4.1 of this report and are shown on Figure 2 in Appendix 1. This appendix presents the detailed environmental analysis of each route option and is summarised in Table 4.2 of this report.

A6.1 Ecology and Ornithology

A6.1.1 General study area

The proposed route options go through coniferous plantation, mire and grassland habitats. The coniferous woodlands are of limited ecological value in terms of their vegetation, given their dense structure and limited understory and ground flora. The majority of dry and marshy grasslands within the study area are subject to grazing and therefore have a reduced species diversity and sward height. The bog and wet heath habitats are mostly degraded due to historical drainage and current grazing pressure however such habitats are still of heightened ecological value and restoration opportunities exist.

The study area is known to support a range of bat species and two structures where confirmed roosts are present. The coniferous plantations and felled areas have potential for Red Squirrel and Pine Marten with evidence of both species recorded during previous surveys for Euchanhead RED and Lorg Wind Farm.

The watercourses throughout the area have foraging potential for Otter, and signs have been identified in past surveys. There is also some limited potential for Water Vole however no evidence of this species has been recorded within the study area to date.

A6.1.2 Route Option A

Ecology

Route Option A is the most westerly route option and would include areas of coniferous plantation and associated marshy grassland lined watercourses, felled plantation, bracken, acid grassland, limited areas of modified bog and open marshy grassland pasture.

The route crosses several watercourses which may support Otter and Water Vole including Polvaddoch Burn, Pot Burn and Water of Ken, and coniferous plantation and felled areas which may support Red Squirrel and Pine Marten.

Ornithology

Route Option A passes through the western area of the coniferous plantation that dominates the northern part of the study area. This plantation provides habitat for woodland species such as Goshawk. The route option then passes through the valley

surrounding the Water of Ken, where raptor species including Red Kite, as well as waterfowl species such as pink-footed goose have been observed using flight lines that follow the course of the river. These flight lines may be affected by the overhead line route where it crosses the river.

Hen Harrier have been observed foraging and commuting frequently through the area around the consented Lorg Collector Substation. All six route options pass through this area and therefore may have an effect on Hen Harrier flight lines.

A6.1.3 Route Option B

Ecology

Route Option B starts the same as Option A, through coniferous plantation however it crosses the Water of Ken further north and follows the ridgeline up Altry Hill, taking in blanket bog and larger areas of modified bog and marshy grassland.

Route Option B would pass near to the bothy where a Soprano Pipistrelle maternity roost is known and in addition where Otter spraints were recorded in 2020.

Ornithology

Route Option B also crosses the Water of Ken, however the crossing point is in a much narrower part of the valley than Option A, between two areas of plantation woodland, and the route runs perpendicular to the course of the river. This may have the effect of forcing any birds commuting through the area to converge directly into the path of the overhead line, increasing the risk of collision.

This route also covers a broader range of habitats than Option A and therefore has a higher risk of causing an impact to more bird species, including in potential route segment 11 where Goshawk have been observed and which was the location of a historic nesting site.

Route Option B also crosses a longer section of upland habitats (potential route segment 12) which provide habitat for wader species and raptors including Merlin and Hen Harrier, which have been observed foraging in this area.

A6.1.4 Route Option C

Ecology

Route Option C is very similar to Route Option A, however this route covers a larger area of felled woodland. Such felled woodland may support Pine Marten including dens. This route would require four watercourse crossings (with a possibility of reducing this to three if the route was to the west of Corse Cleugh), all of which have the potential to support Otter and Water Vole.

Route Option C would also be in close proximity to the bothy where a Soprano Pipistrelle maternity roost is known.

Ornithology

This route is similar to Route Option A however less preferred as it takes in a larger area of felled plantation which may provide habitat for ground-nesting and forest edge-nesting bird species which may be at collision risk, for example Black Grouse and Red Kite.

A6.1.5 Route Option D

Ecology

Route Option D starts similarly to Route Option C, covering a large area of felled plantation. This route then covers the valley mire and flush habitats at Polskeoch before heading up the ridge of Altry Hill crossing blanket bog, modified bog, acid grassland and marshy grassland.

This route would require the possible crossing of Corse Cleugh in addition to crossing the Polskeoch Burn and associated wetland habitat, Fortypenny Burn, Pulmulloch Burn, Small Burn and Altry Burn.

Route Option D would be in very close proximity to the bothy, and the crossing of Polskeoch Burn has the potential to disturb Otter.

Ornithology

This route covers a broader range of habitats than Route Options A, B or C, including the valley mire at Polskeoch which provides suitable foraging and breeding habitat for goose species and for raptor species such as Barn Owl and Short-Eared Owl.

A6.1.6 Route Option E

Ecology

Route Option E covers a range of habitats including coniferous plantation, blanket bog and modified bog on Corse Hill, marshy grassland associated with forest rides and Polskeoch Burn, valley mire community, young plantation woodland and blanket bog and modified bog on Altry Hill.

Being one of the longer routes, the potential for the disturbance of protected species is higher with numerous watercourse crossings and close proximity to the bothy.

Ornithology

Route Option E covers a broader range of habitats and therefore has the potential to disrupt the widest variety of bird species.

Route E also crosses a longer section of upland habitats (potential route segment 12) which provide habitat for wader species and raptors than the routes which follow the Water of Ken through Lorg.

A6.1.7 Route Option F

Ecology

The start of Route Option F follows Route Option E, whereby bog habitats of Corse Hill are covered. Once at Polskeoch valley the route heads west along the Water of Ken taking in marshy and acid grassland and modified bog before turning east up to Altry.

This is the longest proposed Route Option and therefore the potential for disturbance is higher than shorter routes. This route would also be in close proximity to the bothy and locations where Otter have been recorded in 2020.

Ornithology

Route Option F is the longest proposed route and therefore has the potential to disrupt the largest area of bird habitat. It passes through large sections of forestry, upland habitats and valley mire which provide habitats for a variety of different species.

Similarly to Route Option B, the crossing over the Water of Ken also has the potential to interfere with flight lines as it is located in a narrow part of the valley and lies perpendicular to the course of the river.

A6.1.8 Summary

Table A6.1.8: Route preference from an ecology and ornithology perspective

Route Option	Ecological and Ornithological preferability
A	Route Option A would be the preferred route in regard to habitats as there are fewer mire communities along this route and more grassland communities which may be regarded as being of lesser sensitivity and not expected to be an issue. Limited constraints in terms of protected species other than watercourses which may support Otter and Water Vole, but these include watercourses in Route Options B and C where the routes combine. The route crosses an area of felled plantation which could support pine marten. This route is unlikely to disturb the soprano maternity roost at the bothy. Route Option A would also be the preferred route in regard to ornithology as it passes through the least amount of open upland habitat and forestry which provide breeding habitat for notable raptor species. This, along with all other routes passes through an area with known Hen Harrier activity (potential route section 5).
B	This route offers some potential to accommodate the infrastructure however it covers a broader range of habitats of heightened value including blanket bog, modified bog and marshy grassland. A higher number of watercourse crossings would be required and the route would run in close proximity to the bothy bat roost and evidence of otter activity. The route also crosses the Water of Ken at a narrow point, which may cause disruption to bird flight lines along the river and raise the risk of collisions.

Route Option	Ecological and Ornithological preferability
C	This route is similar to Route Option A however less preferred as it takes in a larger area of felled plantation which may provide habitat for nesting pine marten. The areas of felled forestry may also provide habitat for woodland edge bird species and may increase collision risk.
D	This route offers some potential to accommodate the infrastructure however perhaps less than Route Option B given the valley mire community at Polskeoch. In addition there is heightened potential for disturbance to Otter and bats with this Route Option. The wider range of habitats crossed by Route Option D means that there is the potential to disrupt a wider range of bird species.
E	Both routes E and F offer the least potential to accommodate the infrastructure required as they cover the broadest range of habitats including blanket bog communities at Corse Hill. Numerous watercourse crossings would be required for this route and the route would be in close proximity to both confirmed bat roost locations at the bothy and farmhouse. Route Option E also crosses a longer section of upland habitat where raptor species such as Hen Harrier and Merlin have been observed.
F	Route Option F is the longest proposed route and therefore perhaps has the least potential to accommodate the infrastructure required given the amount of habitat to be impacted, including as with Route Option E, the blanket bog communities at Corse Hill and valet mire at Polskeoch. Similarly to Route Option B, Route Option F also crosses the Water of Ken at a narrow point and runs perpendicular to the course of the river which may increase collision risk.

Based on the detailed assessment of ecological and ornithological factors above and using the criteria set out in Section 4.1.3 of this report, Route Option A is the preferred option.

A6.2 Archaeology and Cultural Heritage

A6.2.1 General study area

The proposed OHL comprises a double wood poles of up to 15 m in height. The routeing and option comparison study primarily considers the importance of known heritage assets, and their sensitivity to direct physical impact removing all or part of their physical remains. The discrete nature of required pole locations, groundworks required for their foundations, and the potential for micro-siting to avoid direct impacts upon physical archaeological remains has also been considered.

Given the nature and scale of the proposed OHL and (other than a beacon MDG19, which is located over 2.5km north of the route options, and is therefore unaffected), the lack of any heritage assets whose setting contributes to their cultural significance in the study area, no significant visual effects on heritage assets are anticipated. This consideration has not therefore influenced the analysis of the route options.

A6.2.2 Route Option A

Measuring 5.6 km along its centreline, Route Option A is below the average length of the six routes considered (average: 6.55km).

Route Option A initially drops downslope and predominantly follows the watercourse valleys of Water of Ken, Pot Burn, and Polvaddoch Burn.

There are eight known heritage assets within Route Option A including two known HER features, four features shown on the first edition OS mapping, and two features identified in previous ES baseline data:

- RSK 11, MDG15845 Altry Burn Farmstead and Field System
- RSK 12, MDG15846 Altry Building
- RSK 39- 42, four sheep rees showing on first edition OS
- Lorg 5, Craigstewart Cairn
- Euch 18, sheepfold.

A6.2.3 Route Option B

Measuring 5.2 km along its centreline, Route Option B is the shortest route option.

Route Option B contours along the hilltops of Craigstewart and Altry Hill before dropping down in elevation to cross the Water of Ken, and subsequently follows the valleys of Pot Burn and Polvaddoch Burn.

There are eight known heritage assets within Route Option A including two known HER features, four features shown on the first edition OS mapping, and two features identified in previous ES baseline data:

- RSK 11, MDG15845 Altry Burn Farmstead and Field System
- RSK 12, MDG15846 Altry Building
- RSK 40- 42 & 49, four sheep rees showing on first edition OS
- Lorg 5, Craigstewart Cairn
- Euch 18, sheepfold

A6.2.4 Route Option C

Measuring 6.0 km along its centreline, Route Option C is below the average length of the six routes considered (average: 6.55km).

Route Option A initially drops downslope and predominantly follows the watercourse valley of Water of Ken, before crossing Pot Burn, running up the valley of Polvaddoch Burn and finally up the east side of Polskeoch Rig.

There are eight known heritage assets within Route Option A including two known HER features, five features showing on the first edition OS mapping, and one feature identified in previous ES baseline data:

- RSK 11, MDG15845 Altry Burn Farmstead and Field System
- RSK 12, MDG15846 Altry Building
- RSK 39- 41, 47 & 50, five sheep rees showing on first edition OS
- Lorg 5, Craigstewart Cairn

A6.2.5 Route Option D

Measuring 5.5 km along its centreline, Route Option D is below the average length of the six routes considered (average: 6.55km).

Route Option D contours along the hilltops of Craigstewart and Altry Hill before dropping down in elevation to cross Fortypennies Burn and Polskeoch Burn, running up the valley of Polvaddoch Burn and finally up the east side of Polskeoch Rig.

There are 10 known heritage assets within Route Option D including three known HER features, six features showing on the first edition OS mapping, and one feature identified in previous ES baseline data:

- RSK 11, MDG15845 Altry Burn Farmstead and Field System
- RSK 12, MDG15846 Altry Building
- RSK 20, MDG21 a findspot of a barbed arrowhead
- RSK 40, 41, 47, 49, 50 & 52, six sheep rees/folds showing on first edition OS
- Lorg 5, Craigstewart Cairn

A6.2.6 Route Option E

Measuring 7.9 km along its centreline, Route Option E is above the average length of the six routes considered (average: 6.55km).

Route Option E contours along the hilltops of Craigstewart, Altry Hill and Wether Hill before dropping downslope to cross Fortypennies Burn and Polskeoch Burn, running up the valley of Rashy Grain to the east of Carnine, round the north of Corse Hill and finally up the east side of Polskeoch Rig.

There are 13 known heritage assets within Route Option E including three known HER features, nine features showing on the first edition OS mapping, and one feature identified in previous ES baseline data:

- RSK 11, MDG15845 Altry Burn Farmstead and Field System
- RSK 12, MDG15846 Altry Building
- RSK 20, MDG21 a findspot of a barbed arrowhead
- RSK 40, 41, 47, 49, 52, 54, 55 & 56 eight sheep rees/folds/shelters showing on first edition OS
- RSK 57 a quarry showing on first edition OS
- Lorg 5, Craigstewart Cairn

A6.2.7 Route Option F

Measuring 9.1 km along its centreline, Route Option F is the longest route option.

Route Option F initially drops downslope and follows the watercourse valley of Water of Ken, crosses Fortypennies Burn and Polskeoch Burn, before running up the valley of Rashy Grain to the east of Carnine, round the north of Corse Hill and finally up the east side of Polskeoch Rig.

There are 14 known heritage assets within Route Option E including three known HER features, 10 features showing on the first edition OS mapping, and one feature identified in previous ES baseline data:

- RSK 11, MDG15845 Altry Burn Farmstead and Field System

- RSK 12, MDG15846 Altry Building
- RSK 20, MDG21 a findspot of a barbed arrowhead
- RSK 39, 40, 41, 47, 49, 52, 54, 55 & 56 nine sheep rees/folds/shelters showing on first edition OS
- RSK 57 a quarry showing on first edition OS
- Lorg 5, Craigstewart Cairn

A6.2.8 Summary

Table A6.2.8: Route preference from an archaeological and cultural heritage perspective

Route Option	Archaeological and Cultural Heritage preferability
A	The route option is below the average length of the six routes considered (average: 6.55km). There are no known heritage assets that represent a significant constraint to the OHL development. The known heritage assets that are present within the route option are discrete and can be easily routed to avoid. The nature of the known heritage assets within the route option are not indicative of extensive archaeological potential for hitherto unknown archaeological remains that may be discovered during construction.
B	The route option is the shortest of the route options considered, therefore minimises the potential for impact to hitherto unknown archaeological remains. There are no known heritage assets that represent a significant constraint to the OHL development. The known heritage assets that are present within the route option are discrete and can be easily routed to avoid. The nature of the known heritage assets within the route option are not indicative of extensive archaeological potential for hitherto unknown archaeological remains that may be discovered during construction.
C	The route option is below the average length of the six routes considered (average: 6.55km). There are no known heritage assets that represent a significant constraint to the OHL development. The known heritage assets that are present within the route option are discrete and can be easily routed to avoid. The nature of the known heritage assets within the route option are not indicative of extensive archaeological potential for hitherto unknown archaeological remains that may be discovered during construction.

Route Option	Archaeological and Cultural Heritage preferability
D	The route option is below the average length of the six routes considered (average: 6.55km). There are no known heritage assets that represent a significant constraint to the OHL development. The known heritage assets that are present within the route option are discrete and can be easily routed to avoid. The nature of the known heritage assets within the route option are not indicative of extensive archaeological potential for hitherto unknown archaeological remains that may be discovered during construction.
E	The route option is above the average length of the six routes considered (average: 6.55km), therefore increases the potential for hitherto unknown archaeological remains. There are no known heritage assets that represent a significant constraint to the OHL development. The known heritage assets that are present within the route option are discrete and can be easily routed to avoid. The nature of the known heritage assets within the route option are not indicative of extensive archaeological potential for hitherto unknown archaeological remains that may be discovered during construction.
F	The route option is the longest of the route options considered, therefore maximises the potential for impact to hitherto unknown archaeological remains. There are no known heritage assets that represent a significant constraint to the OHL development. The known heritage assets that are present within the route option are discrete and can be easily routed to avoid. The nature of the known heritage assets within the route option are not indicative of extensive archaeological potential for hitherto unknown archaeological remains that may be discovered during construction.

A6.3 Landscape and Visual Amenity

A6.3.1 General study area

Appendix 4 Environmental & Technical Baseline describes the main landscape and visual receptors in the study area, including landscape designations and Landscape Character Types (LCT), landscape elements, residential properties, core footpaths and recreational routes which could be directly affected by the proposed development. The degree of interaction of each route option with these landscape and visual receptors has been considered in order to identify differentiators between the route options under consideration.

As detailed in Section 4, for landscape and visual amenity, six criteria have been applied at the initial route corridor appraisal stage as outlined below:

- Landscape Sensitivity.

- Residential Amenity.
- Visual Amenity.
- Landscape Designations.
- Length of corridor.
- Forestry.

The routes and tables below focus on the six routes as detailed in Section 5.1 of this Appendix.

A6.3.2 Route Option A

From the Euchanhead connection point the route heads south east in an area of commercial forestry broadly following the valley of Polvaddoch Burn. Core Path 215 broadly follows the same route, however, there are likely to be limited visual receptors due to the dense forestry plantation. The route then approaches the Southern Upland Way (SUW) and changes direction to the south west, following the northern valley side of the Water of Ken. It should be possible to minimise effects on users of the SUW by routing through forest. The route continues to follow Core Path 215 to the valley side of the water of Ken. This section of the route is a deep moorland valley with potential open views from Core Path 215 to any proposed OHL. The route would also be visible from residential property, Lorg, from the valley with all views from the valley seen against the rising land beyond. The southernmost section of the route then turns east, broadly following Altry Burn as it ascends to the Lorg collector substation. This final section of the route would be visible from Core Path 215 to the west but would be screened by landform from the SUW to the east. There would potentially be views from property Nether Holm of Dalquhairn located over 1 km to the south west; property Upper Holm of Dalquhairn appears screened by landform and forestry. Any views would be against the rising land beyond. Views from the wider study area, including the SLA in East Ayrshire, would be screened by intervening landform.

Table A6.3.2: Likely Susceptibility of Landscape and Visual Amenity Criteria to Proposed OHL for Route Option A

Route Segments	Landscape Sensitivity	Residential Amenity	Visual Amenity	Landscape Designations	Length of Corridor (approx.)	Forestry
1-3	Low	None	Low	None	2 km	Medium
4-5	Low	Low	Low/Medium	None	4 km	Low

A6.3.3 Route Option B

From the Euchanhead connection point the route heads south east in an area of commercial forestry broadly following the valley of Polvaddoch Burn. Core Path 215 broadly follows the same route, however, there are likely to be limited visual receptors due to the dense nature of the forestry. The route then approaches the Southern Upland Way (SUW) close to a sheepfold and ascends along the western valley side of Fortypenny Burn from where it is likely to be visible by users of the SUW. The route changes direction to the south-west, crossing Pullmulloch Burn and ascending to the shoulder of Altry Hill. There may be views for visual receptors from the more elevated section of the SUW at High Countam as the OHL ascends the shoulder of Altry Hill, although this would be at distances of over 1 km and the OHL would not appear on the

skyline. Potential views of the OHL from more elevated sections of the SUW rising towards Cairn Hill are likely to be screened by local landform. In addition, there would potentially be views of the OHL from users of Core Path 215 and the residential receptor at Lorg from the opposite side of the valley of the Water of Ken. These would be viewed from distances of 500 m or more but would potentially be within the skyline. It may be difficult to micro-site the OHL to avoid all views from both Core Path 215 to the west and SUW to the east. There would potentially be views from property Nether Holm of Dalquhairn located over 1 km to the south west; property Upper Holm of Dalquhairn appears screened by landform and forestry. The views from Nether Holm may include the OHL viewed against the sky as the route rounds the shoulder of Craigstewart, albeit at a distance of over 2 km. Views from the wider study area, including the SLA in East Ayrshire, would be screened by intervening landform.

Table A6.3.3: Likely Susceptibility of Landscape and Visual Amenity Criteria to Proposed OHL for Route Option B

Route Segments	Landscape Sensitivity	Residential Amenity	Visual Amenity	Landscape Designations	Length of Corridor (approx.)	Forestry
1-3	Low	None	Low	None	2 km	Medium
11, 12, 5	Low	Medium	Medium	None	4 km	Low

A6.3.4 Route Option C

From the Euchanhead connection point the route heads south and then east in an area of commercial forestry crossing Polskeoch Rig and then descending into the valley of a tributary of Polskeoch Burn. It then changes direction to the south west broadly following the valley between Polskeoch Rig and Altry Hill. The route passes close to the SUW as it approaches a sheepfold and would be visible to users for at least a short section dependent on forestry felling. It would also likely be visible from residential property Polskeoch approximately 200 m to the east, although this could be minimised by micro-siting and routing through forest. The route then crosses over a Core Path 215 to the west of Sheepfold before broadly following the route of Core Path 215 to the western valley side of the Water of Ken. The route continues to follow Core Path 215 in a deep moorland valley with potential open views from to any proposed OHL. The route would also be visible from one residential property, Lorg, from within the valley but all views from within the valley would be against the rising land beyond. The southernmost section of the route then turns east, broadly following Altry Burn as it ascends to the Lorg collector substation. This final section of the route would be visible from Core Path 215 to the west but would be screened by landform from the SUW to the east. There would potentially be views from property Nether Holm of Dalquhairn located over 1 km to the south west; property Upper Holm of Dalquhairn appears screened by landform and forestry. Any views would be against the rising land beyond. Views from the wider study area, including the Southern Uplands SLA in East Ayrshire, would be screened by intervening landform.

Table A6.3.4: Likely Susceptibility of Landscape and Visual Amenity Criteria to Proposed OHL for Route Option C

Route Segments	Landscape Sensitivity	Residential Amenity	Visual Amenity	Landscape Designations	Length of Corridor (approx.)	Forestry
1, 6-8	Low	Low	Low/Medium	None	2 km	Medium

Route Segments	Landscape Sensitivity	Residential Amenity	Visual Amenity	Landscape Designations	Length of Corridor (approx.)	Forestry
3-5	Low	Low	Low/Medium	None	4 km	Low

A6.3.5 Route Option D

From the Euchanhead connection point the route heads south and then east in an area of commercial forestry crossing Polskeoch Rig and then descending into the valley of a tributary of Polskeoch Burn. It continues south crossing Polskeoch Burn and then crossing the SUW twice as it begins to climb Wether Hill. The OHL is likely to be visible from the SUW as it gradually descends within Polskeoch Burn and then begins to climb Wether Hill, depending on forest felling. It would also likely be visible from residential property Polskeoch some 200 m to the east.

The route then ascends along the western valley side of Fortypenny Burn from where it is likely to be visible to users of the SUW. The route changes direction to the south-west, crossing Pullmulloch Burn and ascending to the shoulder of Altry Hill. There may be views for visual receptors from the more elevated section of the SUW at High Countam as the OHL ascends the shoulder of Altry Hill, although this would be at distances of over 1 km and the OHL would not appear in the skyline. Potential views of the OHL from more elevated sections of the SUW rising towards Cairn Hill are likely to be screened by local landform. In addition, there would potentially be views of the proposed OHL from users of Core Path 215 and the residents at Lorg from the opposite side of the valley of the Water of Ken. These would be viewed from distances of 500 m or more but any proposed OHL could potentially be viewed within the skyline. It may be difficult to micro-site the proposed OHL to avoid all views from both Core Path 215 to the west and SUW to the east. There would potentially be views from property Nether Holm of Dalquhairn located over 1 km to the south west; property Upper Holm of Dalquhairn appears screened by landform and forestry. The views from Nether Holm may include any proposed OHL viewed against the sky as the route rounds the shoulder of Craigstewart, albeit at a distance of over 2 km. Views from the wider study area, including the SLA in East Ayrshire, would be screened by intervening landform.

Table A6.3.5: Likely Susceptibility of Landscape and Visual Amenity Criteria to Proposed OHL for Route Option D

Route Sections	Landscape Sensitivity	Residential Amenity	Visual Amenity	Landscape Designations	Length of Corridor (approx.)	Forestry
1, 6	Low	Low	Low/Medium	None	1 km	Medium
7, 9, 11	Low	Low/medium	Medium/high	None	1.6 km	Medium
12, 5	Low	Low/medium	Medium	None	3.4 km	Low

A6.3.6 Route Option E

From the Euchanhead connection point the route heads south and then east in an area of commercial forestry crossing Polskeoch Rig. The route then ascends north towards Corse Hill, circumventing the hill in a clockwise direction before descending broadly south east towards the valley of a Polskeoch Burn. The OHL would be visible as it crosses the SUW within the valley and may be visible from residential property, Dalgonar, depending

on its location within areas of forestry. The route then heads broadly south crossing Polskeoch Burn and then south west crossing the SUW again between Polskeoch Burn and Wether Hill. Any proposed OHL is likely to be visible from the SUW in this area and as it climbs Wether Hill up to the disused quarry, depending on forest felling. It could also be visible from the SUW that follows Polskeoch Burn and from residential property Polskeoch depending on forest felling.

The route then crosses Fortypenny Burn from where it is likely to be visible by users of the SUW and continues to the south west, crossing Pullmulloch Burn and ascending to the shoulder of Altry Hill. There may be views for visual receptors from the more elevated section of the SUW at High Countam as the route ascends the shoulder of Altry Hill, although this would be at distances of over 1 km and any proposed OHL would not appear in the skyline. Potential views of the route from more elevated sections of the SUW rising towards Cairn Hill are likely to be screened by local landform. In addition, there would appear to be some views of the route from users of Core Path 215 and the residential receptor at Lorg from the opposite side of the valley of the Water of Ken. These would be viewed from distances of 500 m or more but would potentially be within the skyline. It may be difficult to micro-site the OHL to avoid all views from both Core Path 215 to the west and SUW to the east.

Views from properties Nether Holm of Dalquhairn and Upper Holm of Dalquhairn would be as per Route D. Views from the wider study area, including the SLA in East Ayrshire, would be screened by intervening landform.

Table A6.3.6: Likely Susceptibility of Landscape and Visual Amenity Criteria to Proposed OHL for Route Option E

Route Sections	Landscape Sensitivity	Residential Amenity	Visual Amenity	Landscape Designations	Length of Corridor (approx.)	Forestry
1, 6	Low	Low	Low/Medium	None	1 km	Medium/high
10, 9, 11	Low	Low/medium	Medium/high	None	4.3 km	Medium
12, 5	Low	Low/medium	Medium	None	3.4 km	Low

A6.3.7 Route Option F

From the Euchanhead connection point the route heads south and then east in an area of commercial forestry crossing Polskeoch Rig. The route then ascends north towards Corse Hill, circumventing the hill in a clockwise direction before descending broadly south east towards the valley of a Polskeoch Burn. The OHL would be visible as it crosses the SUW within the valley and may be visible from residential property, Dalgomar, depending on its location within areas of forestry. The route then heads broadly south crossing Polskeoch Burn and then south-west crossing the SUW again to the north of Wether Hill, where it is likely to be visible from the SUW. Views would continue as it climbs Wether Hill up to the disused quarry, depending on forest felling. It could also be visible from the SUW that follows Polskeoch Burn and from residential property Polskeoch depending on forest felling.

Views of the route for users of the SUW, Core Path 215 and residential properties Lorg, Nether Holm of Dalquhairn and Upper Holm of Dalquhairn would be as per routes A and C. Views from the wider study area, including the SLA in East Ayrshire, would be screened by intervening landform.

Table A6.3.7: Likely Susceptibility of Landscape and Visual Amenity Criteria to Proposed OHL for Route Option F

Route Sections	Landscape Sensitivity	Residential Amenity	Visual Amenity	Landscape Designations	Length of Corridor (approx.)	Forestry
1, 6	Low	Low	Low/Medium	None	1 km	Medium/high
10, 9, 11	Low	Low/medium	Medium/high	None	4.3 km	Medium
3-5	Low	Low	Low/Medium	None	4 km	Low

A6.3.8 Summary

It should be noted that all the preliminary routes are viable options from a landscape and visual perspective.

Option A is preferred as it offers the shortest route and the lowest combination of sensitive receptors. The route would require some felling of forestry plantation along approximately 2 km of the route and on either side of the centre line to create a corridor through which the proposed OHL would pass. Micro-siting should minimise effects on the SUW and although the route would be visible from Core Path 215 and two properties within the valley of the Water of Ken it would be seen against the rising land beyond.

Option C is the next preferred option, of similar length to Option A, but with greater potential for impacting the SUW and the property Polskeoch. It follows the same route as Option A to the valley of the Water of Ken from where all views would be seen against the rising land beyond.

Option B is of similar length to A and C and follows the same route through the commercial forest area as Option A and hence should avoid views from Core Path 215. However, it then continues to the south east and is likely to be visible by visual receptors as the SUW passes a sheepfold and continues to the west of Fortypenny Burn. Due to its more elevated routing around Altry Hill it may be difficult to micro-site the proposed OHL to avoid all views from both Core Path 215 to the west and elevated sections of the SUW to the east which would have a sky background.

Option D is preferable to Option F primarily based on its shorter length; it is of similar length to A, B and C and is likely to require felling of commercial forest to a similar scale. It is likely to be more visible from the SUW than Options A, B and C as it descends within Polskeoch Burn and then begins to climb Wether Hill. Again, due to its more elevated routing around Altry Hill, it may be difficult to micro-site the proposed OHL to avoid views from both the Core Path 215 to the west and elevated sections of the SUW to the east which would have a sky background.

Options E and F are the longest routes, with both circumventing Corse Hill in a clockwise direction and both crossing the SUW twice. Option F is the preferred option as it follows the lower route within the valley of Water of Ken, with any views of the proposed OHL seen against a background of rising land. Option E is therefore the least preferred option as it may be difficult to avoid views from both Core Path 215 to the west and elevated sections of the SUW to the east which would have a sky background.

Table A6.3.8: Route preference from a landscape and visual amenity perspective

Route Option	Landscape and visual amenity preferability
A	Greatest potential to accommodate the infrastructure required within the context of the identified environmental and technical constraints.
B	Some potential to accommodate the infrastructure required within the context of the identified environmental and technical constraints.
C	Good potential to accommodate the infrastructure required within the context of the identified environmental and technical constraints.
D	Some potential to accommodate the infrastructure required within the context of the identified environmental and technical constraints.
E	Some potential to accommodate the infrastructure required within the context of the identified environmental and technical constraints.
F	Some potential to accommodate the infrastructure required within the context of the identified environmental and technical constraints.

A6.5 Hydrology, Hydrogeology, Geology and Soils

A6.5.1 General study area

The main geological, hydrogeological and hydrological interests and constraints identified within the study area are covered in A4.5. The main sensitivities that require consideration are private water supply intakes and infrastructure, surface watercourses and waterbodies, and areas of peatland.

There are no specific sensitivities relating to bedrock or superficial geology that have influence on the routeing options. As groundwork for overhead lines is minimal, there are also no specific sensitivities relating to groundwater that need to be considered apart from PWS intakes. The following sections discuss the level of interaction for each route option, with any key sensitivities identified.

A6.5.2 Route Option A

Segment 1

Segment 1 includes a small area within forestry approximately 115 m from the Polyaddoch Burn. There are no watercourse crossings within this segment. The segment is on peaty podzol soils but has been classified as having no peatland vegetation (Class 5). There are no PWS within 250 m or directly downstream of the segment.

Segment 2

Segment 2 includes between one and four watercourse crossings depending on the exact route taken and runs parallel to the Polyaddoch Burn for approximately 1.1 km within forestry. The segment is predominantly underlain by peaty podzol soils and has been primarily classified as having heath with some peatland (peatland Class 4). BGS mapping indicates a stretch of peat approximately 600 m long on the western side of the

Polyaddoch Burn running parallel with the watercourse. There are no PWS within 250 m or directly downstream of the segment.

Segment 3

Segment 3 includes one watercourse crossing of the Water of Ken. The western part of this segment is overlain by peaty podzol soils and the eastern part of this segment is underlain by mineral gleys. This western part of this segment has been classified as having heath with some peatland (Class 4). There are no PWS within 250 m or directly downstream of the route.

Segment 4

Segment 4 includes a watercourse crossing of the Water of Ken and may also include crossing the headwaters of small tributaries of this watercourse; the Water of Ken is in a deeply incised valley with steep slopes. This segment crosses a region of high flooding potential along the Water of Ken. The segment runs parallel and across the Water of Ken for approximately 2.5 km. The northern part of Segment 4 is underlain by peaty podzol soils and the southern part is predominantly overlain by humus-iron podzols, with some peaty gleys and brown earths. The north-central part of this segment has been classified as having carbon-rich soils and some peatland with no peatland vegetation (class 3). There are no PWS within 250 m or directly downstream of the segment.

On the western side of the Water of Ken, to the south of Lorg, several areas of potentially contaminated land have been identified by D&G council; these areas are identified as disused quarries or gravel pits.

Segment 5

Segment 5 includes between one and two watercourse crossings of the Altry Burn and its tributary the Small Burn. The segment runs on the southern slope of the Altry Hill and is overlain by peaty gley soils, classified as having carbon-rich soils and some peatland with no peatland vegetation (class 3). There are no PWS within 250 m or directly downstream of the segment.

A6.5.3 Route Option B

Segment 1

Segment 1 includes a small area within forestry approximately 115 m from the Polyaddoch Burn. There are no watercourse crossings within this segment. The segment is on peaty podzol soils but has been classified as having no peatland vegetation (Class 5). There are no PWS within 250 m or directly downstream of the segment.

Segment 2

Segment 2 includes between one and four watercourse crossings depending on the exact route taken and runs parallel to the Polyaddoch Burn for approximately 1.1 km within forestry. The segment is predominantly underlain by peaty podzol soils and has been primarily classified as having heath with some peatland (peatland Class 4). BGS mapping has indicated a stretch of peat 600 m long on the western side of the Polyaddoch Burn running parallel with the watercourse. There are no PWS within 250 m or directly downstream of the segment.

Segment 3

Segment 3 includes one watercourse crossing of the Water of Ken. The western part of this segment is overlain by peaty podzol soils and the eastern part of this segment is underlain by mineral gleys. This western part of this segment has been classified as having heath with some peatland (Class 4). There are no PWS within 250 m or directly downstream of the route.

Segment 11

Segment 11 includes one watercourse crossing of the Water of Ken within the forestry area and would likely include another crossing of one of its tributaries. The northern part of this segment is overlain by mineral gleys and the southern part is primarily overlain by peaty gleys. The majority of this segment has been classified as having no peatland vegetation (Classes 5 or 0), while the very south-western region of the segment is classified as nationally important peatland habitat (Class 1). There are no PWS within 250 m or directly downstream of the route.

Segment 12

Segment 12 includes one watercourse crossing of the Pulmulloch Burn in the north-eastern part of the segment. The segment is overlain by peaty gleys, with some humus-iron podzols and mineral gleys. This segment crosses an area classified as nationally important peatland habitat (Class 1) on the eastern slopes of Altry Hill. The area of peatland covers the majority of the northern part of the segment and a small part of the southern region. There are no PWS within 250 m or directly downstream of the route.

Segment 5

Segment 5 includes between one and two watercourse crossings of the Altry Burn and its tributary the Small Burn. The segment runs on the southern slope of the Altry Hill and is overlain by peaty gley soils, classified as having carbon-rich soils and some peatland with no peatland vegetation (Class 3). There are no PWS within 250 m or directly downstream of the segment.

A6.5.4 Route Option C

Segment 1

Segment 1 includes a small area within forestry approximately 115 m from the Polyaddoch Burn. There are no watercourse crossings within this segment. The segment is on peaty podzol soils but has been classified as having no peatland vegetation (Class 5). There are no PWS within 250 m or directly downstream of the segment.

Segment 6

Segment 6 includes no watercourse crossings as the route stays on the western side of the Polskeoch Burn. The segment runs up and over the Polskeoch Rig within the area of forestry on peaty podzol soils classified as having no peatland vegetation or heath with some peatland (Classes 4 and 5). There are no PWS within 250 m or directly downstream of the segment.

Segment 7

Segment 7 includes one potential watercourse crossing of the Polskeoch Burn, or alternatively the route runs along the western bank of the Polskeoch Burn, parallel to the watercourse. The segment runs down the valley of the watercourse, overlain by peaty

podzols and mineral gleys to the south-east. This majority of the segment is classified as having heath with some peatland (Class 4).

The segment is approximately 100 m west from the Polskeoch PWS. The supply consists of a number of springs located on the slopes above the property, below the peak at Carnine. If the route keeps along the western side of the segment, it would avoid potential impacts on the supply.

Segment 8

Segment 8 includes no watercourse crossings, with the route segment on the northern side of the Polyaddoch Burn within forestry. Two watercourse crossing are already planned for the windfarm infrastructure immediately south of the segment; across the Polyaddoch Burn and Water of Ken. The segment is overlain by mineral gleys with peaty podzols to the north-west; the north-western part has been classified as having heath with some peatland (Class 4).

The segment is approximately 250 m south-west from the Polskeoch PWS. The supply consists of a number of springs located on the slopes above the property, below the peak at Carnine. The segment is downhill from the supply source and user points and therefore should not interfere with the supply.

Segment 3

Segment 3 includes one watercourse crossing of the Water of Ken. The western part of this segment is overlain by peaty podzol soils and the eastern part of this segment is underlain by mineral gleys. This western part of this segment has been classified as having heath with some peatland (Class 4). There are no PWS within 250 m or directly downstream of the route.

Segment 4

Segment 4 includes a watercourse crossing of the Water of Ken and may also include crossing the headwaters of small tributaries of this watercourse; the Water of Ken is in a deeply incised valley with steep slopes. This segment crosses a region of high flooding potential along the Water of Ken. The segment runs parallel to the Water of Ken for approximately 2.5 km in addition to the crossing location. The northern part of Segment 4 is underlain by peaty podzol soils and the southern part is predominantly overlain by humus-iron podzols, with some peaty gleys and brown earths. The north-central part of this segment has been classified as having carbon-rich soils and some peatland with no peatland vegetation (Class 3). There are no PWS within 250 m or directly downstream of the segment.

On the western side of the Water of Ken, to the south of Lorg, several areas of potentially contaminated land have been identified by D&G council; these areas are identified as disused quarries or gravel pits.

Segment 5

Segment 5 includes between one and two watercourse crossings of the Altry Burn and its tributary the Small Burn. The segment runs on the southern slope of the Altry Hill and is overlain by peaty gley soils, classified as having carbon-rich soils and some peatland with no peatland vegetation (Class 3). There are no PWS within 250 m or directly downstream of the segment.

A6.5.5 Route Option D

Segment 1

Segment 1 includes a small area within forestry approximately 115 m from the Polyaddoch Burn. There are no watercourse crossings within this segment. The segment is on peaty podzol soils but has been classified as having no peatland vegetation (Class 5). There are no PWS within 250 m or directly downstream of the segment.

Segment 6

Segment 6 includes no watercourse crossings as the route stays on the western side of the Polskeoch Burn. The segment runs up and over Polskeoch Rig within the area of forestry, on peaty podzol soils classified as having no peatland vegetation or heath with some peatland (Classes 4 and 5). There are no PWS within 250 m or directly downstream of the segment.

Segment 7

Segment 7 includes one potential watercourse crossing of the Polskeoch Burn, or alternatively the route runs along the western bank of the Polskeoch Burn, parallel to the watercourse. The segment runs down the valley of the watercourse, overlain by peaty podzols and mineral gleys to the south-east. This majority of the segment is classified as having heath with some peatland (Class 4).

The segment is approximately 100 m west from the Polskeoch PWS. The supply consists of a number of springs located on the slopes above the property, below the peak at Carnine. If the route keeps along the western side of the segment, it would avoid potential impacts to the supply.

Segment 9

Segment 9 includes two watercourse crossings of the Polskeoch and Fortypenny Burns. The segment is found beside the Polskeoch property and within the area where several watercourses converge. The segment is underlain by mineral gleys and has been classified as having no peatland vegetation (Classes 5 and 0).

The segment is approximately 300 m away from the Polskeoch PWS source, while the supply point at the property is less than 50 m from the segment. The supply consists of a number of springs located on the slopes above the property, below the peak at Carnine. The segment is downhill from the supply source and therefore should not interfere with the supply.

Segment 11

Segment 11 includes one watercourse crossing of the Water of Ken within the forestry area and would likely include another crossing of one of its tributaries. The northern part of this segment is overlain by mineral gleys and the southern part is primarily overlain by peaty gleys. The majority of this segment has been classified as having no peatland vegetation (Class 5 and 0), while the very south-western region of the segment is classified as nationally important peatland habitat (Class 1). There are no PWS within 250 m or directly downstream of the route.

Segment 12

Segment 12 includes one watercourse crossing of the Pulmulloch Burn in the north-eastern part of the segment. The segment is overlain by peaty gleys, with some humus-iron podzols and mineral gleys. This segment crosses an area classified as nationally important peatland habitat (Class 1) on the eastern slopes of Altry Hill. The area of peatland covers the majority of the northern part of the segment and a small part of the southern part. There are no PWS within 250 m or directly downstream of the route.

Segment 5

Segment 5 includes between one and two watercourse crossings of the Altry Burn and its tributary the Small Burn. The segment runs on the southern slope of the Altry Hill and is overlain by peaty gley soils, classified as having carbon-rich soils and some peatland with no peatland vegetation (Class 3). There are no PWS within 250 m or directly downstream of the segment.

A6.5.6 Route Option E

Segment 1

Segment 1 includes a small area within forestry approximately 115 m from the Polyaddoch Burn. There are no watercourse crossings within this segment. The segment is on peaty podzol soils but has been classified as having no peatland vegetation (Class 5). There are no PWS within 250 m or directly downstream of the segment.

Segment 6

Segment 6 includes no watercourse crossings as the route stays on the western side of the Polskeoch Burn. The segment runs up and over the Polskeoch Rig within the area of forestry on peaty podzol soils classified as having no peatland vegetation or heath with some peatland (Classes 4 and 5). There are no PWS within 250 m or directly downstream of the segment.

Segment 10

Segment 10 includes between five and seven watercourse crossings, depending on the exact route selected. The watercourses include the upper and lower reaches of Polskeoch Burn as well as its tributaries, the Rashy Grain and the Fortypenny Burn. The segment lies between the properties of Polskeoch and Dalgonar, along the eastern slopes of Carnine. The southern area of the segment has been classified as having no peat (Class 0) and comprises predominantly mineral gleys, brown earths and peaty podzols. The northern segment comprises peaty podzol soils. Class 3 carbon-rich soils (identified as having no peatland vegetation and the potential to have some peatland) are identified along the Dalgonar Cleuch, and an area of nationally important peatland (Class 1) is found on the northern slopes of Corse Hill.

The segment is approximately 280 m east from the Polskeoch PWS source, while the user point at the property is approximately 200 m from the segment. The supply consists of a number of springs located on the slopes above the property, below the peak at Carnine. The segment is slightly uphill from the supply; however, the PWS is on a more western region of the slopes and is therefore unlikely to affect the PWS.

The segment is approximately 200 m west of the PWS at Dalgonar. Segment 10 is both uphill and upstream of this PWS, but the segment is drained by the Rashy Grain, which

is located approximately 100 m west of this PWS at its closest point. The Dalgonar PWS is supplied by a small local tributary to the Polskeoch Burn, with headwaters hydraulically separated from Segment 10. Therefore this PWS is deemed to be not at risk from the proposed OHL.

Segment 9

Segment 9 includes two watercourse crossings of the Polskeoch and Fortypenny Burns. The segment is found beside the Polskeoch property and within the area where several watercourses converge. The segment is underlain by mineral gleys and has been classified as having no peatland vegetation (Classes 5 and 0).

The segment is approximately 300 m away from the Polskeoch PWS source, while the supply point at the property is less than 50 m from the segment. The supply consists of a number of springs located on the slopes above the property, below the peak at Carnine. The segment is downhill from the supply source and therefore should not interfere with the supply.

Segment 11

Segment 11 includes one watercourse crossing of the Water of Ken within the forestry area and would be likely to include another crossing of one of its tributaries. The northern part of this segment is overlain by mineral gleys and the southern part is primarily overlain by peaty gleys. The majority of this segment has been classified as having no peatland vegetation (Classes 5 and 0), while the very south-western region of the segment is classified as nationally important peatland habitat (Class 1). There are no PWS within 250 m or directly downstream of the route.

Segment 12

Segment 12 includes one watercourse crossing of the Pulmulloch Burn in the north-eastern part of the segment. The segment is overlain by peaty gleys, with some humus-iron podzols and mineral gleys. This segment crosses an area classified as nationally important peatland habitat (Class 1) on the eastern slopes of Altry Hill. The area of peatland covers the majority of the northern part of the segment and a small part of the southern part. There are no PWS within 250 m or directly downstream of the route.

Segment 5

Segment 5 includes between one and two watercourse crossings of the Altry Burn and its tributary the Small Burn. The segment runs on the southern slope of the Altry Hill and is overlain by peaty gley soils, classified as having carbon-rich soils and some peatland with no peatland vegetation (Class 3). There are no PWS within 250 m or directly downstream of the segment.

A6.5.7 Route Option F

Segment 1

Segment 1 includes a small area within forestry approximately 115 m from the Polyaddoch Burn. There are no watercourse crossings within this segment. The segment is on peaty podzol soils but has been classified as having no peatland vegetation (Class 5). There are no PWS within 250 m or directly downstream of the segment.

Segment 6

Segment 6 includes no watercourse crossings as the route stays on the western side of the Polskeoch Burn. The segment runs up and over Polskeoch Rig within the area of forestry, on peaty podzol soils classified as having no peatland vegetation or heath with some peatland (Classes 4 and 5). There are no PWS within 250 m or directly downstream of the segment.

Segment 10

Segment 10 includes between five and seven watercourse crossings, depending on the exact route selected. The watercourses include the upper and lower reaches of Polskeoch Burn as well as its tributaries, the Rashy Grain and the Fortypenny Burn. The segment lies between the properties of Polskeoch and Dalgonar, along the eastern slopes of Carnine. The southern area of the segment has been classified as having no peat (Class 0) and comprises predominantly mineral gleys, brown earths and peaty podzols. The northern segment comprises peaty podzol soils. Class 3 carbon-rich soils (identified as having no peatland vegetation and the potential to have some peatland) are identified along the Dalgonar Cleuch, and an area of nationally important peatland (Class 1) is found on the northern slopes of Corse Hill.

The segment is approximately 280 m east from the Polskeoch PWS source, while the user point at the property is approximately 200 m from the segment. The supply consists of a number of springs located on the slopes above the property, below the peak at Carnine. The segment is slightly uphill from the supply; however, the PWS is on a more western region of the slopes and is therefore unlikely to affect the PWS.

The segment is approximately 200 m west of the PWS at Dalgonar. Segment 10 is both uphill and upstream of this PWS, but the segment is drained by the Rashy Grain, which is located approximately 100 m west of this PWS at its closest point. The Dalgonar PWS is supplied by a small local tributary to the Polskeoch Burn, with headwaters hydraulically separated from Segment 10. Therefore this PWS is deemed to be not at risk from the proposed OHL.

Segment 9

Segment 9 includes two watercourse crossings of the Polskeoch and Fortypenny Burns. The segment is found beside the Polskeoch property and within the area where several watercourses converge. The segment is underlain by mineral gleys and has been classified as having no peatland vegetation (Classes 5 and 0).

The segment is approximately 300 m away from the Polskeoch PWS source, while the supply point at the property is less than 50 m from the segment. The supply consists of a number of springs located on the slopes above the property, below the peak at Carnine. The segment is downhill from the supply source and therefore should not interfere with the supply.

Segment 11

Segment 11 includes one watercourse crossing of the Water of Ken within the forestry area and would be likely to include another crossing of one of its tributaries. The northern part of this segment is overlain by mineral gleys and the southern part is primarily overlain by peaty gleys. The majority of this segment has been classified as having no peatland vegetation (Classes 5 and 0), while the very south-western region of the segment is

classified as nationally important peatland habitat (Class 1). There are no PWS within 250 m or directly downstream of the route.

Segment 3

Segment 3 includes one watercourse crossing of the Water of Ken. The western part of this segment is overlain by peaty podzol soils and the eastern part of this segment is underlain by mineral gleys. This western part of this segment has been classified as having heath with some peatland (Class 4). There are no PWS within 250 m or directly downstream of the route.

Segment 4

Segment 4 includes a watercourse crossing of the Water of Ken and may also include crossing the headwaters of small tributaries of this watercourse; the Water of Ken is in a deeply incised valley with steep slopes. This segment crosses a region of high flooding potential along the Water of Ken. The segment runs parallel the Water of Ken for approximately 2.5 km in addition to the crossing location. The northern part of Segment 4 is underlain by peaty podzol soils and the southern part is predominantly overlain by humus-iron podzols, with some peaty gleys and brown earths. The north-central part of this segment has been classified as having carbon-rich soils and some peatland with no peatland vegetation (Class 3). There are no PWS within 250 m or directly downstream of the segment.

On the western side of the Water of Ken, to the south of Lorg, several areas of potentially contaminated land have been identified by D&G Council; these areas are identified as disused quarries or gravel pits.

Segment 5

Segment 5 includes between one and two watercourse crossings of the Altry Burn and its tributary the Small Burn. The segment runs on the southern slope of the Altry Hill and is overlain by peaty gley soils, classified as having carbon-rich soils and some peatland with no peatland vegetation (Class 3). There are no PWS within 250 m or directly downstream of the segment.

A6.5.8 Summary

Table A6.5.8: Route preference from a hydrology, geology and peat perspective

Route Option	Hydrology, geology and peat preferability
A	Between three and ten watercourse crossings, Segment 2 underlain by peaty soils with no national importance, steep slopes on Water of Ken banks, small region of high river flooding potential, no PWS
B	Between four and nine watercourse crossings, Segment 12 passes through area of Class 1 peatland, no PWS
C	Between three and ten watercourse crossings, small region of high river flooding potential, passes through peaty soils with no national importance, Segment 7 within 250 m of Polskeoch PWS

Route Option	Hydrology, geology and peat preferability
D	Between four and seven watercourse crossings, Segment 12 passes through area of Class 1 peatland, Segments 7 and 9 within 250 m of Polskeoch PWS
E	Between eight and thirteen watercourse crossings, Segments 10 and 12 pass through area of Class 1 peatland, Segment 10 within 250 m of Dalgonar PWS and Segment 9 and a small part of Segment 10 within 250 m of Polskeoch PWS.
F	Between eleven and eighteen watercourse crossings, small region of high river flooding potential, Segment 10 through area of Class 1 peatland, eastern edge of Segment 10 within 250 m of Dalgonar PWS and Segment 9 and a small part of Segment 10 within 250 m of Polskeoch PWS.

A6.6 Traffic and Transport

A6.6.1 General study area

All route options under consideration start and end at the same two points, namely the Lorg Substation Connection Point and the Euchanhead Wind Farm Collector Point. There are existing forestry tracks and the Southern Upland Way that cross all the proposed route options. General topography and land use have been considered for routes to gain access to construct the OHL.

A6.6.2 Route Option A

Route Option A passes through the woodland area in the northern section of the study area (marked as Segments 1,2 and 3 on Figure 12a) and can utilise the existing forestry tracks as well as the proposed access tracks serving construction and operational phases of the Euchanhead RED potentially offering easier access for construction purposes.

Segments 4 and 5 shown on the Figure 12a, match the area proposed for construction access to the Lorg Wind Farm, additionally existing field access tracks are present to the north-east of the Lorg Farm and C35S adopted track can be utilised, for part of the proposed route south of the Lorg Farm, to gain access to Segment 5, where it would join the construction access tracks proposed for Lorg Wind Farm.

The southern section (Segments 4 and 5) of the Route Option A follow the contours avoiding steep slope constraints to the north-west and south-east of OHL route through these sections.

A6.6.3 Route Option B

Route Option B passes through the woodland area in the northern section of the study area (marked as Segments 1,2 and 3 on Figure 12b) and can utilise the existing forestry tracks as well as the proposed access tracks serving construction and operational phases of the Euchanhead Wind Farm, potentially offering easier access for construction purposes.

Segment 11 passes through the existing woodland area where no or limited forestry tracks exist. Further deforestation and ground condition surveys will be required for the purpose of constructing traffic access.

Segment 12 stretches along the north-western parallel to the contours of Altry Hill with steeper gradients to the north-east to traverse.

A6.6.4 Route Option C

Route Option C passes through the woodland area in the northern section of the study area (marked as Segments 1, 6, 7 and 8 on Figure 12d) and can potentially utilise the proposed access tracks serving both the construction and operational phases of the Euchanhead Wind Farm with further extensions required within the highlighted segments where no tracks are proposed, that can potentially offer easier access for construction purposes.

Segments 1 and 6 form part of the proposed construction access for the Euchanhead Wind Farm therefore those can be potentially utilised for the OHL construction traffic.

Segment 6 climbs towards Carnine in the eastern direction and it has been noted that steeper gradients are present which can have an adverse impact for construction traffic.

Segments 4 and 5 shown on the Figure 12c, match the area proposed for construction access to the Lorg Wind Farm, additionally existing field access tracks are present to the north-east of the Lorg Farm and C35S adopted track can be utilised, for part of the proposed route south of the Lorg Farm, in order to gain access to Segment 5, where it would join the construction access tracks proposed for Lorg Wind Farm.

The southern section (Segments 4 and 5) of the Route Option C follow the contours avoiding steep slope constraints to the north-west and south-east of OHL route through these sections.

A6.6.5 Route Option D

Route Option D passes through the woodland area in the northern section of the study area (marked as Segments 1, 6, 7 and 8 on Figure 12d) and can potentially utilise the proposed access tracks serving both the construction and operational phases of the Euchanhead Wind Farm with further extensions required within the highlighted segments where no tracks are proposed, that can potentially offer easier access for construction purposes.

Segments 1 and 6 form part of the proposed construction access for the Euchanhead Wind Farm therefore can be potentially utilised for the OHL construction traffic.

Segment 6 climbs towards Carnine in the eastern direction and it has been noted that steeper gradients are present which can have an adverse impact for construction traffic.

Segment 11 passes through the existing woodland area where no or limited forestry tracks exist. Further deforestation and ground conditions surveys will be required for the purpose of construction traffic access.

Segment 12 stretches along the north-western parallel to the contours of Altry Hill with steeper gradients to the north-east to traverse.

A6.6.6 Route Option E

Route Option E passes through the woodland area in the north-eastern section of the study area (marked as Segments 1, 6, 10 and 9 on Figure 12e).

Segments 1 and 6 form part of the proposed construction access for the Euchanhead Wind Farm therefore those can be potentially utilised for the OHL construction traffic.

Segment 6 climbs towards Carnine in the eastern direction and it has been noted that steeper gradients are present which can have an adverse impact on construction traffic access.

Segment 10 bypasses Corse Hill along its western, northern and eastern sides to then heads south along the eastern side of Carnine, crossing the Southern Upland way. In the northern section no existing forestry tracks are present therefore further deforestation and ground condition surveys will be required. Additionally, steeper gradients on the hill sides might have an adverse impact on construction traffic access.

Segment 11 passes through the existing woodland area where no or limited forestry tracks exist. Further deforestation and ground conditions surveys will be required for the purpose of construction traffic access.

Segment 12 stretches along the north-western parallel to the contours of Altry Hill with steeper gradients to the north-east to traverse.

A6.6.7 Route Option F

Route Option F passes through the woodland area in the north-eastern section of the study area (marked as Segments 1, 6, 10 and 9 on Figure 12f).

Segments 1 and 6 form part of the proposed construction access for the Euchanhead Wind Farm therefore those can be potentially utilised for the OHL construction traffic.

Segment 6 climbs towards Carnine in the eastern direction and it has been noted that steeper gradients are present which can have an adverse impact on construction traffic access.

Segment 10 bypasses Corse Hill along its western, northern and eastern sides to then heads south along the eastern side of Carnine, crossing the Southern Upland way. In the northern section no existing forestry tracks are present therefore further deforestation and ground condition surveys will be required. Additionally, steeper gradients on the hill sides might have an adverse impact on construction traffic access.

Segment 11 passes through the existing woodland area where no or limited forestry tracks exist. Further deforestation and ground conditions surveys will be required for the purpose of construction traffic access.

Segments 4 and 5 shown on the Figure 12f, match the area proposed for construction access to the Lorg Wind Farm, additionally existing field access tracks are present to the north-east of the Lorg Farm and C35S adopted track can be utilised, for part of the proposed route south of the Lorg Farm, to gain access to Segment 5, where it would join the construction access tracks proposed for Lorg Wind Farm.

The southern section (Segments 4 and 5) of the Route Option C follow the contours avoiding steep slope constraints to the north-west and south-east of OHL route through these sections.

A6.6.8 Summary

Based on the detailed assessment of the Traffic and Transport above using the methodology set out in Section 4.3.2.2 of this report, Route Option A is the preferred option as it utilises existing forestry tracks as well as part of the access tracks proposed for the use by construction traffic related to both the Lorg Wind Farm and Euchanhead Wind Farm. It will therefore have the lowest impact on the provision of new tracks with potentially/relatively minimal requirement for upgrades to the existing and proposed tracks. Additionally, any adverse impacts on the existing traffic/movements along those tracks can be mitigated by Construction Traffic Management Plan (CTMP) if such arise.

Table A6.6.8: Route preference from a Traffic and Transport perspective

Route Option	Traffic and Transport preferability
A	Route Option A utilises both existing forestry tracks as well as construction access tracks proposed for Lorg and Euchanhead Wind Farms. Additionally, it passes lower down on the topography of the site therefore potentially offering easier access for construction purposes.
B	Route Option B passes closer to Altry Hill (and therefore would most likely have steeper gradients to traverse) than Route Option A and would possibly be more difficult to access. Additionally, provision of further access tracks would require additional construction traffic for its construction.
C	Route Option C crosses the Polskeoch Rig (and therefore would most likely have steeper gradients to traverse) than Route Option A and would possibly be more difficult to access. Additionally, provision of further access tracks would require additional construction traffic for its construction.
D	Route Option D crosses the Polskeoch Rig and passes closer to Altry Hill (and therefore would most likely have steeper gradients to traverse) than Route Option A and would possibly be more difficult to access. Additionally, provision of further access tracks would require additional construction traffic for its construction.
E	Route Option E crosses the Polskeoch Rig and passes closer to Corse Hill, Carnine and Altry Hill (and therefore would most likely have steeper gradients to traverse) than Route Option A and would possibly be more difficult to access. Additionally, provision of further access tracks would require additional construction traffic for its construction.
F	Route Option F crosses the Polskeoch Rig and passes closer to Corse Hill and Carnine (and therefore would most likely have steeper gradients to traverse) than Route Option A and would possibly be more difficult to access. Additionally, provision of further access tracks would require additional construction traffic for its construction.

A6.7 Land Use and Recreation

A6.7.1 General study area

The potential route options under consideration in the western -most parts of the study area (west of Altry Hill) will either cross or be located within the view of the Lorg Trail (Core path 215), although about half of the trail is through tall (41 – 50 year old) Sitka spruce plantation which could provide some shielding depending on the location of the final OHL route in relation to the trail.

The potential route options under consideration to the east of Polskeoch Rig will either cross or come in close proximity to a section of the Southern Upland Way, the Polskeoch Farm property and the Polskeoch bothy.

The trails and core paths present in the east of the study area will be unlikely to be affected by an OHL line within the proposed route options due to the hilly topography. In addition, the significance of any effects of an OHL at between 11 and 18 m above ground level on visitors to the study area, trails or nearby attractions (e.g. the Striding Arches) would be diminished in comparison to the expected impacts of the proposed and consented wind turbines of the Euchanhead RED and Lorg Wind Farm respectively on the same visitors. However, careful routeing of the OHL would avoid adding to the visual and consequent recreational impacts of the wind turbines and associated ancillary infrastructure, and has been taken into consideration in Section A6.3.

A6.7.2 Route Option A

Route Option A follows almost the entirety of the Lorg Trail, and would be most likely to impact on the views along this trail in the valley to the west of Altry Hill along the Water of Ken (see also Section A6.3.2). Views of the OHL from the part of the Lorg Trail located within forested areas could be screened through routeing. The part of the OHL route through the Valley of Ken (see route segment 4 on Figure 11 in Appendix 1) would also be visible from residential property, Lorg, and from the valley with all views from the valley seen against the rising land beyond. The potential visual impacts of the OHL on this trail are considered to be low/medium (refer to Section A6.3.2), and this trail is considered to be of local importance and low economic tourism sensitivity. Its value as part of a heritage trail (including providing access to Whig's Hole) is considered to be of local to regional value and low to medium sensitivity.

A6.7.2 Route Option B

Route Option B starts very similarly to Route Option A in that it follows the Lorg trail through forestry in the valley between Lorg Hill and Polskeoch Rig, and would be screened for the most part by the trees, depending on routeing. However, the section of the route that passes close to / coincides with the SUW where it wraps around the western corner of the rectangular sheepfold at Polskeoch could impact on views from the SUW which is of national value and high tourism sensitivity, although it might be possible to screen the OHL from view of the SUW through careful routeing within Route option segments 3 and 11. As described in Section A6.3.3, there may be views for visual receptors from the more elevated section of the SUW at High Countam as the OHL ascends the shoulder of Altry Hill, although this would be at distances of over 1 km and the OHL would not appear on the skyline.

The location of the OHL within Route segment 12 would likely make it more prominent in views from the Lorg Trail (Core path 215) as it is higher up the hill (than Route Option A) and across the river which draws the eye when walking this trail. Views of the OHL from the trail would be viewed from distances of 500 m or more but would potentially be within the skyline. It may be difficult to microsite the OHL to avoid all views from both Lorg Trail (Core Path 215) to the west and the SUW to the east.

A6.7.3 Route Option C

The initial part of Route Option C from the Euchanhead OHL POC would be unlikely to impact on the Lorg Trail due to screening by forestry in Route segments 1 and 6, and by landform in route segments 7 and 8. However, the OHL would likely become visible in views from the SUW where it passes by the Polskeoch farm due to recent felling, although this would likely only be until the saplings to be restocked in this area are tall enough to provide some screening. From there, this route option goes through Route segments 3, 4 and 5, and would have similar impacts on users of the Lorg Trail alongside the Water of Ken as Route Option A.

The potential to impact on visual amenity and was identified in Section A6.3.4 as being low. In addition, the Lorg Trail is of local value and low economic tourism value. The potential impacts of an OHL within Route Option C would be of low significance, particularly if careful routeing is implemented in route segments 7 and 8.

A6.7.4 Route Option D

The initial part of this Route Option from the Euchanhead POC in Segment 1, through segments 6 and 7, will be similar to that of Option C, and would likely be largely screened from the Lorg Trail (Core path 215) and the SUW by forestry and landform, although recent felling in Route segment 7 may increase visibility of the OHL from the SUW near Polskeoch farm until the saplings to be restocked in this area grow tall enough to effectively screen the OHL. However, the routeing of the OHL through Route segment 9 will require the SUW to be crossed twice, which would have direct impacts on users of the SUW near these crossings and would likely be visible from more elevated areas of the SUW (see also Section A6.3.5). This part of the SUW also forms part of the heritage trail that continues onto the SUW where it intersects the Lorg Trail near the rectangular sheepfold at Polskeoch. The national importance and high sensitivity of the SUW from a recreation and tourism perspective make the crossing of this pathway,(particularly since it might require the SUW to be crossed twice) undesirable and should be avoided if possible.

A6.7.4 Route Options E and F

An OHL in Route segment 10 would likely impact on users of the SUW where it passes through the valley at the foot of Carnine, both through potential views of the OHL along the slopes of the hill and through direct impacts resulting from the OHL crossing the SUW. Depending on routeing, the OHL may cross of come in close proximity of the SUW twice within Route segment 10 and would be likely to impact of views from higher elevations of the SUW depending on forestry felling. The national importance and high sensitivity of the SUW from a recreation and tourism perspective make the crossing of this

pathway,(particularly since it might require the SUW to be crossed twice) undesirable and should be avoided if possible.

A6.7.8 Summary

No formal recreation facilities or activities are located or take place within the study area. The Southern Upland Way is a nationally important core path which is considered to be sensitive, and should be avoided if possible. Forestry in the northern and eastern parts of the study area could screen (fully or partially) the OHL from users of the core paths in this area depending on routeing and felling. The topography is comprised of rounded hilltops and deep valleys that limit the visual envelope(s) of the route options and effects are expected to be very localised.

Table A6.7.8: Route preference from a Land Use and Recreation perspective

Route Option	Land Use and Recreation preferability
A	• This route more or less follows the Lorg Trial (Core Path 215) which is considered to be of local importance and low economic tourism sensitivity. • Views from Lorg Trail in forested areas could be screened. • Views in the valley along the Water of Ken would be limited to people passing through this valley, with all views against the landform beyond. • Views from a single property would be affected (Lorg farmhouse). • The potential visual impacts of the OHL on this trail are considered to be low/medium (refer to Section A6.3.2). • Its value as part of a heritage trail (including providing access to Whig's Hole) is considered to be of local to regional value and low to medium sensitivity. • This route is unlikely to be visible from the Southern Upland Way (SUW) except for a small section where it may climb the shoulder of Altry Hill (depending on routeing). This route is the least likely of the six under consideration to affect views from the nationally important and recreationally sensitive SUW.
B	• The section of the route that passes close to the SUW could impact on views from the SUW although it might be possible to screen the OHL from view of the SUW through careful routeing. • The location of the OHL within Route segment 12 would likely make it more prominent in views from the Lorg Trail (Core path 215) as it is higher up the hill (than Route Option A) and across the river which draws the eye when walking this trail. • Views of the OHL in the valley of the Water of Ken from the trail would be viewed from distances of 500 m or more but would potentially be within the skyline. • It may be difficult to microsite the OHL to avoid all views from both Lorg Trail (Core Path 215) to the west and the SUW to the east.

Route Option	Land Use and Recreation preferability
	• The potential views from the SUW make this route less preferable than Route Option A.
C	• The OHL would be less likely to affect views from the Lorg Trail in the forested areas, although it may be visible from the SUW until such time as restocked trees between the SUW and the OHL grow to a height capable of screening the OHL, which would take time (years). Future visibility would fluctuate depending on felling between the OHL and the SUW. • Views along the Water of Ken would be similar to Route Option A.
D, E and F	SUW would be required to be crossed in several locations in all of these route option. As this is a nationally significant core path, this option should be avoided if possible.

A6.8 Forestry

A6.8.1 General study area

All route options on consideration within the study area have an impact on Forestry Crops.

At this stage the preferred option from a forestry perspective would be to favour the route with least impact to standing forest crops.

Two native woodlands have been identified in Area 10 that are common to both Route Option E and F and for this reason these routes are thought to be the least preferred route options.

A6.8.2 Route Option A

Sitka spruce is the prime species within this route option.

The age of the standing crops are between 41 and 50 years old. Felling is programmed within the route to take place between 2024 and 2063, the latter being land recently restocked.

Subject to precise routing it would appear that in the centre of the route option there are areas of open space due to watercourses and as a result smaller compartments are formed. Felling trees back to wind firm edges at the edge of these compartments/sub compartments would reduce the risk of further windthrow to neighbouring crops unlike felling trees through a large continuous compartment.

A6.8.3 Route Option B

Sitka spruce is the prime species within this route option.

The age of the majority of standing crops are between 41 and 50 years old. Felling is programmed within the route to take place between 2019 and 2063, the latter being land recently restocked

Similar to Route A, open ground is present within the centre of the route option and subject to precise routing opportunities present themselves to fell back to windfirm edges in areas containing individual compartments and sub compartments as mentioned above.

A6.8.4 Route Option C

Sitka spruce is the prime species within this route option.

The age of the majority of standing crops are between 31 and 50 years old. Felling is programmed within the route to take place between 2019 and 2063, the latter being land recently restocked

Unlike route options A & B, option C contains less open area around compartments however it does have areas of land felled awaiting restocking in Area 7 & 8 and so tree loss through these already felled sections will be minimal.

A6.8.5 Route Option D

Sitka spruce is the prime species within this route option.

The age of the majority of standing crops are between 31 and 50 years old. Felling is programmed within the route to take place between 2019 and 2053, the latter being land recently restocked

Similar to Option C in containing less open ground than option A or B and also has slightly less land felled awaiting restock.

A6.8.6 Route Option E

Sitka spruce is the prime species within this route option but does contain two native woodlands of Upland Birchwood.

The age of the majority of standing crops are between 21 and 50 years old. Felling is programmed within the route to take place between 2019 and 2053, the latter being land recently restocked

The linear route within this Option would necessitate removal of more forest than Options A,B,C or D, this combined with the fact of the presence of two native woodlands this route option is one of the two least preferred.

A6.8.7 Route Option F

Sitka spruce is the prime species within this route option but does contain two native woodlands of Upland Birchwood.

The age of the majority of standing crops are between 21 and 50 years old. Felling is programmed within the route to take place between 2019 and 2053, the latter being land recently restocked

The linear route within this Option would necessitate removal of more forest than Options A, B, C, D or E, this combined with the fact of the presence of two native woodlands this route option is one of the two least preferred.

A6.8.8 Summary

Table A6.8.8: Route preference from a Forestry perspective

Route Option	Forestry preferability
A	Areas of open ground allowing for felling back to windfirm edge short linear route so less forest to fell in comparison to D,E & F
B	Areas of open ground allowing for felling back to windfirm edge short linear route so less forest to fell in comparison to D,E & F
C	Areas already felled within Area 7 and 8 result in no forest loss Least linear loss of forest
D	Long linear route in comparison to route option A, B,& C
E	Route passes through two native woodlands Long linear route in comparison to route option A, B,& C
F	Route passes through two native woodlands Long linear route in comparison to route option A, B,& C