SP Energy Networks

Troston 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 consented Troston Loch Wind Farm to the national grid. SPEN proposes to achieve this by providing a grid connection between the planned Troston Loch substation and the proposed Glenshimmeroch collector substation, which will be connected to the grid. These renewable energy developments are located between the towns of St John's Town of Dalry and Moniaive in Dumfries and Galloway.

The wood poles will likely be H poles (rather than single poles) of between 11 and 18 m high, with a typical height of 13 m, 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 Troston overhead line (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 OHL grid connection route.

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

- 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 OHL between the planned Troston Loch substation and the proposed Glenshimmeroch collector substation whilst taking into consideration environmental, technical and economic constraints. This means that the preferred 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 Troston Loch OHL grid connection. All comments and input are highly valued and welcome. 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 application will be developed for submission in July 2024.

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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 Troston Loch Wind Farm to the national grid. SPEN proposes to achieve this by providing a grid connection between the planned Troston Loch substation and the proposed Glenshimmeroch collector substation, which will be connected to the grid. These renewable energy developments are located between the towns of St John's Town of Dalry and Moniaive in Dumfries and Galloway, as can be seen on Figure 1 in Appendix 1.

The Troston Loch Wind Farm's point of connection (POC) will be located at NGR E267516, N588834 and the Glenshimmeroch substation collector point will be located at NGR E264779, N587363. 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 (OHL). The locations of the POCs and the study area boundary can be seen on Figures 1 and 2 in Appendix 1.

The study area will be near three wind farms which were at the following development stages at the time of writing of this report:

- Troston Loch Wind Farm:
    - An application (reference ECU00001785) for Section 36 consent under the Electricity Act 1989 was made for 14 wind turbines, 149.9 m to tip, and was approved by the Energy Consents Unit (ECU) in December 2020.
- Glenshimmeroch Wind Farm:
    - Planning permission was granted in September 2019 on appeal (PPA-170-2138) for ten turbines, 149.9 m to tip (Dumfries and Galloway Council reference 18/0992/FUL).
    - Planning permission was granted in February 2022 on appeal (case reference PPA-170-2149) for tip height increase (160 m and 180 m) (Dumfries and Galloway Council reference 20/0861/FUL).
- Margree Wind Farm
    - Planning permission was granted in March 2022 on appeal (case reference PPA-170-2153) for 9 turbines (maximum tip height 200 m) (Dumfries and Galloway Council reference 20/2085/FUL).

It is anticipated that the Troston Loch grid connection will be required to be constructed and ready for connection by October 2025. 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 (EIA) 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 eight potential route

options for the proposed OHL 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 Troston 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 Troston 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 OHL 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 Troston grid connection will be a continuous 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 OHL, the approach is to minimise the length of underground cable necessary to overcome the constraint to OHL 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 Troston Loch Wind Farm from the POC at the planned Troston substation, delivering it to the collector point at the proposed Glenshimmeroch collector 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 degrees
	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. 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 Troston 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 OHL (SPEN, 2021)

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

Figure 1.3: Example of typical terminal structures of a trident 132 kV OHL (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 OHL, 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. Poles are erected in sections, i.e. between angle support poles and/or terminal support pole. The insulator fittings, and wood poles forming the pole support, will be assembled local to the pole site and lifted into position utilising the tracked excavator which excavated the foundations. The pole foundation holes will then be backfilled, and the pole stay wire

supports attached to the ground in preparation for conductor stringing, erection and tensioning.

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 OHL 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.

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 maintenance works. 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 Troston 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 OHL routeing is set out in SPEN's 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 OHL 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 Troston OHL grid connection. Section 2 of this report discusses the methodology used to identify possible route options.

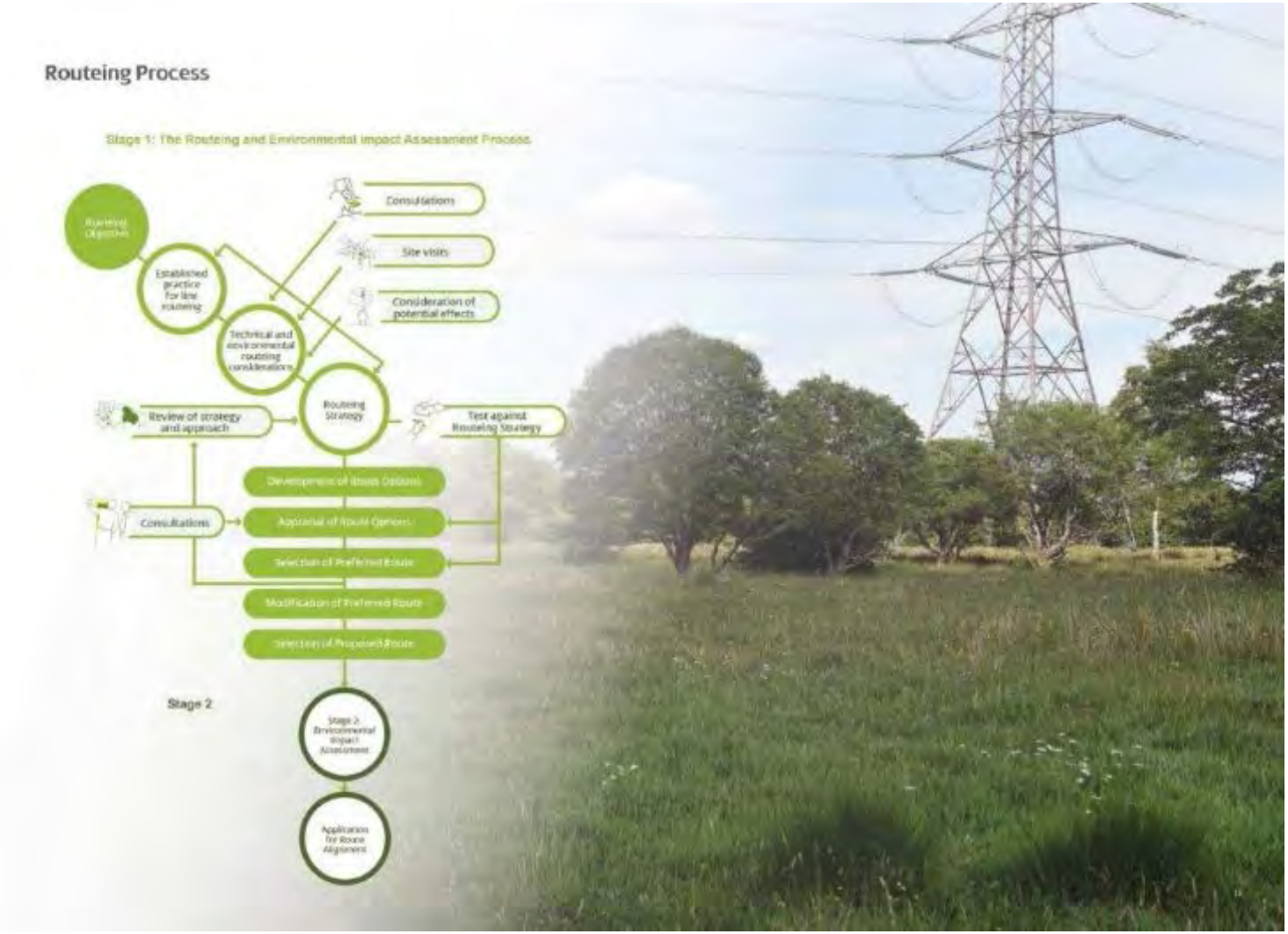

Figure 1.4: Routing process diagram (SPEN, 2020)

1.3 Legal and planning context

1.3.1 Overarching legislation

The overarching legislation applicable to the planned Troston 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 Troston 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 Troston 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 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 Troston 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 Troston 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 OHL 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 2 (LDP2) (Dumfries and Galloway Council, 2019) and Policies are discussed below in Section 1.3.3.

1.3.3 Planning considerations

The proposed Troston 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 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 LDP2 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 state 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 (2020) 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 Troston 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);
- The Draft Fourth National Planning Framework (Draft NPF4) (2021);
- 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 Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 sets a target year of 2045 for reaching net zero emissions in Scotland. The Scottish Government's Energy Strategy (2017) 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 presents Scotland's businesses with many opportunities to create a competitive advantage whilst creating jobs.

The Scottish Government's NPF4 Position Statement (2020) highlights that climate change will be the overarching priority for the National Spatial Strategy, and it is expected that NPF4 will bring forward policies and proposals which will support the Climate Change Plan 2020, which sets the direction for achieving the emission reductions targets of the Climate Change (Emissions Reductions Targets) (Scotland) Act 2019.

The Position Statement acknowledges that there is an expectation that NPF4 will confirm the Government's view that "*the Global Climate Emergency should be a*

material consideration in considering applications for appropriately located renewable energy developments". Further to this, the Position Statement identifies that, as a priority, the "*strategy will need to facilitate the roll-out of renewable electricity and renewable and zero emissions heat technologies. We will need to switch to low and zero carbon fuel sources, and support the delivery of associated infrastructure, such as grid networks and gas pipelines*".

The connection of renewable energy developments such as the Troston Loch Wind Farm to the grid would ensure that the energy generated by the wind farm 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 Troston 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 and 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 OHL connection between the planned Troston Loch POC and the Glenshimmeroch 132 kV 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 OHL routeing

SPEN standardise their route planning methodology by using established standard industry practice for the routeing of OHLs; 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 and more further information is provided in Appendix 2.

Other guidance that is available regarding the routeing of OHL 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 OHLs 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 OHL 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

OHLs 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 OHL 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 waterbodies, 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 and 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 Troston Loch POC and the proposed Glenshimmeroch collector substation.
- 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.

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

Consideration	Constraints/issues
	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 is one internationally designated site within 10 km of the study area, namely Loch Ken and River Dee RAMSAR and Special Area of Protection (SPA). This site is located approximately 8.39 km from the study area boundary.
        - There are no national or local designated sites within 2 km of the study area boundary.
    - Habitats (see Figure 4 in Appendix 1):
        - There are 16 broad habitat types within the study area, the most abundant being coniferous plantation, felled/re-planted plantation, acid grassland and marshy grassland.
        - Areas of sensitive habitats including blanket bog, an Annex I habitat, and marshy grasslands, which have the potential to be Groundwater Dependent Terrestrial Ecosystems (GWDTEs), are present within the study area.
    - Protected species – mammals:
        - An active, outlier badger (*Meles meles*) sett is present near the northern boundary of the study area within an area of sheep grazed pasture. Evidence of otter (*Lutra lutra*) utilising the larger watercourses was recorded within the study area in the form of spraints and feeding remains. Two mature trees along the road to the north of the study area have potential for roosting bats and the forest rides and edges provide suitable foraging and commuting habitat. The coniferous plantations and felled/replanted areas have potential to support pine marten (*Martes martes*) and red squirrel (*Sciurus vulgaris*) and possible evidence of both species was recorded.
    - Protected species – reptiles and amphibians:
        - Features suitable for hibernating reptiles and amphibians were noted across the study area in the form of drystone dykes and piles of deadwood. Seven areas of standing water, all with the potential to support amphibians, were recorded within the study area, and a common frog (*Rana temporaria*) was recorded along a forestry ride to the south-east of the study area.

- Ornithology:
    - The habitats within the study area provide suitable conditions for a range of breeding and wintering bird species, and a number of notable species have been recorded in the study area in recent years.
    - Surveys carried out for the planned Troston Loch Wind Farm, Glenshimmeroch Wind Farm and Margree Wind Farm found birds of conservation concern breeding within the study area including goshawk (*Accipiter gentilis*), peregrine (*Falco peregrinus*), curlew (*Numenius arquata*), black grouse (*Tetrao tetrix*) and barn owl (*Tyto alba*). A recent survey in 2022 found no evidence of black grouse using previously recorded leks within the study area.
    - Birds of conservation concern previously observed overwintering within the study area include short-eared owl (*Asio flammeus*), hen harrier (*Circus cyaneus*), merlin (*Falco columbarius*), Scottish crossbill (*Loxia scotica*), red kite (*Milvus milvus*).
- Archaeology and cultural heritage
    - There are no designated heritage assets (e.g. scheduled monuments, listed buildings) within the study area. The nearest designated asset is the Category B listed building of Barlaes (LB3676) approximately 2.61 km to the south-west of the study area.
    - The current land use of commercial forestry across the majority of the study area is a relatively recent one that was overlaid on an earlier pattern of post-medieval rural settlements.
    - Non-designated assets recorded in the study area (see Figure 5 in Appendix 1) relate primarily to these post-medieval remains of rural settlement and agriculture, apart from the record of four Prehistoric ‘cup-marked’ stones at Meikle Bennan (MDG3826).
    - The quality of preservation of any previously unidentified archaeological deposits located in areas under commercial forestry is likely to have been compromised.
- Landscape:
    - There are no international or national landscape designations within the study area or its vicinity.
    - There are no local landscape designations within the study area, however the study area is located between two locally designated Regional Scenic Areas (RSA).
    - The study area is entirely within NatureScot Landscape Character Type (LCT) 176 Foothills with Forest – Dumfries and Galloway (see Figure 6 in Appendix 1).
    - The study area and the visual envelope are heavily influenced by the topography of the Southern Uplands.
    - The study area is dominated by commercial forestry which acts as a significant screen to long distance views to and from the study area from all directions; however the forestry is in rotation and when felled longer distance and open views would be possible.
    - The rotation of the commercial forestry is likely to create a dynamic landscape and visual envelope.
    - The consented wind farms within the study area will become a key characteristic of the local landscape.
    - There are open areas of moorland immediately outside the study area, to the north and west, which create a landscape where long distance views are possible, particularly from other areas of high ground surrounding the study area.

- There is extremely limited settlement within the wider vicinity of the study area.
- The study area and its locality is not a destination for tourism and there is little in the way of formal or informal recreation within the vicinity of the study area, with the exception of the Southern Upland Way (SUW) which cuts through the western edge of the study area and the National Byway Cycle Route, which runs east to west through the north of the study area (see Figure 7 in Appendix 1).

- Geology, peat, hydrology and hydrogeology:
  - The National Soil Map of Scotland identifies that approximately 28% of the study area is underlain by dystrophic blanket peat. In total approximately 86% of the study area is shown to be underlain by blanket peat, peaty gleys and peaty podzols.
  - The Carbon and Peatland 2016 mapping shows areas of Classes 1 and 2 nationally important peatland to be present primarily within the northern part of the study area (see Figure 8 in Appendix 1). The majority of the study area is shown to be Classes 4 and 5, which have lower sensitivity.
  - Much of the higher ground, including Glenshimmeroch Hill, Hog Hill and Kilnair Hill, have limited or no mapped superficial deposits.
  - The study area is underlain by low productivity bedrock aquifers, with no significant groundwater-bearing superficial deposits.
  - The study area lies across three surface water catchments (see Figure 9 in Appendix 1). The majority of the study area is within the Black Water catchment. All three catchments drain westwards into the Water of Ken, and ultimately the River Dee.
  - A number of wells and springs have been identified from available published EIA reports for nearby developments. Private water supplies (PWS) details have been requested from Dumfries and Galloway Council, but a response has not yet been received.
  - The main channel of the Black Water has a high likelihood of flooding. Areas at risk of flooding are largely confined to the immediate area of the watercourses, and a larger flat area at the base of Lochwhinnie Hill.
  - There are no designated sites relevant to geology, peat, hydrology or hydrogeology within 5 km of the study area.
- Traffic and transport:
  - There is a limited number of existing forestry tracks within the study area.
  - Access to the study area can currently be gained using the following 3 options (see also Figure 10 in Appendix 1):
    - Access to the northern part of the study area can be gained via B729 a single carriageway between Moniaive and Knowehead and use of part of the proposed access tracks to Troston Loch Wind Farm.
    - Access to the northern part of the study area can be gained via B729 a single carriageway between Moniaive and Knowehead and partial use of the U141S and existing forestry tracks and proposed access tracks for Troston Loch Wind Farm.
    - Access to the southern part of the study area can be gained via B7000 a single carriageway and partial use of C51S and U141S (which form part of the SUW).

- Land use and recreation:
    - Existing land use:
        - The majority of the land within the study area consists of commercial coniferous plantation with areas of clear felling.
        - The land within the north-western part of the study area is mainly used for rough grazing by tenant farmers.
    - Planned land use:
        - Several renewable energy developments have received consent but are yet to undergo construction within the study area (see Figure 11 in Appendix 1). These include:
            - Troston Loch Wind Farm:
            - Glenshimmeroch Wind Farm;
            - Margree Wind Farm.
        - Planning applications that had recently received permission from Dumfries and Galloway Council at the time of writing (see Figure 11 in Appendix 1) include:
            - Continued siting of a met mast (max height 70 m) for a temporary period of three years (until October 2023) (application reference 20/2061/FUL).
    - Recreation:
        - There are no formal recreational facilities within the study area, although tracks and core paths provide access for informal recreational use.
        - The SUW (Core Path 504) is a nationally important and sensitive core path which passes through the south-west corner of the study area.
            - This pathway is the first coast-to-coast pathway across Scotland;
            - This track is used for several annual marathon events;
            - Part of the SUW also forms part of a heritage pathway.
        - Margree (Core Path 217) is also partly present within south-eastern part of the study area.
        - Kendoon Youth Hostel to Butterhole Bridge (Core Path 199) is present just outside of the south-western corner of the site where it links with the Southern Upland Way.
        - The National Byway Cycle Route, runs along the unclassified U141S Fingland Lane towards the B7000, passing through the northern to north-western portion of the study area.
- Forestry:
    - Approximately 63 % of the study area is covered by forestry, mostly within the boundaries of the consented Troston Loch Wind Farm and the consented Glenshimmeroch Wind Farm. Most of the open (unforested) land within the study area is within the northern part of the OHL study area.
    - The forest within the Troston Estate is undergoing restructuring, and some additional areas of plantation will need to be removed to accommodate the consented Troston Loch Wind Farm infrastructure. Most of the trees within this forestry estate consist of Sitka spruce.
    - The Glenshimmeroch and Kilnair Forests (within the Glenshimmeroch Wind Farm boundary) are managed by Scottish Woodlands. The majority of these forests are well established, and consist mostly of

Sitka spruce with some small subcompartments of other species such as Norway spruce, Hybrid larch and broadleaved species. Some compartments have been felled and are undergoing restocking as part of the ongoing forestry management plan. Parts of this forest will need to be felled out of plan to accommodate the consented wind farm infrastructure and wind blow mitigation areas.

- There are no Native Woodlands within the study area.

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 Troston 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 11 in Appendix 1) to enable the identification of areas to be avoided or where technical constraints may become an issue and should be treated as constraints when identifying potential route options for the proposed OHL.

The Troston Loch Wind Farm was approved in December 2020 (reference ECU00001785). The wind farm comprises of 14 turbines, 149.9 m to tip. Five of the proposed turbines are located within the northern part of the study area as well as a proposed 90 m tall meteorological mast.

The Glenshimmeroch Wind Farm was approved on appeal in September 2019 PPA-(appeal reference 170-2138, Dumfries and Galloway Council reference 18/0992/FUL). The proposed wind farm comprises 10 turbines, 149.9 m to tip. All of the proposed turbines are within the study area. An application for tip height increase has recently been approved on appeal in February 2022 (appeal reference PPA-170-2149, Dumfries and Galloway Council reference 20/0861/FUL). The approved proposal is for the increase of the turbine tip heights from 149.9 m to 160 m for 4 turbines and to 180 m for 6 turbines.

In connection with the consented Glenshimmeroch Wind Farm, is an application for the continued siting of a 70 m tall meteorological mast for a further 3 years, which was granted planning permission in March 2021 (reference 20/2061/FUL). An application for a 132 kV collector substation in connection with the wind farm was submitted in June 2021 but was refused in May 2022 (reference 21/1379/FUL). A new application for the substation has been submitted in June 2022 (reference 22/1079/FUL).

Planning permission was granted in March 2022 on appeal (appeal reference PPA-170-2153, Dumfries and Galloway Council reference 20/2085/FUL) for the Margree Wind Farm. The approved wind farm comprises 9 turbines, 200 m to tip. Two of the nine turbines are located within the study area. An application for a 80 m high temporary meteorological mast associated with the Margree Wind Farm was approved in February 2022 (reference 21/2345/FUL). The proposed temporary mast is to be located just outside of the study area. An application for the construction of an access track between the consented Glenshimmeroch Wind Farm and the consented Margree Wind Farm was submitted in June 2022 (reference 22/1075/FUL).

An application for a wind farm at land at Cornharrow has been approved on appeal in June 2021 (case reference PPA-170-2145, Dumfries and Galloway Council reference 20/0159/FUL) with a new application in planning to increase tip height (reference 21/1766/S42). Although the wind farm is located at Cornharrow, outside of the study

area, the abnormal loads transport route runs from the B7000 and C51s along the U141S Fingland, which runs through the northern part of the study area, to the B729. Works are proposed along the route to facilitate the abnormal loads delivery.

An application for the retention of a 1,150 m section of temporary access road formed in connection with planning application 11/C/2/0013, Blackcraig and Margree Wind Farms Connection Project was approved in January 2018 (reference 17/1674/FUL).

3.1.3 Technical baseline

Key technical issues for the OHL route options include:

- Topography – steeper slopes 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.
- Ground conditions – the presence of peat and a disused quarry could present engineering challenges and require special foundations.
- The planned location of the wind turbines and related infrastructure at Troston Loch Wind Farm, Glenshimmeroch Wind Farm and Margree Wind Farm. OHL route options need to take the turbine tip height +10% into account, as well as 3x 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.

3.2 Routeing strategy

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

- To identify a technically feasible and economically viable route between the Troston Loch Wind Farm POC and the Glenshimmeroch collector substation 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 OHL 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 12 in Appendix 1):

Hard Constraint: Feature to be avoided wherever possible. These areas are shown in red on Figure 12 (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 12 (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 strategic constraints.

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.	European designated sites (e.g. Special Protection Areas)	Avoid wherever possible and prioritise for mitigation
		National Parks	
		National Scenic Areas	

Sensitivity	Justification	Examples	Route identification response
	Technical constraints of key significance.	Category A Listed Buildings	
		Scheduled Monuments	
		Inventory of Gardens and Designed Landscapes	
		Inventory Battlefields	
		Slopes greater than 22 degrees	
		Turbine tip height +10%	
		Wind farm infrastructure (e.g. turbines, met mast)	
		Areas where peat is present at >2.5 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	
		Non-Inventory Designed Landscapes	
		Archaeologically Sensitive Areas	
		Regional Scenic Areas	
		Local Nature Reserves	
		50 m buffer areas around water bodies	
		Plantations on Ancient Woodland Sites	
		Turbine micrositing buffer[1]	
		Turbine 3x rotor diameter and micrositing buffer area	
		Areas of potential GWDTE/or sensitive habitat areas	
		Peat 1.5 - 2.5 m 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.

[1] Turbine micrositing buffers of 50 m at Troston Loch Wind Farm and 100 m at Glenshimmeroch Wind Farm and Margree Wind Farm.

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

- Avoid European designated sites, residences, scheduled monuments, inventory of gardens and designed landscapes, inventory battlefields, listed buildings and non-designated heritage assets of potentially national significance.
- Preferably avoid or limit the distance travelled within SSSI; RSPB Bird Sensitive Areas; native/nearly-native woodland; Class 1 and 2 peat areas, and 100 m 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. GWDTEs), natural or semi-natural forested areas and peat.

A detailed constraints table (attached as Appendix 5) was used to enable areas of high, medium or low sensitivity to be indicated on the constraints heat map (Figure 12 in Appendix 1) and identify appropriate avoidance buffers to aid the identification of route options for the proposed OHL.

Using the existing environmental, planning and technical information available for the study area as well as information generated through desk-based studies and field surveys undertaken specifically within the study area of the proposed Troston 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 Troston Loch POC and the Glenshimmeroch 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 Troston OHL grid connection was carried out by means of the following below 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 the Troston Loch, Glenshimmeroch and Margree wind farms), background data searches, heritage asset data and information provided by stakeholders such as Dumfries and Galloway Council, Scottish Environment Protection Agency (SEPA), Historic Environment Scotland (HES) and NatureScot. Where necessary, desk-based information was supplemented with field surveys including monthly ornithology vantage point surveys, monthly winter walkovers 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 Section 4.2.2 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 below.

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 Section 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 EIA will be required for the planned Troston OHL grid connection.

Once the proposed route is identified, a 'pre-development' baseline will be established which will be used to confirm the number of biodiversity units. This would be used to carry out a Biodiversity Net Gain (BNG) assessment during the later stages (e.g. EIA stage).

4 ROUTE SELECTION

This section focuses on Stages 1 to 2 of the procedure set out in Section 3.2 above – Routeing Strategy for the selection of a preferred route option for the proposed Troston 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 12 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 (topple distance) and ancillary infrastructure (e.g. met mast);
  - Settlements and individual properties (100 m avoidance buffer);
  - Slopes steeper than 22 degrees;
- Ecology and ornithology:
  - Watercourses (30 m avoidance buffer to protect potential protected species habitats);
- Cultural heritage:
  - Prehistoric non-designated asset (10 m avoidance buffer);
- Landscape and visual:
  - Settlements and individual properties (100 m avoidance buffer);
- Geology and soils:
  - Peat depth over 2.5 m (50 m avoidance buffer);
- Hydrology and geomorphology:
  - Waterbodies (20 m avoidance buffer);
  - PWS (150 m avoidance 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 etc.);
  - Existing OHL (70 m avoidance buffer);
- Ecology and ornithology:

- Important Bird Areas (100 m avoidance buffer);
- Class 1 carbon and peatland (50 m avoidance buffer);

- Cultural heritage:
  - Non-designated assets (25 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);
  - National Byway Cycle Route (100 m avoidance buffer, primary consideration is location of poles if oversail cannot be avoided);
- Hydrology:
  - Waterbodies (50 m avoidance buffer);
- Geology and soils:
  - Class 1 and 2 carbon and peatland (50 m avoidance buffer);
  - Peat depth 1.5 – 2.5 m (50 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).

Using the environmental and technical constraints as a baseline (see Figure 12 in Appendix 1), it was possible to identify several areas where it would be possible to route an OHL (refer to Figure 13 in Appendix 1). Due to the nature of the topography it was possible to identify 23 route segments which could be combined in different sequences to form 10 potential route options for consideration. The route options have been named Route Option A, B, C, D, E, F, G, H, I and J for simplicity. The 23 route segments are indicated in Figure 13, and Figures 14a-j in Appendix 1 show the 10 individual route options that were identified. The route options would have approximate lengths as follows:

- Route Option A (segments 23-1-2-3-4-5): 3.7 km;
- Route Option B (segments 23-1-2-3-4-6): 3.8 km;
- Route Option C (segments 23-1-22-20-7-9): 5.0 km;
- Route Option D (segments 23-1-22-20-7-8-4-5): 4.5 km;
- Route Option E (segments 23-1-22-20-7-8-4-6): 5.0 km;
- Route Option F (segments 23-1-2-10-14-15): 4.4 km;
- Route Option G (segments 11-13-14-15): 3.5 km;
- Route Option H (segments 11-12-15): 3.9 km;
- Route Option I (segments 17-18-19-20-21-3-4-5): 5.0 km; and
- Route Option J (segments 23-16-18-19-20-21-3-4-5): 4.7 km.

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

4.2.1 Appraisal of technical aspects of route options

Route options F - I were considered to be technically constrained as these route options pass between wind turbines. Although the route options avoid the turbine topple distance, there are still constraints on physical space for the construction works and there is potential for wake effects. The technical appraisal focused on Route Options A and J which were considered to be the main contenders for the preferred route based on the environmental appraisal (see Section 4.2.2). 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 wind farms; and
- Pollution/corrosion zones.

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

- Route length:
    - Both route options are feasible in terms of route length, however Route Option A is shorter than Route Option J.
- Altitude:
    - 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.
    - Both route options are above 200 m AOD, with the highest point of the route option corridors at approximately 290 m AOD.
- Topography:
    - The majority of both route options have gradients less 11 degrees but there are some small sections with gradients up to and greater than 22 degrees, which could provide some technical difficulty.
- Buildability/access constraints:
    - Both route options have available access via surrounding country roads, with some areas of remote terrain which would require temporary access.
    - Both route options would require access to the Glenshimmeroch collector substation to take into account sufficient clearance under the existing 132 kV OHL.
- Proximity to existing OHL:

    - Both route options potentially require crossing of the 132 kV OHL north of the Glenshimmeroch collector substation.
- Ground conditions:
    - Within both route option corridors there are areas of class 1 and 2 peat, although Route Option J includes a larger area of class 1 and 2 peat, which is likely to require site investigations to determine if special foundations are required (Table 4.3 of the environmental appraisal notes that Route Option A includes up to 70 m of class 1 peatland and Route Option J includes between 1.2 and 1.7 km of blanket peat or Class 1 and 2 peatland).
- Watercourses:
    - Both route options would require watercourse crossings (Table 4.3 of the environmental appraisal notes that Route Option A is likely to require between 7 to 8 watercourse crossings, while Route Option J is likely to require between 9 and 14 watercourse crossings).
- Road/railway crossings:
    - Both route options would require crossing of forestry tracks, but Route Option J would also require crossing of the unclassified U141S Fingland Lane.
- Wind farms:
    - Both route options are in proximity to wind turbines.
    - Technical considerations when routeing the OHL include keeping the line out of topple distance and considering the impact within the areas where wake effect might be experienced (area within 3x the turbine rotor diameter), and clearance to wind turbines.
- Public services 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:
    - Both route options include areas of forestry which may require felling and compensatory planting (Table 4.3 of the environmental appraisal estimates that Route Option A is likely to require additional felling of approximately 18.4 ha of forestry while Route Option J is likely to require felling of approximately 21.3 ha of forestry).
- Residential/industrial areas:
    - Neither route options pass through or are in proximity to residential or industrial areas.
- Mineworking areas including historical and future opencast mining:
    - Route Option J is within proximity of potential quarry/open cast mining and made ground, which is noted as a disused quarry on the OS 1:25,000 mapping (no active mining or quarrying activities were identified through the Coal Authority interactive map and BGS Geoindex).
- Pollution:
    - Both route options pass through rural land which has a low corrosion rate.

4.2.1.1 *Summary conclusion of technical appraisal*

In summary, although the technical appraisal did not identify any high risk technical challenges, there are some key engineering concerns associated with Route Options A and J including:

- Proximity to a disused quarry;
- Areas of peat;
- Wind turbines;
- Existing 132 kV OHL; and,
- Access through forestry and remote areas.

Both route options require access through forestry and remote areas, and both route options are in proximity to consented wind turbines. Both route options also potentially require crossing of the existing 132 kV OHL which runs to the north of the proposed Glenshimmeroch collector substation.

Although both route option corridors contain areas of class 1 or 2 peat, Route Option J includes a much larger area of class 1 or 2 peat. Route Option J is also within proximity of a disused quarry (as noted OS 1:25,000 mapping). Route Option A, which is also a shorter route, would therefore be slightly more preferrable from a technical perspective.

4.2.2 Appraisal of environmental aspects of route options

4.2.2.1 *Appraisal criteria*

To enable the 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 coding 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 4-5 November 2021 by suitably qualified ecologists. The route options plus a 250 m buffer were 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 (*Arvicola amphibius*) and otter was also noted.

Ornithological surveys commenced in September 2021 and are due to be completed in August 2022. To date, these have included vantage point surveys from locations designed to cover the route options, black grouse lek surveys, breeding bird surveys of the study area and raptor nest searches. A desk-based study was also carried out of ornithology data gathered during the EIAs of the three proposed wind farm developments overlapping the study area: Troston Loch Wind Farm (EDF Renewables, 2019), Glenshimmeroch Wind Farm (EnergieKontor, 2018), and Margree Wind Farm (EnergieKontor, 2020). Potential impacts on birds were assessed and target species selected with reference to guidance from NatureScot on the impacts of power lines on birds (NatureScot, 2016).

Limitations

The results of the 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 walkover for protected species was to establish the potential for presence and therefore a detailed survey was not undertaken and signs and features may have been undetected.

The ornithology survey programme for the Troston OHL grid connection is currently ongoing, with data collection and analysis not yet completed. However, the ornithology reports for the three proposed wind farms which overlap with the study area were also consulted for the desk study to supplement the RSK survey results. These reports (EnergieKontor, 2018: EDF Renewables, 2019: EnergieKontor 2020) include data from bird surveys undertaken in the vicinity from 2011 to present, and the survey areas for these wind farm studies cover the entirety of the Troston OHL grid connection study area.

Habitat evaluation criteria

The nature conservation value of habitats was assessed according to widely accepted criteria that relates to important factors such as naturalness, extent, rarity and diversity

of ecological receptors. These and others are described extensively in literature (CIEEM, 2006: Rackham, 1986: Ratcliffe, 1977: Usher,, 1986: Wigginton, 1999). In addition, Ratcliffe (1977) and Usher (1986) recognise that the nature conservation value of habitats can be influenced by size, diversity, naturalness, rarity, fragility, typicalness, geographical location, recorded history, potential wildlife value and intrinsic appeal. An ecological value has been assigned to each habitat type in accordance with Chartered Institute of Ecology and Environmental Management (CIEEM) guidelines (CIEEM, 2018) using the categories consolidated in 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 Local Biodiversity Action Plan (*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 study 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

With respect to the potential route options considered for this connection it is relevant to note that the different options are in relatively close proximity to each other (including some areas of overlap) and are crossing broadly the same landscape, with limited scope for much differentiation in terms of likely landscape and visual amenity impacts. Nevertheless, it remains good practice to consider the different potential routes as for any other scheme, and the broad methodology for this is detailed below.

For landscape and visual amenity six criteria were applied at the 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 OHLs);
- 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 residents in settlements, users of main transport routes, and users of key recreational areas;
- 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; and
- Forestry – areas of ancient woodland should be avoided and, if possible, impact on other natural or semi-natural woodland 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 OHL and likely concerns. A judgement of 'high' indicated that a particular aspect would most likely be adversely affected by the introduction of an OHL and a judgement of 'low' indicated that the route option would likely avoid adverse effects on this criterion. A judgement of none means that the criteria would not be of concern e.g. if there were no residential properties within the vicinity of a route then the likely effects on residential amenity would be considered 'none'.

The judgements on these criteria, in respect of the different route options, are provided in Appendix 6 of this report.

The landscape appraisal took account of:

- The landscape character and sensitivity of the landscape designations, if applicable;
- The degree to which the route options and potential alignments could be considered to have the least impact on landscape resource; and
- The degree to which the options conformed to the Holford Rules.

For this project, potential landscape and visual amenity impacts would not be a key factor in designing the route options because the differences between them is limited. However, the appraisal still takes a qualitative, expansive approach and attempts to draw out the key differences between the route options where possible.

Consideration was given to the potential visibility of the OHL from sensitive receptors within the vicinity of the study area, in particular, residential and recreational receptors. However, it is noted that due to the location of the development and the landscape of the wider area there are limited visual receptors to be considered.

With respect to potential visibility, the degree to which an OHL would actually be perceptible was taken into account. At a distance of 1 km, a trident wood pole with an above ground height of 12-15 m (including the conductor), would only occupy a very small portion of the existing view and is highly unlikely to give rise to significant effects. The degree to which poles are perceived depends on various other factors including weather conditions, the time of day (i.e. the direction of the sun), whether the poles are seen against a physical backdrop or against the sky and the design of the pole (e.g. H-poles are more noticeable than single poles). As with any external material, wood poles are susceptible to weathering and consequent colour variations. The colour of the poles at the time of construction would be dark brown but this would fade over time to a noticeably lighter silver-grey. The rate of colour change would depend on the prevailing weather conditions and to some degree on the type of timber and timber treatment used. Over time these changes would tend to reduce the perceptibility of elements viewed above the skyline but may increase the visibility of structures when viewed against a dark background such as coniferous plantation. The metal bracing and the conductors would be constructed from aluminium, which is initially shiny but tends to dull over time to dark matt silver.

Taking this into account and taking account of existing screening provided by landform and commercial forestry, the appraisal identified if any receptors were sufficiently close to the route to be considered to be at risk of significant adverse effects on visual amenity.

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 Council and the National Record of the Historic Environment (NRHE) maintained by Historic Environment Scotland (HES) identified known non-designated assets within the study area.

There is a robust baseline available for the study area from local authority and national databases, and a lack of designated or non-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.

Data gathered for the baseline was used to assess the degree of interaction between each route option and the identified archaeological and cultural heritage sensitivities.

Geology, Peat, Hydrology and Hydrogeology appraisal methodology

The appraisal for geology, peat, hydrogeology and hydrology considered the main aspects of concern to routeing and the main environmental sensitivities that require protection. The sensitivities that require consideration in route identification are:

- PWS, including source location, properties served and any connecting infrastructure;
- Surface watercourses and waterbodies; and
- Areas of peatland.

The main aspects of concern in relation to routeing options are:

- Areas of peatland and associated buildability concerns; and
- Steep or unstable slopes.

Other considerations included potential sensitivities relating to bedrock or superficial geology, former or current mining or mineral working areas, and potential future mineral resources that would require protection from sterilisation.

The baseline conditions within the study area relating to the hydrology, hydrogeology, geology and peat were established through desk-based activities, using publicly available information.

Each of the route options was then appraised taking the baseline and likely effects of the construction, operation and decommissioning of the OHL into account, and compared with one another to determine a preference for the route(s).

Traffic and Transport appraisal methodology

Baseline information was gathered using publicly available information and information that was generated for the EIAs supporting the Troston Loch Glenshimmeroch and Margree Wind Farms. Aspects that were considered include access to the Glenshimmeroch substation collector point, the Troston Loch Wind Farm POC, 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 Troston Loch Wind Farm, Glenshimmeroch Wind Farm and Margree Wind Farm. The information gathered through the desk-based activities was supplemented by observations made during a site walkover.

Forestry

Establishing the baseline

An initial desk study was carried out to gather all available information prior to conducting an appraisal of each of the potential overhead line route options. This included obtaining all available information on any of the woodlands likely to be affected by the potential routeing.

The study included capturing any relevant information on current 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 Government environment web map[2];
- Scottish Forestry Map Viewer[3];
- Forestry Commission National Forest Inventory Woodlands[4];
- Aerial photographs; and
- Ordnance survey maps.

However, while it was useful to determine the current baseline with regards to forestry within the study area and immediate surrounds, as described above and as observed on two general site visits conducted in September and October 2021, because both Troston Loch Wind Farm and Glenshimmeroch Wind Farm have been consented, it was considered more appropriate, for the purposes of the comparative appraisal in Appendix 6, to utilise the post-construction and mitigation forestry plans developed for each wind farm as a baseline, since these provide a more accurate indication of what the new forestry baseline will be once the wind farms have been constructed and are operational. This effectively enabled the determination of any additional forestry that may need to be felled and replanted as compensation as a result of the construction of an OHL. The post-construction and mitigation plans for the wind farms were obtained from the following sources and are attached in Appendix 7:

- Troston Loch Wind Farm, Supplementary Environmental Information Report, SEI Chapter 13 Forestry (2019); and
- Glenshimmeroch Wind Farm Environmental Impact Assessment Report, 2018.

Comparative assessment of route options

In order to comparatively assess the ten potential route options that have been identified from a forestry perspective, the sensitivity of the woodlands and the magnitude of the changes from the wayleave clearance have been assessed based on:

- Sensitivity:
    - Highly sensitive woodlands:
        - Ecologically sensitive e.g. Ancient Semi Natural Woodlands;
        - Woodlands subject to other designations e.g. Native Woodland Survey of Scotland (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:

[2] Scottish Government, Scotland's environment web map. https://map.environment.gov.scot/sewebmap/

[3] Scottish Forestry map viewer. https://scottishforestry.maps.arcgis.com/apps/webappviewer/index.html?id=0d6125cfe892439ab0e5d0b74d9acc18

[4] Forestry Commission Open Data (November 2019). https://data-forestry.opendata.arcgis.com/datasets/b71da2b45dde4d0595b6270a87f67ea9_0/explore?location=55.173876%2C-4.112803%2C13.49

        - 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:
    - 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.

4.2.2.3 Appraisal findings and discussion

Table 4.3 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 Table 4.1.

Table 4.3: Summary of route options (Route Option A – J) 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	Route Option G	Route Option H	Route Option I	Route Option J
Ecology									
Preferred route with regard to Biodiversity Net Gain (BNG) due to short length and direct route with lowest amount of habitat lost. The potential for BNG may be more likely as the route covers mostly lower value habitats including coniferous plantation and grazed grassland. A small area of bog is present which could be restored. The likelihood of GWDTEs would be required to be assessed given the presence of marshy grassland. Limited constraints in terms of protected species are likely to exist, other than watercourses which support otter and possibly water vole. The route crosses an area of felled plantation which could support pine marten.	This route option is very similar to Route Option A and hence there is no preference between Route Options A and B in terms of ecology.	Route Option C is a long route which offers the least potential to accommodate the infrastructure required and for BNG to be achieved as it covers higher value, sensitive habitats including large areas of bog on likely deep peat and marshy tributaries and potential GWDTEs. Numerous watercourse crossings would be required for this route and the route would be in close proximity to an active badger sett.	Given its similarities with Route Option C, this route offers the least potential to accommodate the infrastructure required. This route would also cover an area of felled plantation which has the potential for pine marten.	This route is very similar to Route Option D and hence offers the least potential to accommodate the infrastructure required.	This route covers a limited area of higher value habitats, restricted to a small area of bog to the north and south and some grazed purple moor-grass pasture. The majority of the route covers habitats of limited value including semi-improved grazed grassland and coniferous plantation. This route option is in close proximity to a number of waterbodies and as such the risk of disturbance to amphibians is higher with this route, although not considered a considerable constraint.	This route covers mostly felled and coniferous plantation which are considered to be of lower ecological value and hence it is considered that BNG could be more achievable with this route. However, a small area of bog is present to the south of the route.	This route option is similar to Route Option G; however as it comes around the south of Kilnair Hill it is in closer proximity to the possible common pipistrelle (Pipistrellus pipistrellus) maternity roost at Kilnair cottage/tree and therefore there is a possibility of disturbance to this roost.	This is a fairly long route option which starts in felled conifer plantation and covers mostly marshy and acid grassland before joining onto Route Option A. The end of the route covers mostly lower value habitats including coniferous plantation and grazed grassland. The route passes within close proximity to Black Water and two features with low bat roost potential including a stone bridge and drystone dyke. A section of the route closely adheres to the access track and also lies within proximity of suitable water vole habitat. There is an active outlier badger sett located within 400 m of the proposed route however this is distant enough to not be considered a constraint to the works.	This route option is very similar to Route Option I although it crosses a number of small water courses, therefore there is no preference between Route Options I and J in terms of ecology.
Ornithology									
While this is a short and direct route, it passes in close proximity to a known black grouse lekking site. Breeding curlew and snipe have also been recorded on Lochwinnie Hill. This route presents a significant risk of	Similarly to Route Option A, Route Option B also passes in close proximity to a black grouse lekking site and area where breeding curlew and snipe have been recorded. Therefore, there is no preference	Route Option C passes in close proximity to two known black grouse leks, as well as an area where breeding curlew and snipe have been recorded, presenting a significant risk of collision for these	Route Option D also passes in close proximity to a known black grouse lek and area where breeding curlew and snipe have been recorded. Therefore, it presents a collision risk to these species and offers least	Route Option E is very similar to Route Option D and therefore also offers least potential to accommodate the infrastructure required.	As with Route Options A-E, Route Option F also passes in close proximity to a known black grouse lek and area where breeding curlew and snipe have been recorded. Therefore, it presents a collision	Route Option G avoids the black grouse lekking sites in the north of the study area. It also avoids the summit of Kilnair Hill where red kite and goshawk have been observed flying regularly. Therefore, it is the	Route Option H is similar to Route Option G, however in passing south around Kilnair Hill it passes more closely to areas where red kite and goshawk have been observed and therefore holds slightly more risk of	This route option is similar to Route Option A, however it passes north of Lochwinnie Hill, thereby maintaining an approximately 250 m distance from the black grouse lek and breeding area for curlew and snipe	Similarly to Route Option I, Route Option J passes to the north and east of the black grouse lek on Lochwinnie Hill, however it passes more closely to the east of this area than Route Option I and is

Route Option A	Route Option B	Route Option C	Route Option D	Route Option E	Route Option F	Route Option G	Route Option H	Route Option I	Route Option J
collision for breeding black grouse, curlew and snipe and therefore has the least potential to accommodate the infrastructure required.	between Route Options A and B.	species. It is also the longest route, crossing areas of bog habitats which provide suitable habitat for wader species and hen harrier, which are also at risk of collision with OHLs. Therefore, this route has least potential to accommodate the required infrastructure.	potential to accommodate the required infrastructure.		risk to these species and has least potential to accommodate the required infrastructure.	preferred route option with regard to ornithology.	collision for these species, however this is not considered a significant constraint.	that have been recorded in previous surveys. For this reason, it is preferred to options A-F. It also passes further from this area to the east than Route Option J and therefore it is preferred over Route Option J.	therefore less preferred.
Landscape									
This route does not cross any landscape designations. The route runs through a landscape dominated by commercial forestry, although the future baseline would also include the turbines from the consented wind farms. The main landscape effects would likely arise from the introduction of the OHL into the 1.3 km section of untouched moorland landscape. Overall the sensitivity of the landscape to the proposed development has been judged as low.	This route does not cross any landscape designations. The route runs through a landscape dominated by commercial forestry, although the future baseline would also include the turbines from the consented wind farms. The main landscape effects would likely arise from the introduction of the OHL into the 1.3 km section of untouched moorland landscape. Overall the sensitivity of the landscape to the proposed development has been judged as low.	This route does not cross any landscape designations. The route crosses moorland to the immediate north of a landscape dominated by commercial forestry. The main landscape effects would likely arise from the introduction of the OHL into a 4.4 km length of moorland landscape. Overall the sensitivity of the landscape to the proposed development has been judged as medium.	This route does not cross any landscape designations. The route is partly within a landscape dominated by commercial forestry. The main landscape effects would likely arise from the introduction of the OHL into a 2.5 km length of moorland landscape. Overall the sensitivity of the landscape to the proposed development has been judged as low.	This route does not cross any landscape designations. The route is partly within a landscape dominated by commercial forestry. The main landscape effects would likely arise from the introduction of the OHL into a 2.5 km length of moorland landscape. Overall the sensitivity of the landscape to the proposed development has been judged as low.	This route does not cross any landscape designations. The route runs through a landscape dominated by commercial forestry, although the future baseline would also include the turbines from the consented wind farms. The main landscape effects would likely arise from the introduction of the OHL into a 1.3 km length of moorland landscape. Overall the sensitivity of the landscape to the proposed development has been judged as low.	This route does not cross any landscape designations. The route runs through a landscape dominated by commercial forestry, although the future baseline would also include the turbines from the consented wind farms. Overall the sensitivity of the landscape to the proposed development has been judged as low.	This route does not cross any landscape designations. The route runs through a landscape dominated by commercial forestry, although the future baseline would also include the turbines from the consented wind farms. Overall the sensitivity of the landscape to the proposed development has been judged as low.	This route does not cross any landscape designations. The west of the route runs through a landscape dominated by commercial forestry, although the future baseline would also include the turbines from the consented wind farms. The main landscape effects would likely arise from the introduction of the OHL into the 2.5 km section of untouched moorland landscape within the east of the route. Overall the sensitivity of the landscape to the proposed development has been judged as low.	This route does not cross any landscape designations. The west of the route runs through a landscape dominated by commercial forestry, although the future baseline would also include the turbines from the consented wind farms. The main landscape effects would likely arise from the introduction of the OHL into the 2.5 km section of untouched moorland landscape within the east of the route. Overall the sensitivity of the landscape to the proposed development has been judged as low.
Visual Amenity									
Route Option A would be perceptible from the residential properties Fingland and Auchenshinnoch. This Route Option would be visible from an approximate 3-	Route Option B would be perceptible from the residential properties Fingland and Auchenshinnoch. This Route Option would be visible from an approximate 3-	Route Option C would be perceptible from the residential properties Fingland, Auchenshinnoch and Marskaig. This Route Option would be visible from an approximate 4 km	Route Option D would be perceptible from the residential properties Fingland and Auchenshinnoch. This Route Option would be visible from an approximate 2.5-	Route Option E would be perceptible from the residential properties Fingland and Auchenshinnoch. This Route Option would be visible from an approximate 2.5-3	Route Option F would be perceptible from the residential properties Fingland and Auchenshinnoch. This Route Option would be visible from an approximate 2.5-3	The perceptibility of Route Option G would largely depend on the rotational nature of the commercial forestry within the vicinity of the route. Whilst this Route	The perceptibility of Route Option H would largely depend on the rotational nature of the commercial forestry within the vicinity of the route. Whilst this Route Option does	Route Option I would be perceptible from the residential properties Fingland and Auchenshinnoch. Residents at Fingland would have views of a	Route Option J would be perceptible from the residential properties Fingland and Auchenshinnoch. Residents at Fingland would have views of a

Route Option A	Route Option B	Route Option C	Route Option D	Route Option E	Route Option F	Route Option G	Route Option H	Route Option I	Route Option J
4 km section of the National Byway Cycle Route and the western end would be visible to users of the SUW. This Route Option would be screened from all views from the south and east of the higher ground located within the centre of the study area. It is not anticipated that any residential receptors would experience significant visual effects; there would likely be localised non-significant effects on users of the National Byway Cycle Route.	4 km section of the National Byway Cycle Route. It's path to the east of Garlaffin may screen the western end of Route Option B for users of the SUW. It is not anticipated that any residential receptors would experience significant visual effects; there would likely be localised non-significant effects on users of the National Byway Cycle Route.	section of the National Byway Cycle Route and it would pass directly over a section of the SUW. Whilst Route Option C benefits from being on the lowest lying ground, it would not benefit from screening or backclothing provided by commercial forestry and is located within a landscape where longer distance views of the OHL would be possible from the north and west. It is not anticipated that any residential receptors would experience significant visual effects; there would potentially be localised significant effects on users of the National Byway Cycle Route and SUW.	3 km section of the National Byway Cycle Route. A large section of Route Option D benefits from being on lower lying ground within the study area, however this same section would not benefit from screening or backclothing provided by commercial forestry and is located within a landscape where longer distance views of the OHL would be possible from the north and west. It is not anticipated that any residential receptors would experience significant visual effects; there would potentially be localised significant effects on users of the National Byway Cycle Route.	km section of the National Byway Cycle Route. A large section of Route Option E benefits from being on lower lying ground within the study area, however this same section would not benefit from screening or backclothing provided by commercial forestry and is located within a landscape where longer distance views of the OHL would be possible from the north and west. It is not anticipated that any residential receptors would experience significant visual effects; there would potentially be localised significant effects on users of the National Byway Cycle Route.	km section of the National Byway Cycle Route. It is unlikely to be perceptible for users of the SUW. It is not anticipated that any residential or recreational receptors would experience significant visual effects.	Option does cross some of the higher ground within the study area, it avoids proximity to residential properties and recreational receptors. The development would be generally screened to views from within the north and west of the study area by intervening landform; and is unlikely to be perceptible from either the SUW or the National Byway Cycle Route. It is not anticipated that any residential or recreational receptors would experience significant visual effects.	cross some of the higher ground within the study area, it avoids proximity to residential properties and recreational receptors. The development would be generally screened to views from within the north and west of the study area by intervening landform; and is unlikely to be perceptible from either the SUW or the National Byway Cycle Route. It is not anticipated that any residential or recreational receptors would experience significant visual effects.	considerable stretch of the eastern section of the OHL, but from a minimum distance of 400 m. This Route Option would be visible from an approximate 4 km section of the National Byway Cycle Route. A large section of Route Option I benefits from being on lower lying ground within the study area, however this same section would not benefit from screening or backclothing provided by commercial forestry and is located within a landscape where longer distance views of the OHL would be possible from the north, west and east. It is not anticipated that any residential receptors would experience significant visual effects; there would potentially be localised significant effects on users of the National Byway Cycle Route.	considerable stretch of the eastern section of the OHL, but from a minimum distance of 400 m. This Route Option would be visible from an approximate 4 km section of the National Byway Cycle Route. A large section of Route Option I benefits from being on lower lying ground within the study area, however this same section would not benefit from screening or backclothing provided by commercial forestry and is located within a landscape where longer distance views of the OHL would be possible from the north, west and east. It is not anticipated that any residential receptors would experience significant visual effects; there would potentially be localised significant effects on users of the National Byway Cycle Route.

Route Option A	Route Option B	Route Option C	Route Option D	Route Option E	Route Option F	Route Option G	Route Option H	Route Option I	Route Option J
Archaeology and Cultural Heritage									
Among preferred route options – short distance (3.7 km) and able to avoid known assets.	Among preferred route options – short distance (3.8 km) and able to avoid known assets.	Among the longest route options and contain numerous previously identified remains that would be difficult to avoid. Among least preferred route options, but potentially viable with appropriate mitigation. Jointly the longest at 5.0 km long.	Among the longest route options and contain numerous previously identified remains that would be difficult to avoid. Among least preferred route options, but potentially viable with appropriate mitigation.	Among the longest route options and contain numerous previously identified remains that would be difficult to avoid. Among least preferred route options, but potentially viable with appropriate mitigation. Jointly the longest route at 5.0 km long.	It contains a single previously identified archaeological asset which does not extend across a significant width of the route option. Potentially viable option.	Among preferred route options – it contains no previously identified archaeological assets. Shortest route at 3.5 km long.	It contains a single previously identified archaeological asset which does extends across a significant width of the route option. Short distance (3.9 km). Potentially viable option.	Contains three previously identified archaeological assets and takes a circuitous route. Among least preferred route options, but potentially viable with appropriate mitigation. Jointly the longest route at 5.0 km long.	Contains three previously identified archaeological assets and takes a circuitous route. Among least preferred route options, but potentially viable with appropriate mitigation. Among the longest route at 4.7 km long.
Geology, Peat, Hydrology and Hydrogeology									
Seven to eight watercourse crossings. Up to 70 m of Class 1 peatland, although this is fully avoidable. A small area of peat over 2.5 m deep recorded in Troston Loch Wind Farm EIA, although this may be avoidable. No PWS near or downstream from the route. This is the preferred option.	Six to seven watercourse crossings. Up to 70 m of Class 1 peatland, although this is fully avoidable. A small area of peat over 2.5 m deep recorded in Troston Loch Wind Farm EIA, although this may be avoidable. Passes approximately 250 m upslope of a PWS intake.	Nine to ten watercourse crossings. Between 804 and 1,190 m of blanket peat or Class 1/2 soils. A small area of peat over 2.5 m deep recorded in Troston Loch Wind Farm EIA, although this may be avoidable. No PWS near or downstream from the route.	Seven to nine watercourse crossings. Between 700 and 990 m of blanket peat or Class 1/2 soils. A small area of peat over 2.5 m deep recorded in Troston Loch Wind Farm EIA, although this may be avoidable. No PWS near or downstream from the route.	Six to eight watercourse crossings. Between 700 and 990 m of blanket peat or Class 1/2 soils. A small area of peat over 2.5 m deep recorded in Troston Loch Wind Farm EIA, although this may be avoidable. Passes approximately 250 m upslope of a PWS intake.	Nine watercourse crossings. Between 170 and 270 m of blanket peat. A small area of peat over 2.5 m deep recorded in Troston Loch Wind Farm EIA, although this may be avoidable. Passes approximately 150 m upslope of a PWS intake.	Seven watercourse crossings. Between 200 and 560 m of blanket peat or Class 1/2 soils. A small area of peat up to 1.5 m deep recorded in Troston Loch Wind Farm EIA. Passes approximately 150 m upslope of a PWS intake.	Four watercourse crossings. Between 200 and 560 m of blanket peat or Class 1/2 soils. A small area of peat up to 1.5 m deep recorded in Troston Loch Wind Farm EIA. Passes approximately 150 m upslope of a PWS intake.	Between 7 and 12 watercourse crossings. Between 1.0 and 1.6 km of blanket peat or Class 1/2 soils. A small area of peat up to 2.5 m deep recorded in Troston Loch Wind Farm EIA, although this may be avoidable. No PWS near or downstream from the route.	Between 9 and 14 watercourse crossings. Between 1.2 and 1.7 km of blanket peat or Class 1/2 soils. A small area of peat over 2.5 m deep recorded in Troston Loch Wind Farm EIA, although this may be avoidable. No PWS near or downstream from the route.
Traffic and Transport									
Route Option A access may use existing forestry tracks and tracks proposed for Glenshimmeroch Wind Farm. Where no forestry tracks present, 'fire breaks' may potentially be used. Route passes through Clachandow Rig and along the Lochwinnie Hill with steeper gradients making access more onerous. New access tracks will result in additional	Route Option B access may use existing forestry tracks and tracks proposed for Glenshimmeroch Wind Farm. Where no forestry tracks present, 'fire breaks' may potentially be used. Route passes through Clachandow Rig and along the Lochwinnie Hill with steeper gradients making access more onerous. New access tracks will result in additional	Route Option C runs parallel with the U141S along its northern edge. Route Option C can utilise the U141S as principal access. It passes along the south and west of Lochwinnie Hill and east of White Knowe with steeper gradients making access more onerous. New access tracks will result in additional HGVs on	Route Option D can potentially utilise U141S. Similarly, to Route Options A, B and C it follows through segment 1 where steeper ground might be expected and additionally follows segments 8, 4 and 5 where no existing tracks are present therefore further tree removal and additional construction traffic will be generated. Therefore, it is	Route Option E can potentially utilise U141S. Similarly, to Route Options A, B, C and D it follows through segment 1 where steeper ground might be expected and additionally follows segments 8, 4 and 6 where no existing tracks are present therefore further tree removal and additional construction traffic will be generated. Therefore, it is	Route Option F passes along the south and west of Lochwinnie Hill and east of White Knowe with steeper gradients making access more onerous. Heading south it uses forestry land where no forestry tracks exist. Route segments 14 and 15 are in close proximity to the existing forestry tracks which may potentially be	Route Option G runs in a southerly direction through forestry land. Some existing tracks are available. Access tracks proposed for Glenshimmeroch Wind Farm may be utilised. Route heads north of Kilnair Hill and then turns south. Existing forestry tracks and proposed access tracks for Glenshimmeroch Wind Farm in the vicinity of the proposed OHL route	Route Option H runs in a southerly direction through forestry land. Some existing tracks are available. Access tracks proposed for Glenshimmeroch and Troston Loch wind farms could be utilised. Route then heads south of Kilnair Hill and then west. Existing forestry tracks and access tracks proposed for Glenshimmeroch Wind Farm in the	Route Option I runs in a northerly direction along the southern and western edge of Lochlee Hill to then cross the U141S and run parallel along its northern edge to then connect to route segments 3, 4 and 5 where partial use of existing forestry tracks might be possible. It passes along the western edge of Lochlee Hill with potentially steeper gradients	Route Option J runs in a northerly direction along the between Lochwinnie Hill and Lochlee Hill to then cross the U141S and run parallel along its northern edge to then connect to Segments 3, 4 and 5 where partial use of existing forestry tracks might be possible. New access tracks will result in additional

Route Option A	Route Option B	Route Option C	Route Option D	Route Option E	Route Option F	Route Option G	Route Option H	Route Option I	Route Option J
HGVs on roads during construction.	HGVs on roads during construction.	roads during construction.	expected that this route might have a higher impact than Option C.	expected that this route might have a higher impact than Option C.	used as access onto sections of the OHL. Access tracks proposed for Glenshimmeroch Wind Farm may also be utilised. New access tracks will result in additional HGVs on roads during construction.	could be potentially used. New access tracks will result in additional HGVs on roads during construction.	vicinity of the proposed OHL route could be potentially used. New access tracks will result in additional HGVs on roads during construction.	making access more onerous. New access tracks will result in additional HGVs on roads during construction.	HGVs on roads during construction.
Land Use and Recreation									
The route avoids most of the wind farm infrastructure apart from crossing one wind farm track and potential borrow pit. There would likely be localised non-significant visual effects on users of the National Byway Cycle Route.	The route avoids most of the wind farm infrastructure apart from crossing one wind farm track. There would likely be localised non-significant visual effects on users of the National Byway Cycle Route.	The route mostly avoids the wind farm sites. The route would require the National Byway Cycle Route and the SUW to be crossed in two locations. As the SUW is a nationally significant core path, this option should be avoided if possible. There would be potentially localised significant visual effects on users of the National Byway Cycle Route and SUW.	The route avoids most of the wind farm infrastructure apart from crossing one wind farm track and potential borrow pit. The route would require the National Byway Cycle Route to be crossed in two locations. There would potentially be localised significant effects on users of the National Byway Cycle Route.	The route avoids most of the wind farm infrastructure apart from crossing one wind farm track. The route would require the National Byway to be crossed in two locations. There would potentially be localised significant visual effects on users of the National Byway Cycle Route.	The route passes between proposed turbines and crosses wind farm tracks. Views of the OHL are from the National Byway, SUW and core paths are likely to be screened by land form and forestry and significant visual effects on recreational receptors are not anticipated.	The route passes between proposed turbines and crosses wind farm tracks. Views of the OHL are from the National Byway, SUW and core paths are likely to be screened by land form and forestry and significant visual effects on recreational receptors are not anticipated.	The route passes between proposed turbines and crosses wind farm tracks. Views of the OHL are from the National Byway, SUW and core paths are likely to be screened by land form and forestry and significant visual effects on recreational receptors are not anticipated.	Existing land use includes rough grazing land and commercial forestry. The route passes between proposed turbines and crosses a wind farm track. The route would require the National Byway Cycle Route to be crossed in two locations. There would potentially be localised significant visual effects on users of the National Byway Cycle Route.	Existing land use includes rough grazing land and commercial forestry. The route would require the National Byway Cycle Route to be crossed in two locations. There would potentially be localised significant visual effects on users of the National Byway Cycle Route.
Forestry									
Approximately 18.4 ha of forestry consisting of 1-10 years Sitka spruce and a small section of broadleaved species to be planted as part of the Troston forestry restructuring plan to be felled for the OHL in addition to the forestry that will be felled for the wind turbine and wind farm access track. Parts of route segment 5 have	Approximately 19.8 ha of forestry consisting of Sitka spruce (30+ years), and a section of Norway spruce planted in 2014 would require to be felled and kept clear for the OHL. Neither the forestry within the Troston Loch Wind Farm boundary or the Glenshimmeroch Wind Farm boundary within this route option would be	Approximately 2.7 ha of forestry consisting of 1-10 years Sitka spruce and a small section of broadleaved species to be planted as part of the Troston forestry restructuring plan would be required to be felled for the OHL in addition to the forestry that will be felled for the wind turbine and wind farm access track.	Approximately 14.3 ha of forestry would require to be felled for the installation of the OHL in addition to the felling required for the construction of the wind farm infrastructure. However, most of the trees in these areas are over 30 years old and consist mostly of Sitka spruce, some of which is scheduled to be felled in 2028.	Approximately 15.7 ha of forestry would require to be felled for the installation of the OHL in addition to the felling required for the construction of the wind farm infrastructure. However, most of the trees in these areas are over 30 years old and consist mostly of Sitka spruce, some of which is scheduled to be felled in 2028.	Approximately 19.5 ha of forestry would require to be felled for the installation of the OHL in addition to the felling required for the construction of the wind farm infrastructure. Felling currently ongoing or scheduled within the near future being undertaken as part of forestry management near Kilnair Hill. Potential opportunity to coincide OHL construction within	Approximately 32.4 ha of forestry would require to be felled for the installation of the OHL in addition to the felling required for the construction of the wind farm infrastructure. Opportunity to coincide construction of the OHL with the current or near future felling in this area. No forestry within this route is planned to be felled and kept	Approximately 32.7 ha of forestry would require to be felled for the installation of the OHL in addition to the felling required for the construction of the wind farm infrastructure. Opportunity to coincide construction of the OHL with the current or near future felling in this area. No forestry within this route is planned to be felled and kept felled for wind farm	Approximately 23.8 ha of forestry would need to be removed to accommodate the installation and keeping installed of an OHL within this route option. Very little of the forest crops within the forested route segments will require felling for the construction of the wind farms; hence, the majority of the forestry within this OHL route option	Approximately 21.3 ha of forestry would need to be removed to accommodate the installation and keeping installed of an OHL within this route option. Very little of the forest crops within the forested route segments will require felling for the construction of the wind farms; hence, the majority of the forestry within this

Route Option A	Route Option B	Route Option C	Route Option D	Route Option E	Route Option F	Route Option G	Route Option H	Route Option I	Route Option J
already been felled and could remain felled within the OHL route segment if replanting has not yet commenced in the areas near the Glenshimmeroch Collector Substation location, subject to discussion with the forestry owners. Neither the forestry within the Troston Loch Wind Farm boundary or the Glenshimmeroch Wind Farm boundary within this route option would be felled for wind farm construction or for wind blow mitigation purposes. All forested areas within this route would therefore require felling.	felled for wind farm construction or for wind blow mitigation purposes. All forested areas within this route would therefore require felling.	This route option is the most preferable from a forestry perspective, since it would require the felling of the least area of forestry.	Potential opportunity to bring felling of Sitka spruce forward to coincide or closely precede construction of the OHL, thus reducing the area of forestry requiring felling specifically for the OHL.	Potential opportunity to bring felling of Sitka spruce forward to coincide or closely precede construction of the OHL, thus reducing the area of forestry requiring felling specifically for the OHL.	areas to be felled as part of forest management. Small sections within route segment 10 and 14 to be felled and kept clear as part of wind blow mitigation felling for Glenshimmeroch Wind Farm. Also, potential opportunity to negotiate with forestry owners not to replant within areas recently felled if OHL route is to be constructed within this route option.	felled for wind farm infrastructure or related wind blow mitigation.	infrastructure or related wind blow mitigation.	would need to be removed in addition to the forest crops that will need to be felled for the wind farms.	OHL route option would need to be removed in addition to the forest crops that will need to be felled for the wind farms.

4.2.2.4 Preferred route option

Analysis of the route options appraisal in Appendix 6, and the summary thereof in Table 4.3 above, revealed the following:

- Route Option A has been identified as the preferred option for six out of the nine environmental aspects considered. However, it is the least preferred route in terms of ornithology as it passes in close proximity to a black grouse lekking site and an area where breeding curlew and snipe have been recorded. Black grouse lek surveys undertaken by RSK in 2022 found no evidence of black grouse using the previously recorded lek. However mitigation measures in the form of line markers could be used to reduce the potential collision risk for black grouse and other birds.
- Route Option B has been identified as the preferred option for five out of the nine environmental aspects considered. Similar to Route Option A, it is the least preferred route in terms of ornithology due to its proximity to the black grouse lekking site and the area where breeding curlew and snipe have been recorded.
- Route Option C is the least preferable option for six of the nine environmental aspects considered due to proximity to black grouse lekking site, breeding curlew and snipe, sensitive habitats, peat, number of watercourse crossing and crossing of the National Byway Cycle Route and SUW.
- Route Options D and E are the least preferable options for four out of the nine environmental aspects considered.
- Route Option F has been identified as the preferred option for three out of the nine environmental aspects considered. This route is however also in close proximity to the black grouse lekking site and the area where breeding curlew and snipe have been recorded. It also least preferrable in terms of geology, peat, hydrology and hydrogeology due to proximity of a PWS intake.
- Route Option G has been identified as the preferred option for six out of the nine environmental aspects considered. However, the route is the least preferable in terms of geology, peat, hydrology and hydrogeology due to proximity of a PWS intake and the amount of forestry felling that would be required.
- Route Option H has been identified as the preferred option for five out of the nine environmental aspects considered. However, as with Route Option G, this route is the least preferable in terms of geology, peat, hydrology and hydrogeology due to proximity of a PWS intake and the amount of forestry felling that would be required.
- Route Option I has been identified as the preferred option for two out of the nine environmental aspects considered. It is the least preferred option in terms of archaeology because it contains three previously identified archaeology assets and due its long circuitous route. However, this route is still potentially viable with appropriate mitigation. The route is also the least preferable in terms of geology, peat, hydrology and hydrogeology due the number of watercourse crossings and areas of potential peat.
- Route Option J has been identified as the preferred option for two out of the nine environmental aspects considered. As with Route Option I above, it is the least preferred option in terms of archaeology because it contains three previously identified archaeology assets and due to its long circuitous route. However, this route is still potentially viable with appropriate mitigation. The route is also the least preferable in terms of geology, peat, hydrology and hydrogeology due the number of watercourse crossings and areas of potential peat.

In conclusion, when all the environmental aspects and likely effects are considered, on balance, Route Option A, with the inclusion of mitigation, would be most preferable from an environmental perspective. In addition, 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 Option A is technically feasible. 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 Troston 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 OHL?

The public consultation will be held online from 3 October 2022 to 24 October 2022 at:

http://www.spenergynetworks.co.uk/pages/troston_loch_wind_farm_connection.aspx

Online public consultation events are being held on the afternoon of Wednesday 5 October (3-5pm) and the evening of Tuesday 11 October (6-8pm), further information on these events can be obtained from the above website.

Please email comments to trostonprojectmanager@spenergynetworks.co.uk, or post to : Troston Overhead Line Grid Connection Project, Land and Planning Team, SP Energy Networks, 55 Fullarton Drive, Glasgow, G32 8FA, by the 24 October 2022. Alternatively, you can submit your comments via the online feedback form on our website (above) by the 24 October 2022.

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

BGS. (2021). GeoIndex online geological mapping. British Geological Survey. http://mapapps2.bgs.ac.uk/geoindex/home.html, accessed August 2021.

BTO. (2015). Birds of Conservation Concern 4: the Red List for Birds. British Trust for Ornithology.

CIEEM. (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management, Winchester.

Coal Authority. (2020). Interactive Map Viewer: Available at: https://mapapps2.bgs.ac.uk/coalauthority/home.html, accessed in August 2021

Dumfries and Galloway Council. (2020). Local Development Plan 2 Wind Energy Development: Development Management Considerations Supplementary Guidance – February 2020. Available at: 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 November 2021.

Dumfries and Galloway Council. (2019). Dumfries and Galloway Local Development Plan 2. Adopted October 2019. Available at: https://www.dumgal.gov.uk/media/21885/Adopted-Local-Development-Plan-2/pdf/Adopted_LDP2_OCTOBER_2019_web_version.pdf?m=637060550180970000, Accessed November 2021.

Dumfries and Galloway Council. (2009). Dumfries and Galloway Local Biodiversity Action Plan. Dumfries and Galloway Biodiversity Partnership.

EDF Renewables. (2019). Troston Loch Wind Farm: Supplementary Environmental Information Report.

EDF Renewables. (2019). Troston Loch Wind Farm: Environmental Impact Assessment Report.

EnergieKontor UK Ltd. (2020). Margree Wind Farm: Environmental Impact Assessment Report.

EnergieKontor UK Ltd. (2020). Glenshimmeroch Wind Farm Tip Height Extension: Comparative Environmental Impact Assessment Report.

EnergieKontor UK Ltd. (2018). Glenshimmeroch Wind Farm: Environmental Impact Assessment Report.

Falvey, D. (ed). (1999). Geological Survey of Scotland Sheet 9W: New Galloway (solid edition). Available at https://webapps.bgs.ac.uk/data/maps/maps.cfc?method=viewRecord&mapId=10664, accessed August 2021.

NatureScot. (2021). Sites of Specific Scientific Interest 2021: Scottish Natural Heritage. Available at: https://sitelink.nature.scot/map, accessed August 2021

NatureScot. (2019). National Landscape Character Assessment, Landscape Character Type 176 Foothills with Forest – Dumfries & Galloway.

NatureScot. (2016). Guidance - Assessment and mitigation of impacts of power lines and guyed meteorological masts on birds. Available at: https://www.nature.scot/guidance-assessment-and-mitigation-impacts-power-lines-and-guyed-meteorological-masts-birds, accessed October 2021.

Rackham, O. (1986). The History of the Countryside. J. M. Dent.

Ratcliffe, D. (1977). A Nature Conservation Review. Cambridge University Press.

Ruddock, M. & Whitfield, D.P. (2007). A review of disturbance distances in selected bird species. Natural Research (Projects) Ltd.

Scotland's Soils. (2021). Carbon and Peatland 2016: Scottish Natural Heritage. Available at: https://map.environment.gov.scot/Soil_maps/?layer=10#, accessed in August 2021.

Scottish Forestry. Scottish Forestry Map Viewer. https://scottishforestry.maps.arcgis.com/apps/webappviewer/index.html?id=0d6125cfe892439ab0e5d0b74d9acc18, accessed December 2021.

Scottish Government. (2021). Scotland 2024: Our Fourth National Planning Framework. Draft.

Scottish Government. (2020). Scotland's Fourth National Planning Framework Position Statement.

Scottish Government. (2020). Update to the Climate Change Plan 2018 – 2032: Securing a Green Recovery on a Path to Net Zero. Available at: file:///C:/Users/NRehm/Downloads/update-climate-change-plan-2018-2032-securing-green-recovery-path-net-zero.pdf. Accessed November 2021.

Scottish Government. (2019). Scottish Government's policy on control of woodland removal: implementation guidance. February 2019. Available at: https://scotland.forestry.gov.uk/images/corporate/pdf/Implementation-Guidance-Control-of-woodland-removal.pdf, accessed October 2021.

Scottish Government. (2017). Scottish Energy Strategy: The future of energy in Scotland. Available at: https://www.gov.scot/publications/scottish-energy-strategy-future-energy-scotland-9781788515276/documents/, accessed October 2021.

SEPA. (2021a). Water Environment Hub: Scottish Environment Protection Agency. Available at: https://www.sepa.org.uk/data-visualisation/water-environment-hub/, accessed in August 2021.

SEPA (2021b). Scottish Environment Protection Agency: Available at: http://map.sepa.org.uk/floodmap/map.htm, accessed in August 2021.

SP Distribution Limited. Schedule 9 Statement. Statement on Preservation of Amenity in accordance with Schedule 9 of the Electricity Act 1989. Available at: https://www.scottishpower.com/userfiles/document_library/Sched9SPDver9.pdf, accessed November 2021.

SPEN. (2020), *Approach to Routeing and Environmental Impact Assessment*. (Glasgow, LUC). Available at:

https://www.spenergynetworks.co.uk/userfiles/file/SPEN_Approach_to_Routeing.pdf, accessed August 2021.

UK Government. (2020). Press release: New plans to make UK world leader in green energy. Available at: https://www.gov.uk/government/news/new-plans-to-make-uk-world-leader-in-green-energy, access November 2021.

Usher, M.B. (1986). Wildlife Conservation Evaluation. Chapman & Hall.

Wigginton, M.J. (1999). British Red Data Book 1: Vascular Plants. 3rd Edition. Joint Nature Conservation Committee.

APPENDIX 1
FIGURES

Table A1: List of Figures

Figure No.	Figure Title
1	Location Plan
2	Study Area
3	Ecological Designations
4	Phase 1 Habitat Survey
5	Archaeological Constraints
6	Landscape Character Types
7	Visual Receptors
8	Carbon and Peatland
9	Watercourses and Private Water Supplies
10	Site Access Route Options
11	Planned Infrastructure Constraints
12	Environmental Constraints Heat Map
13	OHL Route Options and Segments
14a-h	OHL Route Options A - H
15	Forestry

APPENDIX 2
HOLFORD RULES

A copy of the Holford Rules (taken 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[1].

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 (AONBs) (England and Wales)
- National Parks
- Wild Land Areas
- National Nature Reserves (NNRs)
- Sites of Special Scientific Interest (SSSIs)
- Scheduled Monuments
- Listed Buildings
- Conservation Areas
- World Heritage Sites (a non-statutory designation)
- Gardens and Designed Landscapes (a non-statutory designation)
- Historic Battlefields
- Heritage Coasts

[1] This appendix was originally updated to reference to planning policy (as at February 2020), Infrastructure (Scotland) Planning Policy (SPP) 2014) Infrastructure Policy Statement (NPPS) for England (2011) and Planning Policy Wales (10th Edition) (12).

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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	Scottish Government environment web map
Conservation Areas	CA	Historic Environment Scotland
Core Paths	-	Dumfries and Galloway Council
Cycle Routes	-	SUSTRANS
Existing Transmission Infrastructure	-	SPEN
Flood Risk Zones	FRZ	SEPA online flood mapping
Forestry	-	Scottish Government environment web map / Scottish Forestry Map Viewer / Forestry Commission National Forest Inventory Woodlands
Geology & Hydrogeology	-	BGS (online)
Geological Conservation Review sites	GCR	Joint Nature Conservation Committee
Historic Environment Record	HER	Dumfries and Galloway Council
Inventory Historic Gardens and Designed Landscapes	GDL	Historic Environment Scotland
Inventory Battlefields	IBs	Historic Environment Scotland
Landscape Character Types (Landscape Character Assessment)	LCT (LCA)	NatureScot
Listed Buildings	LB	Historic Environment Scotland
Minining and mineral data	-	Coal Authority (online) / BGS (online) / Dumfries and Galloway Council
National Record of the Historic Environment	NRHE	Historic Environment Scotland Canmore (canmore.org.uk)
National Tourist Routes	-	VisitScotland
National Scenic Areas	NSA	Scottish Government
Non-Inventory Gardens and Designed Landscapes	NIDL	Dumfries and Galloway Council
Regional Scenic Areas	RSA	Dumfries and Galloway Council
OS Maps 1-250k	-	OS Open Data
OS Maps 1-50k	-	Emapsite
Ramsar sites	-	NatureScot
Residential Settlements and housing allocation areas	-	OS_Address_Layer (downloaded from emapsite)

Feature	Abb	Source
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
Special Area of Conservation	SAC	NatureScot
Special Protection Areas	SPA	NatureScot
Soils and peat	-	Scotland's Soils online mapping; James Hutton Institute online mapping
SUW long distance trail	-	Dumfries and Galloway Council
Watercourse catchment areas	-	Flood Estimation Handbook webservice
Wind Farms	-	NatureScot / Council / Energy Consents Unit
World Heritage Sites	WHS	Historic Environment Scotland

APPENDIX 4
ENVIRONMENTAL BASELINE

A4.1 Ecology and Ornithology

The following reports were used to inform these sections:

- Glenshimmeroch Wind Farm Environmental Impact Assessment Report;
- Troston Loch Wind Farm Supplementary Environmental Information Report;
- Troston Loch Wind Farm Environmental Impact Assessment Report; and
- Margree Wind Farm Environmental Impact Assessment Report.

A4.1.1 Designated sites

There are no statutory designated sites within 2 km of the study area boundary. There are two internationally designated sites within 10 km of the study area, one Ramsar site and one Special Protection Area (SPA) within 10 km of the study area (see Figure 3 in Appendix 1). These sites are listed in Table A4.1.1; short descriptions are given for the sites.

Table A4.1.1: Internationally designated sites

Site name	Designation	Approximate distance (m)
Loch Ken and River Dee Marshes	Ramsar	8,390
Designated features: • Greenland white-fronted goose • Graylag goose		
Loch Ken and River Dee Marshes	SPA	8,390
Qualifying species: • Greenland white-fronted goose • Graylag goose		

A4.1.2 Broad habitats

A total of 16 habitat types and were recorded within the study area during the walkover survey (see Figure 4 in Appendix 1) and are broadly described below.

A4.1.2.1 Acid grassland

Small areas of unimproved acid grassland were noted within the study area, the majority associated with the unplanted hill tops within the plantation, such as Glenshimmeroch Hill and Kilnair Hill. Species present include common bent *(Agrostis capillaris),* mat grass (*Nardus stricta*), *Pleurozium schreberi* moss, sheep's fescue (*Festuca ovina*), wavy hair grass (*Avenella flexuosa*), heath bedstraw *(Galium saxatile),* sheep's sorrel *(Rumex acetosella)* and tormentil (*Potentilla erecta*).

Areas of grassland to the north and south of the study area have been likely modified and are currently used for sheep grazing and as such a restricted range of species was noted including creeping bent *(Agrostis stolonifera*) and common bent, creeping thistle *(Cirsium arvense),* heath rush (*Juncus squarrosus*), white clover (*Trifolium repens*), crested dog's tail (*Cynosurus cristatus*), creeping buttercup (*Ranunculus repens*), soft rush (*Juncus effusus)* and *Pleurozium schreberi* moss.

Acid grassland is listed on the Scottish Biodiversity List (SBL) and is also listed on the Local Biodiversity Action Plan (LBAP) (Dumfries and Galloway Council, 2009). The areas of unimproved acid grassland, whilst a priority habitat, occupy a very small proportion of the study aera and as such are considered to be of site importance. The areas of acid grassland which have been modified for sheep grazing are also considered to be of site importance.

A4.1.2.2 Bog

Wet modified bog/blanket bog is present within the north of the study area on Lochwhinnie Hill and several areas to the north of the U141S road on plateaus. Species recorded include hare's-tail cottongrass (*Eriophorum vaginatum*), purple moor grass (*Molinia caerulea*), Sphagnum species including *S.fallax, S.palustre, S.cuspidatum* and *S.magellanicum*, *Polytrichum commune*, cross-leaved heath (*Erica tetralix*), common heather (*Calluna vulgaris),* deer grass (*Trichophorum germanicum),* bog asphodel (*Narthecium ossifragum)* and heath rush. Wet modified bog/blanket bog is an Annex 1 and UKBAP habitat, and blanket bog is listed on the SBL. This habitat type is widespread in Scotland but is important in a European context. Much of the wet modified bog/blanket bog within the study area has been degraded through grazing or draining and is therefore of poor quality, although restoration would be possible. Overall, this habitat is considered to be of regional importance.

A4.1.2.3 Bracken

Numerous areas of dense bracken (*Pteridium aquilinum*) were recorded across the study area. This habitat type has no conservation designations and is widespread throughout Scotland and is considered to be of negligible importance.

A4.1.2.4 Coniferous plantation/felled plantation/re-planted

A large majority of the study area comprises of dense Sitka spruce (*Picea sitchensis*) plantations of various ages, including recently planted plantation in areas of previously cleared plantation. Very limited ground flora is present within the mature plantation due to the heavy shading of the dense canopy. Where areas have been replanted, the ground flora typically comprises of neutral grassland with tufted hair grass (*Deschampsia cespitosa*), common bent, purple moor grass, soft rush, bracken, cock's foot (*Dactylis glomerata*) and meadow thistle (*Cirsium dissectum*).

Conifer plantations are generally regarded as being of low conservation importance, and given the abundance of this habitat in the wider area, this habitat type is considered to be of negligible importance.

A4.1.2.5 Hardstanding

Several roads are present within the study area including the U141S Fingland Lane which runs along the north of the plantation and the forestry tracks within the plantation. This habitat type is considered to be of negligible importance.

A4.1.2.6 Marshy grassland

The sheep grazed pastures to the north of the U141S road are dominated with purple moor-grass, with occasional damper areas which are dominated with sharp flowered rush and soft rush. In lower lying areas, adjacent to the Black Water, purple moor-grass and bog myrtle (*Myrica gale*) are abundant. Forest rides comprise of marshy grassland vegetation.

Marshy grassland often corresponds to a variety of UKBAP and SBL habitats and purple moor-grass and rush pasture is listed within the LBAP (Dumfries and Galloway Council, 2009). The habitat is widespread but local throughout the uplands of Scotland. The majority of the marshy grassland within the study area is species poor, however, damper areas contained a greater range of species. Therefore, this habitat is considered to be of local importance. In addition, areas of marshy grassland have the potential to be GWDTEs.

A4.1.2.7 Quarry

Two old small quarries were noted within the forestry plantation, one of which now supports an area of standing water (see below) and has re-vegetated with tussocky grassland. The quarries themselves are considered to be of site importance within the context of the wider area.

A4.1.2.8 Running water

The river Black Water and numerous small burns are located within the study area. Rivers and burns are UKBAP habitats and LBAP habitats, and are listed on the SBL. These habitats are widespread across Scotland and Dumfries and Galloway and those within the study area are considered to be of local importance.

A4.1.2.9 Scattered broadleaved trees

Two mature trees, a sycamore (*Acer pseudoplatanus*) and an ash (*Fraxinus excelsior*), are located along the U141S road to the north of the study area. The ash has grown to maturity in an exposed location and exhibits significant damage to its trunk; it is therefore considered to be a veteran tree (Woodland Trust, 2008). To the south of the study area is an area of alder (*Alnus glutinosa*) trees, with purple moor-grass grassland beneath.

Veteran trees are listed on the LBAP, as are native wet woodlands, as such scattered trees within the study area are considered to be of local importance.

A4.1.2.10 Scrub

An area of willow scrub exists around a pond to the northern edge of the plantation, adjacent to the Black Water. Willow scrub or carr is considered to be a wet woodland under the LBAP, and some willow woodlands correspond to UKBAP and SBL habitats, and as such the habitat is considered to be of local importance.

A4.1.2.11 Standing water

Seven areas of standing water were noted within the study area. Ponds within the plantation are likely former borrow pits which have now naturalised and support emergent and aquatic vegetation. A large pond is present to the south-west of the study area with abundant floating pondweed (*Potamogeton* sp.) and emergent soft rush and floating sweet grass (*Glyceria fluitans*) and is bound by plantation to the east, and felled/re-generating forest to the west.

Lochs and ponds are UKBAP habitats, and are on the SBL; this habitat type is therefore considered to be of local importance.

A4.1.2.12 Tall ruderal

A small area of tall ruderal vegetation is present to the south of the study area and comprises of bracken, broad-leaved dock (*Rumex obtusifolius*) and spear thistle (*Cirsium vulgare*). This habitat is considered widespread and considered to be of negligible importance

A4.1.3 Protected species

A4.1.3.1 Mammals

Desk study

A possible common pipistrelle (*Pipistrellus pipistrellus)* maternity roost was detected outwith the study area, either within an abandoned cottage or neighbouring sycamore tree during remote monitoring surveys undertaken for the Glenshimmeroch Wind Farm in 2016. The cottage and tree are roughly 180 m south of the study area. During the bat surveys undertaken in 2016 at least five species of bat were recorded: common pipistrelle, soprano pipistrelle (*Pipistrellus pygmaeus*), Nathusius' pipistrelle (*Pipistrellus nathusii*), Leisler's bat (*Nyctalus leisleri*) and noctule (*Nyctalus noctula*).

Surveys for the Glenshimmeroch Wind Farm reported four badger setts to the west of the wind farm site boundary; however no further information into the location of the setts is available.

Field walkover survey

The study area offers a range of habitats suitable for bat species; however it is likely that roosting sites are restricted given the lack of buildings and limited mature trees within the study area. Two trees with bat roosting potential were noted along the U141S road to the north of the site and stone bridges within the study area provide possible bat roosting habitat. In addition, much of the northern study area is likely to be too exposed for foraging bats. Some foraging and commuting areas are present along plantation edges, burns and the Black Water.

Evidence of otter was recorded within the study area in the form of spraints and feeding remains. The majority of signs were along the Black Water; however spraints were also recorded along Fingland Lane burn and near the large pond to the south-west of the study area. No resting up sites or holts were noted.

No evidence of water vole (*Arvicola amphibius*) was recorded during the walkover survey However, a section of the Black Water towards the east of the study area is considered

suitable for this species due to its slow flow rate and riparian vegetation of tall rushes, sedges and grasses. The remaining sections of the Black Water are unsuitable for water vole due to its high flow rate, rock substrate and shallow depth (<0.5 m). The drainage ditches and other watercourses within the study aera are also unsuitable for this species as they are generally narrow (*c.*50 cm wide), shallow (*c.*30 cm deep) and trampled by livestock.

A single-entrance, outlier badger sett was recorded to the north of the study area, along the Fingland Lane burn, near Auchenshinnoch Farm. Badger dung was recorded at a single location on Kilnair Hill along a well-used mammal track. The study area provides suitable habitat for commuting, foraging and sett digging. The setts reportedly west of the Glenshimmeroch Wind Farm site boundary were not found during the walkover survey.

Feeding remains, likely from red squirrel were recorded during the walkover survey within the plantation. The forested areas and felled areas could provide suitable habitat for both red squirrel and pine marten.

A4.1.3.2 Amphibians and reptiles

Desk study

Previous surveys for the Glenshimmeroch Wind Farm reported incidental sightings of common lizard (*Zootoca vivipara*) within the study area.

Field walkover survey

Seven ponds with the potential to support amphibians are present within the study area and a common Frog was sighted during the walkover along a forest ride within marshy grassland. Environmental DNA (eDNA) sampling on ponds within the Troston Loch Wind Farm (outwith the study area) did not detect the presence of great crested newt (*Triturus cristatus*).

No reptiles were observed during the walkover survey; however there are suitable habitats for common lizard and adder (*Vipera berus*) across the study area, particularly in un-forested areas and felled areas. Frequent drystone dykes and brash piles across the study area provide hibernation opportunities for amphibians and reptiles

A4.1.4 Ornithology

A4.1.4.1 General

Potential impacts on birds were assessed and target species selected with reference to guidance from NatureScot on the impacts of power lines on birds (NatureScot 2016). Results from vantage point surveys undertaken between September and November 2021 were considered alongside ornithology reports relating to three proposed wind farms with footprints overlapping the Troston OHL gird connection study area.

A4.1.4.2 Breeding birds

Surveys undertaken between 2011 and 2018 have recorded several bird species of conservation concern breeding across the site, both in areas of open habitat and within the plantation woodland.

There is a peregrine nest site within the study area, and it is also assumed that goshawk and barn owl have bred within the study area. Red kite have been observed frequently over the study area during the breeding season, however no evidence of breeding has been found. Osprey (*Pandion haliaetus*) have also been observed flying over the study area, however no evidence of breeding has been found. All five of these raptor species are protected under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended).

There are several ponds across the study area that may provide suitable habitat for breeding waterfowl. Greylag geese (*Anser anser*) have been confirmed as breeding on lochs close to the study area, however these are not thought to be associated with the population at the Loch Ken and River Dee SPA/Ramsar site. This species has been observed flying over the study area, although not at potential collision risk height.

There are known black grouse lekking sites in the north of the site, close to route segments 1, 7 and 9. Black grouse are on the red list of Birds of Conservation Concern and are a priority species in the UK Biodiversity Framework. Concentrations of up to 2 male and 2 female black grouse have been observed at each site, which means that these leks are considered to be of regional importance. The area around Lochwinnie Hill has also been observed to host concentrations of snipe and curlew during the breeding season.

Black grouse lek surveys undertaken by RSK in 2022 found no evidence of black grouse using these previously recorded leks.

A4.1.4.3 Wintering birds

Ponds around the study area provide habitat for wintering waterfowl, and species such as pink-footed goose (*Anser brachyrhynchus*), goldeneye (*Bucephala clangula*) and whooper swan (*Cygnus cygnus*) have been observed using lochs and ponds around the study area and flying over the study area.

Hen harrier have been observed hunting in the north of the study area over the grassland and bog habitats, and red kite over the plantation woodland and felled woodland. Resident pairs of goshawk, peregrine and barn owl also remain in the study area throughout the year and have been joined in winter by other raptor species such as merlin and short-eared owl.

A4.2 Archaeology and Cultural Heritage

The study area consists largely of upland commercial coniferous plantation with areas of open moorland. The majority of the open ground is located in the northern quadrant of the study area, but there are forestry rides and water channels interspersed within the blocks of plantation forestry.

The various route options originate at the proposed Troston Loch Wind Farm POC at an altitude of approximately 300 m AOD, terminating at the proposed Glenshimmeroch collector substation at 220 m AOD.

There are no designated heritage assets (e.g. scheduled monuments, listed buildings) within the study area. The nearest designated assets are the Category B listed building of Barlaes (LB3676) approximately 2.61 km to the south-west of the study area and the Category C listed Kendoon South Dam (part of the Galloway Hydroelectric Power

Scheme) located approximately 3.98 km west of the study area. The nearest scheduled monument is Stroanfreggan Craig fort (SM1095) located approximately 3.12 km north of the study area.

The current land use of commercial forestry across the majority of the study area is a relatively recent one that was overlaid on an earlier pattern of post-medieval rural settlements. In addition to the former farmsteads themselves are associated field systems and head dykes, as well as animal shelters and hay rees in the “outfield” (the area further away from the farmstead that was unsuitable for arable cultivation).

Non-designated assets recorded in the study area relate primarily to these post-medieval remains of rural settlement and agriculture. The most notable exception is the record of four Prehistoric ‘cup-marked’ stones at Meikle Bennan (MDG3826).

The locations of the identified archaeological and cultural heritage assets are shown on Figure 5 in Appendix 1.

Overall, in terms of archaeological potential, the upland nature of the landscape within the study area means that past human activity is likely to have taken the form of stock-raising and animal husbandry (e.g. sheep), hunting and fishing, with arable agriculture concentrated on the lower ground. Human occupation is more likely to have taken the form of low density and temporary or seasonal (such as the occupation of summer grazings, shielings and bothies) rather than permanent year-round settlement. The quality of preservation of any previously unidentified archaeological deposits located in areas under commercial forestry is likely to have been compromised.

A4.3 Landscape and Visual Amenity

The study area is entirely within the local authority of Dumfries and Galloway Council.

A4.3.1 Landscape designations and classifications

There are no designated landscapes of international or national importance within the study area or its immediate vicinity.

There are no designated landscapes of local importance within the study area; however there are two areas classified as Regional Scenic Areas (RSA) within the wider area. The Galloway Hills RSA is approximately 2.8 km west of the western boundary of the study area; and the western edge of the Thornhill Uplands RSA is approximately 5.2 km north-east of the eastern boundary of the study area.

Due to their distance from the study area for the routeing consultation any potential impacts on the RSA resulting from the proposed development would be indirect and never greater than negligible/imperceptible regardless of which route option was selected. Therefore the RSA are not detailed further within the environmental baseline.

A4.3.2 Landscape Character

The landscape character of the area was classified in the NatureScot 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). As per NatureScot (2019): *‘the 2019 Landscape Character Type map and associated Landscape Character Type Descriptions now supersede the 1990s landscape character*

descriptions and mapping… [and]… should be used for new development proposals, plans and strategies.'

The study area is entirely within LCT176 Foothills with Forest – Dumfries and Galloway. The location of the study area relative to the NatureScot landscape character types is shown on Figure 6 in Appendix 1.

A4.3.2.1 LCT176 Foothills with Forest – Dumfries and Galloway

As described by NatureScot:

'These foothills are generally found at heights of between 170 and 250 metres and are often undulating with gently rounded summits. The landscape is dissected by many streams which have cut incisions into the landform. The land cover is predominantly forest land cover which creates its forest-dominated character.

The different stages of forest rotation can typically be experienced within short distances where mature conifers contrast with the raw appearance of young planting on the hillside. Design improvements are evident in many areas, e.g. deciduous fringes, informal edges, feathering on high slopes. There are locally distinctive unforested areas, with semi-improved pasture, rougher and unenclosed in higher areas, and elsewhere with patterns of drystone dykes, occasional lochs and estate policies, distinctive ridges and landmark summits.

Wind farm development is occurring in the Stroan and Ae parts of the Foothills with Forest – Dumfries & Galloway where there are more plateau-like landscapes. This is changing local landscape character to the point where wind farms are becoming a key characteristic.'

With respect to the study area the different stages of forest rotation and new wind farm development are particularly relevant to the landscape character.

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

- *Dark green blanket of forest covering undulating foothills.*
- *Changing landscape with areas with large and medium scale forestry operations and wind farm development.*
- *Forested areas dominated by Sitka Spruce, interspersed with mixed conifers and broadleaf planting, undergoing felling and replanting in large coupes.*
- *Tall mature conifers at roadside.*
- *Areas of more complex, locally distinctive and smaller-scale landscapes, with semi-improved pasture with walled enclosures on open ground, occasional lochs and estate policies, distinctive ridges and landmark summits.*
- *Areas of relict landscape with remains of pre-improvement settlement and agriculture clustered in burn valleys.*
- *Wind farms, locally defining the character in some areas of central Dumfries and Galloway.*

A4.3.3 Cumulative context

A new 132 kV OHL was recently installed as part of the Blackcraig and Margree Wind Farm Connection, which crosses the south-west of the study area and passes in close proximity to the Glenshimmeroch Collector Substation.

The study area contains consented wind farms at Troston Loch Wind Farm and Glenshimmeroch Wind Farm, which have not yet been built.

A4.3.4 Visual envelope

The topography of the study area heavily influences the visual envelope. In addition, the considerable area of commercial forestry within the study area acts as a significant screen to long distance views to and from the study area.

Typically within the foothills landscape there is extensive visibility from the highpoints of the hills to the surrounding landscapes. Within the valleys separating the hills however the visibility is appreciably more limited and the winding courses and topography of the valleys prevents any extended views. The forest cover within the area further reduces the local visibility. From the edges of these areas there is often extensive visibility across the upland landscape which forms the core of the study area.

The open areas of moorland to the north and west of the study area create a landscape where long distance views are possible, however, this is generally from other areas of high ground outside the study area. The higher ground within the centre of the study area would impact where the OHL is visible from, for instance an OHL within the north of the study area, would not be perceptible from the south and vice versa.

The rotational nature of commercial forestry within the landscape would mean that the visual envelope is dynamic e.g. the forestry within the north of the study area has recently been felled (as at a site visit on 21 October 2021) and this has created open views to and from the north facing slopes in the study area and to the north of the study area; however this situation will change over time as the new and younger planting matures.

Once the consented wind farms have been constructed they would result in more permanent open areas within the forestry and reduce the level of existing screening provided by the forests. In addition the new turbines would become dominant vertical features within the landscape.

A4.3.5 Settlements

There are no settlements within the study area. The small settlement of St John's Town of Dalry is located approximately 6.2 km south-west of the study area and would not be impacted by OHLs within the study area. The town is located at the junction of the local road network including the A713, A702 and B700. Other small settlements including Balmaclellan, New Galloway and Kenbridge are further to the south-west.

Within the study area there are no residential properties, however there are a very small number of scattered and isolated residential properties within the vicinity of the study area (see Figure 7 in Appendix 1). The closest properties to the proposed route options and those most likely to experience views of the proposed OHL, dependent on the final preferred route, are:

- Two properties at Glenshimmeroch, approximately 780 m south of the proposed Glenshimmeroch collector substation;
- Fingland, approximately 1.5 km north of the proposed Troston Loch Wind Farm POC;
- Marskaig, approximately 1.8 km north-west of the proposed Troston Loch Wind Farm POC; and

- Auchenshinnoch approximately 1.9 km north-west of the proposed Troston Loch Wind Farm POC.

All residential receptors are considered to have a high susceptibility and sensitivity to the potential development. However, the sensitivity decreases with distance from the development and it is considered that although potentially visible any effects on the visual amenity of residents would never be greater than minor adverse, and generally would only be negligible/imperceptible. This is because the OHL would often be heavily screened by landform and/or forestry; and for the two properties to the north (Fingland and Auchenshinnoch) whilst any proposed northern route would be more visible all views would be from a minimum distance of 600 m. Therefore, it is considered that the potential development would have minimal overall visual impact on residential receptors.

A4.3.6 Transport routes

Road users within the study area would be considered to have a low susceptibility and sensitivity to the proposed development. There is one publicly accessible local road (Fingland U141S) which runs east to west through the north of the study area, in addition to private access tracks relating to the existing commercial forestry operations. Other than this single local road any transport routes to be considered would not be directly impacted and due to intervening topography and forestry the majority of potential views are likely to be heavily screened. The further transport routes to be considered are the B700 to the west, A702 to the south and the B729 to the north. In addition there are quiet unnamed local roads to the north and west of the study area. It is considered unlikely there would be any significant visual effects on users of transport routes as a result of the proposed development.

A4.3.7 Tourism and recreation

The study area and its locality is not a destination for tourism and there is little in the way of formal or informal recreation within the vicinity of the study area. An exception is the Southern Upland Way (SUW), a very short section of which runs through the western edge of the study area at Butterhole Bridge, approximately 900 m north-west of the proposed Glenshimmeroch collector substation and briefly crossed by Route Option C.

In addition to the SUW there are two Core Paths within the study area, Core Path Margree a looping 8 km path which just passes into the south-east of the study area. The path is predominantly in woodland and views towards the study area are heavily filtered. A second Core Path, Kendoon Youth Hostel to Butterhole Bridge, runs west to east for 2.8 km along the path of Black Water from the now closed Kendoon Youth Hostel to Butterhole Bridge and the SUW, with the eastern end of the Core Path just reaching the western extents of the study area. The path is through open moorland, though on the lower valley floor, with open views eastwards towards the study area possible.

The National Byway Cycle Route runs east to west through the north of the study area along the unnamed local road within the north of the study area. Within the west of the study area the cycle route is briefly coincident with the path of the SUW. The route runs through open moorland to the north of the forestry in the study area and, dependent on the preferred route, users could potentially have open views of the OHL for a distance of approximately 4 km. Route Options C, D and E all cross the cycle route.

Users of the SUW, Core Paths and Cycle Route would have a high susceptibility and sensitivity to the proposed development.

A4.5 Geology, peat, hydrology and hydrogeology

The study area is located 6.2 km north-east of St John's Town of Dalry, Dumfries and Galloway, within the UK Meteorological (Met) Office's west of Scotland climate region. Much of Western Scotland consists of high ground, with the study area being found in the Southern Uplands region.

A4.5.1 Geology

Geological information is derived from the BGS GeoIndex online geological mapping for bedrock geology and superficial geology at 1:50,000 scale (BGS, 2021) and the Geological Survey of Scotland 1:63,360/1:50,000 geological map series (Falvey, 1999).

A4.5.1.1 Bedrock geology

Both the Shinnel and Glenlee Formations consist of wacke sandstone and siltstone turbidites. The formations are described as thin- to thick-bedded turbidites of sandstones and siltstones. Some of the siltstones in the Glenlee Formation contain graptolite fossils. The sandstones are mainly quartzose (silica-rich).

A small dyke is present in the south-western part of the study area. This forms part of the North Britain Siluro-Devonian Calc-Alkaline Dyke Suite.

The area is located within the Southern Uplands region, and has undergone significant folding and faulting as a result. The Shinnel and Glenlee Formations are separated by a faulted boundary, placing the older Shinnel Formation on top of the younger Glenlee Formation.

A4.5.1.2 Superficial geology

Where present, superficial deposits are associated with the valleys and watercourses within the study area, with much of the higher ground, specifically around the peaks of Glenshimmeroch Hill, Hog Hill and Kilnair Hill, having limited or no superficial deposits.

The superficial deposits consist mainly of Devensian diamicton till, with smaller areas of alluvium and peat. Diamicton till is a highly variable glacial sediment consisting of unsorted material ranging in size from clay to boulders. The till is found covering a large area either side of the Black Water within the central region of the study area. The alluvium deposits are mainly located alongside the Black Water within its floodplain. Peat deposits have been identified as small, isolated pockets around the study area.

A4.5.2 Geomorphology

The study area is characterised by distinct valley slopes on either side of the Black Water, the river flowing east to west across the study area. A number of prominent hills are present within the study area. Lochwinnie Hill and Clachandow Rig lie to the north of the Black Water, with the summit of Lochlee Hill located immediately north of the study area boundary. South of the Black Water, Meikle Bennan, Glenshimmeroch Hill, Kilnair Hill and Hog Hill form the main summits. The highest point within the study area is Meikle

Bennan, at 344 m above Ordnance Datum (AOD), although Lochlee Hill is higher at 352 m AOD. The lowest ground is within the Black Water valley, at 210 m AOD.

A4.5.3 Soils

The National Soil Map of Scotland identifies the main soil types as podzols, gleys, brown soils and blanket peat. The majority of the study area is made up of peaty podzols, of the Ettrick soil association (Table A4.5.1).

Table A4.5.1 Soil types within the study area

Soil Assoc.	Parent Material	Component Soils	Landforms	Vegetation	Area %
Ettrick	Drifts derived from Lower Palaeozoic greywackes and shales	Peaty podzols, peaty gleys; some peat and rankers	Hills with complex strong and steep slopes: non-rocky	Moist Atlantic Heather moor. Heath rush – fescue grassland. Blanket and flying bent bog	45.2
		Noncalcareous gleys, brown forest soils	Hills and valley sides with generally concave, strong and steep slopes	Sharp-flowered rush pasture. Tussock-grass pasture. Acid bent fescue grassland.	14.1
		Peaty podzols, peaty gleys, peat	Drumlins with intervening simple and complex gentle slopes	Moist Atlantic Heather moor. Heath rush – fescue grassland. Blanket and flying bent bog	11.7
		Peaty gleys, peat; some peaty podzols	Foothills and undulating uplands with gentle slopes	Moist Atlantic Heather moor. Heath rush – fescue grassland. Blanket and flying bent bog.	1.4
Organic Soils	Organic deposits	Dystrophic blanket peat	Uplands and northern lowlands with gentle and strong slopes	Blanket and flying bent bog. Upland and mountain blanket bog.	27.6

Areas of carbon-rich soil, deep peat and peatland habitats are mapped by NatureScot (Scotland's Soils, 2016). The top two Classes, 1 and 2, taken together identify nationally important peatland. Areas of Class 1 peatland are present in the northern and north-western margins of the study area, with a third area in the north-central section. An area of Class 2 peatland is also present along the northern margin, with a second area in the south of the study area.

The study area primarily consists of Classes 4 and 5 with a substantial area of Class 0 in the central part of the study area. The peatland class descriptions and the proportions

present within the study area are provided in Table A4.5.2 and shown in Figure 8 in Appendix 1.

Table A4.5.2 Carbon and peatland classes present within the study area

Peatland Class	Description	Area %
Class 0	Mineral soils; peatland habitats are not typically found on such soils	14.1
Class 1	All vegetation cover is priority peatland habitat; all soils are carbon-rich soils and deep peat	5.7
Class 2	Nationally important carbon-rich soils, deep peat and priority peatland habitat. Areas of potentially high conservation value and restoration potential	3.0
Class 3	Dominant vegetation cover is not priority peatland habitat but is associated with wet and acidic type. Occasional peatland, most soils are carbon-rich.	12.8
Class 4	Area unlikely to be associated with peatland habitat or wet and acidic type; area unlikely to include carbon-rich soils	33.1
Class 5	Soil information takes precedence over vegetation data; no peatland habitat recorded; may also show bare soil; all soils are carbon-rich and deep peat	31.3

A4.5.4 Mineral extraction

The Coal Authority interactive map and BGS Geoindex (BGS, 2021) were consulted to identify any mining or quarrying activities within the site and surrounding area. Within the study area or the surrounding 5 km search area there are no identified active mining or quarrying activities.

A disused quarry is identified on the OS 1:25,000 mapping adjacent to the minor road on the north side of Lochwinnie Hill. Former pits are indicated near the summit of Hog Hill and at Cullys Knowe, just west of the western site boundary near Butterhole Bridge. A number of other pits and quarries, now all disused, are indicated within 5 km of the study area boundary. Many appear to be former borrow pits for track construction.

A4.5.5 Hydrogeology

The bedrock underlying the study area is classed as a low productivity aquifer (BGS, 2021), where flow is virtually all through fractures and other discontinuities. The aquifer is multi-layered throughout the region and has low yields except from the areas where it is disturbed by mining.

The glacial till and alluvium superficial deposits have the potential for water storage and groundwater flow in any sand and gravel beds; however, their vertical and lateral extent will limit the groundwater potential. The overall variability of the deposits can result in a large range of possible hydraulic conductivities.

The peat bodies in the area may 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 study area is in the Galloway groundwater (ID: 150694) catchment, in the Solway Tweed river basin district (SEPA, 2021a). Details are provided in Table A4.5.3.

Table A4.5.3 Summary of groundwater body status

WATERBODY NAME & ID	STATUS	IDENTIFIED PRESSURES
150694 Galloway	Overall: Good Water flows and levels: Good Water quality: Good	N/A

A4.5.5 Designated sites

Designed sites of relevance to geology, hydrogeology and hydrology have been searched for within 5 km of the study area. Data was collected from NatureScot (2021) and reviewed Sites of Special Scientific Interest, Geological Conservation Review sites, Special Areas of Conservation and Local and National Nature Reserves. From this search, there were no sites designated for geological, hydrogeological or hydrological characteristics identified within the site or within 5 km of the boundary.

A4.5.6 Hydrology

The study area lies entirely across three watercourse catchments: the Black Water, the Garple Burn and the Earlstoun Burn.

Classifications for the Black Water and Garple Burn are provided in Table A4.5.4. The Earlstoun Burn is too small to be classified. The location of watercourses is shown in Figure 9 in Appendix 1.

A4.5.6.1 Black Water catchment

The Black Water catchment covers the majority of the study area, draining west into the Water of Ken, a tributary of the River Dee. The main watercourse within this catchment is the Black Water, flowing east to west across the central region of the study area. A number of tributaries feed the Black Water; most are minor and unnamed. The Lags Strand drains the northern slopes of Glenshimmeroch Hill and Meikle Bennan, while the Fingland Lane drains the northern side of Clachandow Rig, Lochwinnie Hill and Lochlee Hill.

The Black Water catchment is designated as a heavily modified water body on account of physical alterations for hydroelectricity generation (SEPA, 2021a).

A4.5.6.2 Garple Burn catchment

The south-eastern and south-central region of the study area is drained by the Garple Burn. The main watercourses within the study area are the Lochinvar Burn, to the west of Hog Hill, and the Margree Burn, to the east of Hog Hill. Drainage is mainly directed south to the Garple Burn, which then flows south-west to join the Water of Ken.

A4.5.6.3 Earlstoun Burn Catchment

The south-western region of the study area is drained by the Earlstoun Burn. The main watercourse within the study area is the Earlstoun Burn, which drains the southern slopes

of Glenshimmeroch Hill. The watercourse drains south-east into the Earlstoun Loch, part of the Water of Ken system.

Table A4.5.4: Summary of surface waterbody status

WATERBODY NAME & ID	STATUS	IDENTIFIED PRESSURES
10573 Black Water	Overall: poor Access for fish migration: poor Water flows and levels: high Physical condition: good Freedom from invasive species: high Water quality: high	Access for fish migration
10572 Garple Burn/Margree Burn	Overall: moderate Access for fish migration: high Water flows and levels: high Physical condition: good Freedom from invasive species: moderate Water quality: high	Invasive crayfish

A4.5.7 Groundwater-Dependent Terrestrial Ecosystems

GWDTE are defined by the UK Technical Advisory Group (UKTAG) (2004) as:

> *"A terrestrial ecosystem of importance at Member State level that is directly dependent on the water level in or flow of water from a groundwater body (that is, in or from the saturated zone). Such an ecosystem may also be dependent on the concentrations of substances (and potentially pollutants) within that groundwater body, but there must be a direct hydraulic connection with the groundwater body."*

In line with the guidance provided in UKTAG (2004), a dual ecological and hydrogeological approach to identifying GWDTE will be used to identify potential GWDTE based initially on national vegetation classification (NVC) mapping. A walkover survey will be undertaken to identify any potential groundwater linkages associated with habitats of interest.

Some potential GWDTE were identified as part of the Troston Loch and the Glenshimmeroch Wind Farm EIAs. As groundworks for OHL routes are confined to small, discrete areas for the wood pole installation, with temporary access routes, any impacts on potential GWDTE would be minor and local micrositing would be able to avoid any particularly sensitive areas of habitat.

A4.5.8 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 study area boundary. A response has not yet been received to this request.

A search of available PWS data contained with published EIA reports for Margree and Glenshimmeroch Wind Farms has identified 11 properties served by ten PWS source locations. Details are provided in Table A4.5.5 below.

Table A4.5.5: Summary of PWS location data

NAME	PROPERTY NGR		SOURCE NGR		SOURCE TYPE
Holmhead	270941	585908	270750	585640	Groundwater spring/well
Duchrae	265645	583484	265800	585000	Surface water loch
Troston Estate Office	268350	589627	268320	589699	Groundwater spring
Troston Farm	268840	589265	268600	589600	Groundwater spring
Stroanpatrick	264309	591964	264200	592100	Groundwater spring
Blackmark	265287	591689	265388	591683	Groundwater spring
Lochrennie	271709	586582	271600	586600	Groundwater spring
Glenshimmeroch 1	264958	586611	264950	587170	Surface water loch
Glenshimmeroch 2	264962	586588	264950	587170	Surface water loch
Marskaig			263926	588705	Groundwater well
Margree			267660	586635	Groundwater well
Auchenshinnoch	265877	589896	Not available		Groundwater spring
Fingland	266999	590171	Not available		Groundwater spring

A risk screening of any PWS identified by the council records will be undertaken as part of the application process, with a full risk assessment undertaken for any sources identified as potentially at risk.

A4.5.9 Flood risk

SEPA's Flood Map (2021b) was consulted to gain an overview of the likelihood of flooding within the study area. Flood risk is shown to be relatively minor 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 channel of the Black Water, with a larger area indicated at the foot of Lochwhinnie Hill, where the ground is very flat. The main channel of the Black Water has a high likelihood of flooding, defined as having a 10% chance of a flood event in any given year.

There are very small areas at high risk of surface water flooding scattered across the study area, particularly in the southern region of the study area around the col between Kilnair and Glenshimmeroch Hills.

A4.6 Traffic and transport

There are three main access routes to the study area, shown on Figure 10 in Appendix 1. Currently, access to the northern part of the study area can be gained by road from the B729 which connects Moniaive with Carsphairn partially utilising proposed access to the Troston Loch Wind Farm. B729 provides a single two-way carriageway highway subject

to a national speed limit, with some reduction (typically to 30/40 mph) when passing through some of the small villages/hamlets.

The proposed Troston Loch Wind Farm access tracks do not provide full access to the study area, however as part of the consented Glenshimmeroch Wind Farm access tracks and upgrades are proposed and once constructed access to the Glenshimmeroch substation collector point might be gained.

Additionally, access can be partially obtained off the U141S to the west of the proposed Troston Loch Wind Farm access, with further track extensions and upgrades to be required and potential connection to proposed access tracks for Glenshimmeroch Wind Farm can provide full access to the study area.

Direct access to the Glenshimmeroch collector substation can be gained at the moment as there are existing forestry tracks. Access to the Glenshimmeroch collector substation will be gained via tracks that will be constructed as part of the Glenshimmeroch Wind Farm via the C51S leading eastwards from its junction with B7000.

A4.7 Land Use and Recreation

A4.7.1 Land use

A4.7.1.1 Existing land use

The study area consists primarily of commercial coniferous plantation, areas of clear felling and some areas of upland livestock farming within the north-eastern part of the study area. There are no residential properties within the study area. There are five residential properties located outside of the study area, including Glenshimmeroch farmhouse. The Troston estate office is located just to the north of the study area.

Figure A4.7.1: Areas of new forestry plantation at Troston Estate with mature forestry plantation in the background

Figure A4.7.2: Rough grazing areas

A4.7.1.2 Planned land use

Planned land uses include the consented Troston Loch Wind Farm, consented Glenshimmeroch Wind Farm and the consented Margree Wind Farm.

The site boundaries and key planned infrastructure related to these developments are shown on Figure 11 in Appendix 1 and were primary considerations when identifying potential route segments and route options for the proposed Troston OHL grid connection.

A4.7.2 Recreation

There are no formal recreational facilities within the study area, although tracks and other paths provide access for visitors to enjoy informal recreational. 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. However, it is noted from site visits that some of the gates to access the commercial forestry areas are padlocked which would restrict some areas from public access.

There are two core paths that fall partly within the study area, including the Southern Upland Way (Core Path 504) and Margree (Core Path 217), and a core path just outside the study area Kendoon Youth Hostel to Butterhole Bridge (Core Path 199).

A4.7.2.1 Southern Upland Way

The 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. 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 SUW passes through the south-west corner of the study area.

Figure A4.7.3: SUW at the intersection with the National Byway Cycle Route and the Fingland Lane

A4.7.2.2 Margree (Core Path 217)

The core path is an approximately 8.4 km route which starts at the A702 and provides access to the Divot Hill and the Greentop of Margree via a circular route, along forestry tracks.

The path passes through the south-western part of the study area for a small distance.

A4.7.2.3 Kendoon Youth Hostel to Butterhole Bridge (Core Path 199)

The core path is a short (approximately 2.7 km) route which used to link the SUW with the now closed youth hostel. The core path runs from the SUW to the B7000 along Black Water.

The core path is present just outside of the south-western corner of the study area where it links with the SUW.

A4.7.2.4 The National Byway Cycle Route

The National Byway is a 5,150 km sign-posted leisure cycling route which passes through Scotland, England. The cycling route runs along the unclassified U141S Fingland Lane towards the B7000, passing through the northern to north-western part of the study area.

A4.8 Forestry

A 4.8.1 Forestry study area

The forestry study area includes the forested areas within the Troston OHL study area; the OHL study area is shown on Figure 1 in Appendix 1. The OHL study area falls between three wind farm boundaries, namely the Troston Loch, Glenshimmeroch and Margree Wind Farms. For reference, Troston Loch and Glenshimmeroch Wind Farms have been consented but construction had not yet commenced at the time of the site visits which were undertaken in September and October 2021. The proposed Margree Wind Farm was only consented in March 2022.

A4.8.1.1 Forestry within Troston Loch Wind Farm boundary

The forestry within the Troston Loch Wind Farm boundary is owned by Troston Estate. The forest contains a range of woodland types and age classes due to ongoing restructuring of first rotation forest. The crops are comprised largely of commercial conifers with areas of mixed broadleaves and open ground. There is an active felling and restocking programme underway across the Troston Estate with areas of ground currently being felled[5].

A4.8.1.2 Forestry within Glenshimmeroch Wind Farm boundary

The forest within the Glenshimmeroch Wind Farm boundary is managed by Scottish Woodlands. The forest consists primarily of commercial forestry plantation associated with Glenshimmeroch Hill and Kilnair Forests. Sitka spruce in pure species plantings is the dominant crop present. There are elements of slower growth in some compartments but overall the conifer crops across the property exhibit strong growth rates assessed in the range of Yield Class 18 – 24[6].

A4.8.1.3 Forestry within Margree Wind Farm boundary

There is also forestry in the south-eastern part of the OHL study area which falls within the boundary of the Margree Wind Farm. Forestry within the Margree Wind Farm boundary is owned and operated by a private company. Detailed information regarding the Wind farm Forestry Plan to accommodate the consented Margree Wind Farm is available in the wind farm EIA Report. However, forestry within this area has not been taken into consideration within this document, as it falls outside of the route options that have been identified for the potential overhead line grid connection, and will not be

[5] Arcus Consultancy Services Ltd, February 2019. EDF Renewables. Troston Loch Wind Farm EIA Report. Volume 1, Main Text, Chapter 13, Forestry.

[6] Scottish Woodlands Ltd on behalf of Energiekontor UK Ltd. June 2018. Glenshimmeroch EIA Report, Chapter 13, Forestry.

affected. Forestry within the Margree Wind Farm boundary will therefore not be considered further.

A 4.8.2 Baseline conditions

A 4.8.2.1 General description

Approximately 63% of the land within the study area is used for forestry. However, in September and October 2021, felling operations were underway in some areas, both within the Troston Loch Wind Farm boundary and within the Glenshimmeroch Wind Farm boundary.

Figure A4.8.1: Example of an area that had recently been felled at Troston Estate in September 2021

Figure A4.8.2: Example of an area that had been felled at Glenshimmeroch (near Kilnair Hill) in September 2021

A 4.8.2.2 Troston forestry baseline description

The woodlands are currently undergoing restructuring and as a result there is a broad range of age classes across the study area. Many woodlands established in the mid to late 1900s, were planted in large contiguous blocks, often over a limited number of years and with a limited range of species. Such woodlands develop poor structural diversity, especially on upland sites. Restructuring the age class and species of such forests is desirable and would yield both forest management and environmental benefits.

The current age class composition of the Troston Loch Wind Farm forested area is detailed in Figure 13.2 in Appendix 7 (extract of Volume 2 of the Troston Loch Wind Farm EIA Report, dated February 2019). The two main age classes of the current forested located near the two route segments that could lead out from the proposed Troston Loch POC are 1-10 years (see Figure A4.8.3, below) and 40 + years (see Figure 4.8.4, below).

Figure A4.8.3: Year 1 – 10 age class (to the right of the photo) and Year 40+ (to the left of the photo) near proposed Troston Loch Wind Farm POC location (photo taken 21/10/2021).

The baseline species composition within the Troston Loch Wind Farm boundary is shown on Figure 13.3 in Appendix 7 (extract of Volume 2 of the Troston Loch Wind Farm EIA Report, dated February 2019). The majority of the trees near the proposed Troston Loch Wind Farm POC consist of Sitka spruce, but there are small stands of broadleaved species near potential OHL route segments 23, 1, 11 and 16, all of which lead out from the substation. There is a stand of Norway spruce to the north of the proposed substation, and there are several stands of Lodgepole pine to the south of the substation, but these both fall outside of the proposed OHL route segments 23, 1, 16 and 11.

Following felling in the period 2021 – 2025, a portion of the Sitka spruce that has already been felled was planned to be restocked with Norway spruce (see Figure 3.5 Baseline restocking plan in Appendix 7). The wind farm post-construction forestry restocking plan is discussed in Section 4.8.3.1, below.

A 4.8.2.3 Glenshimmeroch forestry baseline description

As mentioned previously, the majority (over 93%) of the trees within the Glenshimmeroch Wind Farm boundary's forested areas (including both Glenshimmeroch Hill and Kilnair Hill) consist of Sitka spruce with a mix of stands having been planted between 1981 and 2018 – see Figure 13.1 in Appendix 7 (extracted from the Glenshimmeroch EIA Report, 2018). However, there is a small section of Hybrid larch near the location of the proposed

Glenshimmeroch Wind Farm substation, to which the overhead line will be connected, and there is also a small section of Norway spruce approximately 600 m to the north-east of the proposed substation, through which it is likely that route segments 4 and 6 may traverse.

Figure A4.8.4: View of Sitka spruce (tall trees to the left of the photo) and Norway spruce very recently restocked at Glenshimmeroch (photo taken 21/10/2021).

Figure A4.8.5: Southward-facing view of Sitka spruce at Glenshimmeroch Hill forest from Fingland Lane near Catherine's Pool to the north (photo taken 21/10/2021).

A 4.8.3 Forestry plans

A 4.8.3.1 Troston Loch Wind Farm forestry plans

According to the EIA Report for Troston Loch Wind Farm[5] (February 2019), key hole forestry felling will be undertaken around each turbine (100 m radius) within woodland for construction, operation and environmental mitigation. In addition, a 10 m buffer around each item of infrastructure in addition to the area required for the infrastructure, and a 30 m wayleave for access roads will also be felled. In some cases, further felling may be required for wind yield, turbine performance and forest management purposes in addition to the felling required of the infrastructure.

In October 2019, a Supplementary Environmental Information Report was submitted which included some changes to the wind farm felling and restocking plans. Since the wind farm has been approved, and the overhead line would only be required to be installed if the wind farm is constructed, it is reasonable to expect that the future state of

the forests at Troston Estate will conform to the wind farm felling and restocking plans set out in the Supplementary Environmental Information Report (October 2019).

For the purposes of determining whether the proposed routeing of the overhead line within any of the route options would impact on the forests within the study area, and to what extent they might be affected, the post-construction and mitigation felling and restocking plans have been used as the forestry baseline. The October 2019 Troston Loch Wind Farm felling and restocking plans (Figures 13.1 and 13.2) are attached in Appendix 7.

A 4.8.3.2Glenshimmeroch Wind Farm forestry plans

Construction of the permanent infrastructure required for the proposed development (including the construction compound, access tracks, borrow pits, turbine foundations and crane pads) would require the removal of trees from the site. In addition to this, associated over-sail corridors along parts of the access tracks add to the areas that would require to be removed and maintained free of trees to ensure access for maintenance during the lifetime of the proposed development.

Additional trees will be removed due to expected instability and to prevent wind blow (referred to as windblow mitigation). Crops would be permanently removed for infrastructure construction and compensatory planting would be undertaken within the wind farm boundary in order to satisfy the requirements of the Control of Woodland Removal Policy.

Figure 13.3 of the Glenshimmeroch EIA Report is attached in Appendix 7. The plan indicated areas that are to be felled to accommodate the wind farm infrastructure and potential wind blow, as well as substitute replanting areas. Since the Glenshimmeroch Wind Farm has been consented, the Windblow mitigation felling plan (Figure 13.2 in Appendix 7) has been used as the baseline forestry conditions against which to assess the potential effects of the Troston OHL potential route options.

A 4.8.4 Native woodlands

The Native Woodland Inventory of Scotland[7] shows three areas of native woodland located near the study area – see Figure A4.8.6, below. The Native woodland areas labelled on the map below are as follows:

- 1.04 ha of young, immature pole stage, Lowland mixed deciduous woodland;
- 0.57 ha of young, immature pole stage, Wet woodland;
- 4.6 ha of Regenerating (established regeneration) Wet woodland; and
- 43.5 ha of Open land habitat – neutral grassland.

However, all of these areas are outwith the study area and will not be directly affected by the construction of an OHL.

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

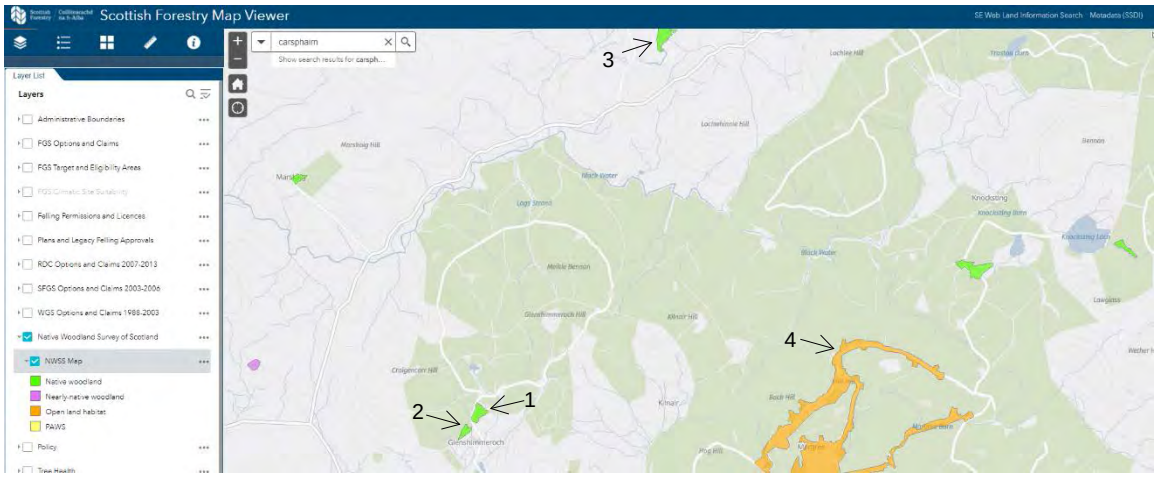


Figure A4.8.6: Native Woodland Inventory of Scotland, areas of native woodland and Open land habitat near the Troston OHL study area (map viewer access 08/12/2021)

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. In general environmental constraints of high sensitivity were treated as hard constraints, of medium sensitivity were treated as moderate constraints and of low or no sensitivity were considered to be soft constraints.

It is noted that in some cases constraints that were considered of high sensitivity have been treated as moderate level constraints, for example Class 1 and 2 peatland was treated as moderate constraints because peat probing would be required to determine the actual presence, area coverage and depth of peat to identify areas of peat to avoid.

Table A5.1: Sensitivity of environmental constraints within the Troston OHL grid connection study area

Constraint	Sensitivity	Buffer (m)	Constraint level (Hard, Moderate, Soft)	Within study area boundary
Landscape				
Sensitive Landscape Area	High	200	Hard	No
Garden and Designated Landscape	High	200	Hard	No
National Park	High	200	Hard	No
National Scenic Area	High	200	Hard	No
Regional Scenic Area	High	200	Hard	No
Settlements and residential properties	High	100	Hard	No
Long distance trail	High	100	Moderate	Yes
Core path	High	100	Moderate	Yes
National Cycle Routes (National Byway Cycle Route)	Medium	100	Moderate	Yes
Ancient Woodland	Medium	100	Moderate	No
Scottish Dark Sky	High	100	Hard	No
Scottish Wild Land	High	100	Hard	No
Cultural Heritage				
World Heritage Sites	High	100	Hard	No
Properties in Care	High	100	Hard	No
Listed Buildings - A	High	50	Hard	No
Listed Buildings - B	Medium	50	Moderate	No
Listed Buildings - C	Low	50	Moderate	No
Scheduled Monuments	High	50	Hard	No
Conservation Areas	Medium	50	Moderate	No

Constraint	Sensitivity	Buffer (m)	Constraint level (Hard, Moderate, Soft)	Within study area boundary
Inventory Gardens and Designed Landscapes	High	25	Hard	No
Non-Inventory Designed Landscapes	Medium	25	Moderate	No
Battlefield Inventory Sites	High	25	Hard	No
Non-designated assets	High/ Medium/ Low	0 - 25	Hard / Moderate	Yes
Archaeologically Sensitive Areas	Medium	25	Moderate	No
Ecology				
Site of Special Scientific Interest (SSSI)	High	100	Hard	No
Special Protection Area (SPA)	High	100	Hard	No
Special Areas Conservation (SAC)	High	100	Hard	No
Ramsar site	High	100	Hard	No
Important Bird Area	Medium	100	Moderate	No
Local Nature Reserves	Medium	50	Moderate	No
Provisional Wildlife Site	Low	50	Soft	No
Ancient Semi Natural Woodlands (ASNW)	High	50	Hard	No
Plantations on Ancient Woodland Sites (PAWS)	Moderate	0	Moderate	No
Carbon and peatland (Class 1)	High	50	Moderate	Yes
Areas of potential GWDTE / or sensitive habitat areas	Medium	50	Moderate	Potentially
Waterbodies (potential otter and water vole habitat)	High	30	Hard	Yes
Geology, Hydrogeology and hydrology				
Carbon and peatland (Class 1 or 2)	High	50	Moderate	Yes
Peat > 2.5 m	High	50	Hard	Yes
Peat 1.5 - 2.5 m	Medium	50	Moderate	Yes
Private water supply sources	High	150	Hard	Yes
Waterbodies (Rivers, burns, lakes, ponds etc.)	High	20 / 50	Hard / Moderate	Yes
Groundwater-dependent terrestrial ecosystems	Medium	20	Moderate	Potentially
Geological Conservation Review Site	Medium	20	Soft	No
Infrastructure				
Existing HV lines	Medium	70	Moderate	Yes
Settlements and individual properties	High	100	Hard	No
Wind farm infrastructure (e.g. turbines, met mast)	High	Turbine height plus 10%	Hard	Yes

Constraint	Sensitivity	Buffer (m)	Constraint level (Hard, Moderate, Soft)	Within study area boundary
Turbine micrositing buffer	Medium	50-100	Moderate	Yes
Consented mineral sites	High		Hard	No
Areas of potential future mineral extraction (low-medium)	Medium		Moderate	No
Slope > 22 degrees	High		Hard	Yes
Traffic and Transport				
Site Topography	Low		Soft	Yes
Ground Conditions	Low		Soft	Yes
Core Paths	Low		Soft	Yes
Thornhill	Low		Soft	Potentially on route to study area depending on construction traffic routeing
Moniaive	Low		Soft	
St John's Town of Dalry	Low		Soft	
Carsphairn	Low		Soft	

APPENDIX 6
ENVIRONMENTAL ANALYSIS OF ROUTE OPTIONS

The route options that were identified for the proposed Troston OHL grid connection were discussed in Section 4.1 of this report and are shown on Figure 13 in Appendix 1. This appendix presents the detailed environmental analysis of each route option and is summarised in Table 4.3 of this report.

A6.1 Ecology and Ornithology

A6.1.1 General study area

A6.1.1.1 Ecology

The proposed route options go through coniferous plantation, felled/regenerating forest, bog and grassland habitats. The bog habitats are degraded due to grazing, however the bog communities on peatland are of ecological value. The grazed purple-moor grass pastures to the north are of lesser botanical value than that of the marshy and bog habitats, although they could be potential GWDTEs in certain settings. The bog habitats have potential for restoration where grazing can be reduced and as such an opportunity for Biodiversity Net Gain (BNG) could be secured.

The forestry areas within the study area have potential for bats, badger and red squirrel and potentially pine marten. The watercourses throughout the area provide foraging and commuting potential for otter, with confirmation of this species through spraints and feeding remains. There is also potential for water vole, especially in the eastern part of the study area. Most of the habitat is open and/or dense forestry with limited potential for foraging and commuting bats, although the wooded areas provide suitable edge habitat. Several waterbodies are present within the study area, including a large pond and a smaller pond roughly 200 m and 100 m respectively to south of the proposed Glenshimmeroch collector substation. These waterbodies have the potential to support amphibians and otter.

A6.1.1.2 Ornithology

The proposed route options pass through habitats suitable for a range of breeding bird species. Bog habitats and grass pastures to the north are known to support lekking black grouse, breeding curlew and snipe, and also provide suitable breeding habitat for raptor species such as hen harrier and short-eared owl, and foraging habitat for barn owl, red kite and peregrine. Coniferous plantation provides suitable breeding habitat for goshawk and red kite. Ponds in the study area provide suitable breeding habitat for duck and goose species as well as foraging habitat for osprey.

Resident breeding species in the coniferous plantation such as peregrine and goshawk are supplemented in winter by species such as merlin. The open bog and grassland habitats also provide winter habitat for species such as hen harrier, barn owl and short-

eared owl. The ponds in and around the study area are suitable for wintering waterfowl, including goldeneye, greylag goose and whooper swan.

A6.1.2 Route Option A

A6.1.2.1 Ecology

Route Option A is one of the most direct, and hence, one of the shortest routes. This route would include areas of felled plantation, mature coniferous plantation, a small area of bog, semi-improved acid grassland, open marshy grassland grazing pasture, marshy grassland lined watercourses and forest rides.

The route crosses several watercourses which support otter and have the potential for water vole including Black Water and Lags Strand and coniferous plantation and felled areas which may support badger, red squirrel and pine marten.

A6.1.2.2 Ornithology

While Route Option A is the one of the shortest and most direct route, it passes in close proximity to a known black grouse lekking site in the north of the study area, although black grouse lek surveys undertaken by RSK in 2022 found no evidence of black grouse using the previously recorded lek. Breeding curlew and snipe have also been recorded on Lochwinnie Hill, and low-flying hunting hen harrier have also been observed in this area.

A6.1.3 Route Option B

A6.1.3.1 Ecology

Route Option B is similar to Route Option A, however this would include more mature plantation as opposed to felled/regenerating areas.

As with Option A, this route would also cross the Black Water and Lags Strand watercourses and include a small area of bog.

A6.1.3.2 Ornithology

As in Route Option A, Route Option B passes close to an area which has a known black grouse lek, breeding curlew and snipe, and where hen harrier have been observed hunting.

A6.1.4 Route Option C

A6.1.4.1 Ecology

Route Option C is the most northerly route and would not cover any areas of commercial plantation woodland. The route instead would cross the road and cover open purple moor-grass pasture, numerous marshy watercourses and bog habitats, with the potential to be GWDTEs. This route would be roughly 200 m from an active outlier badger sett. This route requires numerous watercourse crossings, the majority of which are small burns and the Black Water to the west of the study area. Otter are known to use the Black Water and Fingland Lane burn for commuting and foraging. The route would also be in

close proximity to two trees assessed as offering bat roost potential, one of which is considered to be a veteran ash tree.

This is one of the longest proposed route options and therefore the potential for adverse effects is higher than shorter routes. In addition this route covers higher quality habitats and as such the opportunity for BNG may be reduced.

A6.1.4.2 Ornithology

As with Route Options A and B, Route Option C also passes in close proximity to an area with a black grouse lek, breeding curlew and snipe, and hen harrier activity. However it also passes a second black grouse lekking area in the north-west of the study area, which increases the risk of black grouse collision with the OHL. However, black grouse lek surveys undertaken by RSK in 2022 found no evidence of black grouse using these previously recorded leks. It also passes through more open grassland and bog habitats which provide habitat for breeding and wintering waders, and raptor species such as hen harrier and short-eared owl.

Route Option C is also one of the longest of the route options, meaning the potential for adverse effects is higher.

A6.1.5 Route Option D

A6.1.5.1 Ecology

Route Option D starts similar to Route Option C, crossing the U141S road and covering areas of bog and purple moor-grass pasture before it crosses back over the road and the Black Water into the forestry plantation and felled areas.

As with Route Option C, this route is one of the closest proposed routes to an active badger sett and would cross the Black Water.

A6.1.5.2 Ornithology

Again, Route Option D passes in close proximity to an area in the north of the study area where there is a known black grouse lek, hen harrier activity and breeding curlew and snipe. However it avoids the second black grouse lekking site that is passed by Route Option C. It also passes through less open grassland and bog habitats than Route Option C.

A6.1.6 Route Option E

A6.1.6.1 Ecology

Route Option E is similar to Route Options C and D; however after crossing the U141S road it heads due south through forestry and would take in limited felled/regenerating areas. This route is one of the longest proposed routes, covering a range of habitats including coniferous plantation in the south, and blanket bog and marshy grassland on the northern slopes of Glenshimmeroch Hill.

Being one of the longer routes, the potential for the disturbance of protected species is higher with numerous watercourse crossings.

A6.1.6.2 Ornithology

Route Option E is similar to Route Option D, again passing close to the black grouse lek in the north of the study area, and the area of hen harrier and breeding curlew and snipe habitat.

A6.1.7 Route Option F

A6.1.7.1 Ecology

Route Option F is a long route which covers a range of habitats including a small area of bog, grazed grassland and marshy grassland, plantation and felled areas.

This route would require the crossing of the Black Water and several other small tributaries. The route is the closest route to the waterbody to the north of the forest, within approximately 130 m, and a waterbody within the forest, roughly 180 m away; both of these have the potential to support amphibians.

A6.1.7.2 Ornithology

Again, Route Option F passes in close proximity to the area in the north of the site with a black grouse lek, hen harrier activity and breeding curlew and snipe. However following this, it turns sharply south to weave between the planned locations of wind turbines in the consented Glenshimmeroch Wind Farm. When installed these turbines may provide a barrier to commuting birds, reducing the risk of collision with the OHL.

A6.1.8 Route Option G

A6.1.8.1 Ecology

Route Option G is one of the most direct, and hence, one of the shortest routes. Route Option G is a southerly route, the majority of which is through felled plantation and mature plantation, with the exception of a small area of bog to the south and marshy grassland associated with forest rides.

The forestry has potential for pine marten, red squirrel and badger. This route would require a crossing of the Black Water at its most easterly extent within the study area, where is bound by plantation.

A6.1.8.2 Ornithology

Route Option G avoids both black grouse lekking sites in the north of the study area, and the areas of hen harrier activity and breeding curlew and snipe habitat. For most of the route it weaves through the locations of wind turbines in the proposed Glenshimmeroch Wind Farm, which when installed may pose a barrier to birds, reducing collision risk. It also avoids the summit of Kilnair Hill where red kite and goshawk have been observed flying regularly.

A6.1.9 Route Option H

A6.1.9.1 Ecology

This route is similar to Option G; however it covers an area of marshy and sheep grazed grassland on the western flanks of Kilnair Hill.

This option is the closest route to the possible common pipistrelle roost within either the derelict cottage or neighbouring tree at Kilnair, both of which are outwith the study area but approximately 400 m south from the proposed route.

A6.1.9.2 Ornithology

Similarly to Route Option G, Route Option H avoids both black grouse lekking sites in the north of the study area, and the areas of hen harrier activity and breeding curlew and snipe habitat. For most of the route it weaves through the locations of wind turbines in the consented Glenshimmeroch Wind Farm, which when installed may pose a barrier to birds, reducing collision risk. However in passing south around Kilnair Hill it passes more closely to areas where red kite and goshawk have been observed and therefore holds slightly more risk of collision for these species.

A6.1.10 Route Option I

A6.1.10.1 Ecology

This is a fairly long route option which starts in felled conifer plantation and joins onto Route Option A just south of the main access track. The route covers mostly blanket bog in addition to marshy and acid grassland to the east and starts in felled conifer plantation. There are numerous small watercourses associated with Black Water and Lags Strand watercourses which are present within the route option. As the end of the route includes Route Option A, it covers mostly lower value habitats including coniferous plantation and grazed grassland. There are two features with low or negligible bat roost potential that lie within the route which include Stone Bridge and Drystone Dyke which are associated with Black Water. Approximately a quarter of the route closely adheres to the access track and also lies within proximity of suitable water vole habitat. The active outlier badger sett is located approximately 400 m north-west of the proposed route, however this is distant enough to not be considered a constraint to the works.

A6.1.10.2 Ornithology

Route Option I is similar to Route Option A, however as it leaves the point of connection, it passes to the east and then north of Lochwhinnie Hill, at a distance of around 250 m from the area where a black grouse lek and breeding curlew and snipe were recorded in previous surveys for the wind farm developments in the area. For this reason, it is preferred to Route Options A-E. Due to the use of route segment 17 rather than 16, it also remains further from the sensitive area on Lochwhinnie Hill than Route Option J and is therefore preferred.

A6.1.11 Route Option J

A6.1.11.1 Ecology

Route Option J is similar to Route Option I, however this would affect a slightly larger area of marshy grassland.

As with Option I, this route would also cross the Black Water and Lags Strand watercourses and lies within proximity of features with potential for roosting bats.

A6.1.11.2 Ornithology

Route Option J is similar to Route Option I, however as it leaves the point of connection, it passes to the west of a planned wind turbine before joining Route Option I at segment 18, north of Lochwhinnie Hill. It passes Lochwinnie Hill at a distance of around 250 m from the area where a black grouse lek and breeding curlew and snipe were recorded in previous surveys for the wind farm developments in the area. For this reason, it is preferred to route options A-E. However, due to the use of route segment 16 rather than 17, it passes closer to the sensitive area on Lochwhinnie Hill than Route Option I and is therefore less preferred.

A6.1.12 Summary

Table A6.1.1: Route preference from an ecology perspective

Route Option	Ecological preferability
A	Route Option A would be the preferred route with regard to BNG as it is one of the shortest, most direct route and would likely result in the lowest area of habitat loss. In addition the potential for BNG may be more likely with this route given that it covers mostly lower value habitats including coniferous plantation and grazed grassland. The likelihood of GWDTEs would require to be assessed given the presence of marshy grassland along the route. Limited constraints in terms of protected species are likely to exist, other than watercourses which support otter and possibly water vole, but a crossing of the Black Water is required for all routes. The route crosses an area of felled plantation which could support pine marten.
B	This route is very similar to Option A and hence there is no preference between A and B in terms of ecology.
C	Route Option C is a long route which offers limited potential to accommodate the infrastructure required and achieve BNG as it covers higher value, sensitive habitats including large areas of bog on likely deep peat and marshy tributaries and potential GWDTEs. Numerous watercourse crossings would be required for this route and the route would be in close proximity to an active badger sett.

Route Option	Ecological preferability
D	Given its similarities with Route Option C, this route offers limited potential to accommodate the infrastructure required and achieve BNG. This route is one of the closest proposed routes to an active badger sett and would cross the Black Water. This route would also cover an area of felled plantation which has the potential for pine marten.
E	This route is very similar to Route Option D and hence offers limited potential to accommodate the infrastructure required and achieve BNG. Being one of the longer routes, the potential for the disturbance of protected species is higher with numerous watercourse crossings.
F	The route option covers a limited area of higher value habitats, restricted to a small area of bog to the north and south and some grazed purple moor-grass pasture. The majority of the route covers habitats of limited value including semi-improved grazed grassland and coniferous plantation. This route would require the crossing of several watercourses. This route is in close proximity to a number of waterbodies and as such the risk of disturbance to amphibians is higher, although not considered a considerable constraint.
G	The route covers mostly felled and coniferous plantation which are considered to be of lower ecological value and hence it is considered that BNG could be more achievable with this route. A small area of bog is present to the south of the route. The forestry has potential for pine marten, red squirrel and badger, and this route would cross the Black Water.
H	This route is similar to Option G, although marshy and sheep grazed grassland is present on Kilnair Hill. This route is in closer proximity to the possible common pipistrelle maternity roost at Kilnair cottage/tree and therefore there is a possibility of disturbance to this roost.
I	The route option covers mostly blanket bog, marshy grassland and acid grassland and starts in felled conifer plantation which are considered to be of lower ecological value. There are two features with between low and negligible bat roost potential that lie within the route. These features include Stone Bridge which has negligible/low roosting potential and Drystone Dyke which has low potential. Both of these features are associated with Black Water. The active outlier badger sett is considered suitably distant enough to not be considered a constraint to the works. There are numerous small watercourses associated with Black Water and Lags Strand watercourses which are present within the route which are known to support otter and possibly water vole, however every route option would cross Black Water and therefore limited constraints in terms of protected species are likely to exist.
J	This route is very similar to Option I and hence there is no preference between I and J in terms of ecology.

Based on the detailed assessment of ecological factors above and using the criteria set out in Section 4.1.3 of this report, Route Options A, B, G and H are the preferred options.

Table A6.1.2: Route preference from an ornithology perspective

Route Option	Ornithology preferability
A	While Route A is the shortest and most direct route, it passes in close proximity to a known black grouse lekking site. Breeding curlew and snipe and hunting hen harrier have also been recorded on Lochwinnie Hill. This route presents a risk of collision for breeding black grouse, curlew and snipe and therefore a limited potential to accommodate the infrastructure required.
B	This route is very similar to Route Option A and hence there is no difference between Route Options A and B in terms of ornithology.
C	Route C passes in close proximity to two known black grouse leks, as well as an area where hunting hen harrier and breeding curlew and snipe have been recorded, presenting a risk of collision for these species. It is also the longest route, crossing areas of bog habitats which provide suitable habitat for wader species, short-eared owl and hen harrier, which are also at risk of collision with OHLs. Therefore this route has the least potential of all the route options in terms of ornithology.
D	Route Option D passes in close proximity to an area in the north of the study area where there is a known black grouse lek, Hen harrier activity and breeding curlew and snipe. However it avoids the second black grouse lekking site that is passed by Route Option C. It also passes through less open grassland and bog habitats than Route Option C. However it still presents limited potential in terms of ornithology.
E	Route Option E is similar to Route D, again passing close to the black grouse lek in the north of the study area, and the area of hen harrier and breeding curlew and snipe habitat.
F	Route Option F passes in close proximity to the area in the north of the site with a black grouse lek, hen harrier activity and breeding curlew and snipe. However following this, it turns sharply south to weave between the planned locations of wind turbines. When installed these turbines may provide a barrier to commuting birds, reducing the risk of collision with the OHL.
G	Route Option G avoids both black grouse lekking sites in the north of the study area, and the areas of hen harrier activity and breeding curlew and snipe habitat. For most of the route it weaves through the locations of wind turbines, which when installed may pose a barrier to birds, reducing collision risk. It also avoids the summit of Kilnair Hill where red kite and goshawk have been observed flying regularly. This is the preferred route with regard to ornithology

Route Option	Ornithology preferability
H	Similarly to Route Option G, Route Option H avoids both Black Grouse lekking sites in the north of the study area, and the areas of hen harrier activity and breeding curlew and snipe habitat. For most of the route it weaves through the planned locations of wind turbines, which when installed may pose a barrier to birds, reducing collision risk. However in passing south around Kilnair Hill it passes more closely to areas where red kite and goshawk have been observed and therefore holds slightly more risk of collision for these species, however this is not considered a significant constraint
I	This route option is similar to Route Option A, however it passes north of Lochwinnie Hill, thereby maintaining an approximately 250 m distance from the black grouse lek and breeding area for curlew and snipe that have been recorded in previous surveys. For this reason, it is preferred to options A-F. It also passes further from this area to the east than Route Option J and therefore it is preferred over Route Option J.
J	Similarly to Route Option I, Route Option J passes to the north and east of the black grouse lek on Lochwinnie Hill, however it passes more closely to the east of this area than Route Option I and is therefore less preferred.

Based on the detailed assessment of ornithological factors above and using the criteria set out in Section 4.1.3 of this report, Route Options G and H are the preferred options.

A6.2 Archaeology and Cultural Heritage

The degree of interaction between each route option and identified archaeological and cultural heritage sensitivities has been considered. The route options able to avoid identified heritage constraints, wherever possible, are assessed as preferable.

A6.2.1 General study area

Given the nature of the proposed development, a double wood pole OHL of up to 15 m in height, and the intervening distance between the ten route options and identified designated assets, no significant effects on the setting of heritage assets is anticipated. This consideration has not therefore influenced the analysis of the route options below.

Feedback from the DGC Archaeologist during the preparation of the Routeing and Consultation Document (RCD) was as follows:

> *Please note that if there is any intention to place the grid connection northwards, into the valley of the Water of Ken / Stroanfreggan Burn, then the Archaeology Service would expect indirect impacts on the designated monuments of Straonfreggan Fort and Stroanfreggan Cairn to be taken into account even though they lie outwith your search area.*

While this RCD does not assess options extending northwards into the valley of the Water of Ken/Stroanfreggan Burn, this advice will be noted should such an option be taken forward in the future.

A6.2.1.1 Summary of route segments

The ten route options each comprise a different set of segments, as shown in Figure 5 and Figure 13 in Appendix 1. A summary of the archaeological baseline in each segment is provided below.

- Segment 1: Contains no assets recorded on the HER or NRHE.
- Segment 2: Contains a single entry in the HER and NRHE recorded as a “hay ree” (MDG16021).
- Segment 3: Contains a small fraction of a possible enclosure identified by DGC but not yet uploaded to the HER.
- Segment 4: Contains no assets recorded on the HER or NRHE.
- Segment 5: Contains a small fraction an area recorded in the NRHE as a farmstead and head dyke (Canmore ID 177682).
- Segment 6: Contains a single entry of a sheep ree identified by DGC but not yet uploaded to the HER.
- Segment 7: Contains possible peat cuttings and a sheepfold identified by DGC but not yet uploaded to the HER, and the farmstead and field system of Auchenshinnoch (MDG16025).
- Segment 8: Contains no assets recorded on the HER or NRHE.
- Segment 9: Contains an enclosure marked on the First Edition Ordnance Survey (1st Edition OS) (MDG16033), the field system and farmstead of Cairnyhill (MDG26106) recorded on the HER and NRHE, and clearance cairns and a farmstead at Butterhole recorded on the HER and NRHE (MDG3836).
- Segment 10: Contains no assets recorded on the HER or NRHE.
- Segment 11: Contains no assets recorded on the HER or NRHE.
- Segment 12: Contains the farmstead and field system of Kilnair (MDG26146) recorded on the HER.
- Segment 13: Contains no assets recorded on the HER or NRHE.
- Segment 14: Contains no assets recorded on the HER or NRHE.
- Segment 15: Contains no assets recorded on the HER or NRHE.
- Segment 16: Contains a single entry of a sheep ree identified by DGC but not yet uploaded to the HER.
- Segment 17: Contains no assets recorded on the HER or NRHE.
- Segment 18: Contains no assets recorded on the HER or NRHE.
- Segment 19: Contains no assets recorded on the HER or NRHE.
- Segment 20: Contains a single entry of possible peat cuttings identified by DGC but not yet uploaded to the HER.
- Segment 21: Contains a possible enclosure and a sheepfold identified by DGC but not yet uploaded to the HER.
- Segment 22: Contains no assets recorded on the HER or NRHE.

- Segment 23: Contains no assets recorded on the HER or NRHE.

A6.2.2 Route Option A

Route Option A consists of six route segments (1 to 5 and 23). It contains one previously identified archaeological asset, which does not extend across a significant proportion of the route option, and it is among the shortest and most direct routes between the two proposed substations at 3.7 km.

A6.2.3 Route Option B

Route Option B consists of six route segments (1 to 4, 6 and 23). It contains three previously identified archaeological assets, but no asset extends across the entire width of the route option, and it is among the shortest and most direct routes between the two proposed substations at 3.8 km.

A6.2.4 Route Option C

Insert Route Option C consists of six route segments (1, 7, 9, 20, 22 and 23). It contains six previously identified archaeological assets, two of which extend across the majority of the width of the route option. Route Option C is also jointly the longest at 5.0 km.

A6.2.5 Route Option D

Route Option D consists of eight route segments (1, 4, 5, 7, 8, 20, 22 and 23). It contains four previously identified archaeological assets, one of which extends across the majority of the width of the route option. It is among the longest at 4.5 km in length.

A6.2.6 Route Option E

Route Option E consists of eight route segments (1, 4, 6, 7, 8, 20, 22 and 23). It contains four previously identified archaeological assets, one of which extends across the majority of the width of the route option. It jointly the longest at 5.0 km in length.

A6.2.7 Route Option F

Route Option F consists of six route segments (1, 2, 10, 14, 15 and 23). It contains a single previously identified archaeological asset which does not extend across a significant width of the route option. It is 4.4 km in length.

A6.2.8 Route Option G

Route Option G consists of four route segments (11, 13, 14 and 15). It contains no previously identified archaeological assets. It is the shortest at 3.5 km in length.

A6.2.9 Route Option H

Route Option H consists of three route segments (11, 12 and 15). It contains a single previously identified archaeological asset which extends across a significant proportion of the route option. It is among the shortest at 3.9 km in length.

A6.2.10 Route Option I

Route Option I consists of eight route segments (3 to 5 and 17 to 21). It contains three previously identified archaeological assets. It is jointly the longest at 5.0 km in length.

A6.2.11 Route Option J

Route Option J consists of nine route segments (3 to 5, 16, 18, 19, 20, 21 and 23). It contains three previously identified archaeological assets. It is among the longest at 4.7 km in length.

A6.2.12 Summary

Of the ten route options, all could be progressed without causing potentially significant effects on archaeology and cultural heritage assets.

In terms of land use, every route option contains a mixture of commercial forestry with areas of open ground. Therefore, while any archaeological deposits located in the areas subject to forestry are likely have experienced some previous disturbance, there are no route options which have experienced no disturbance. However, several of the route options extend through areas that have previously been subject to arable cultivation and settlement in post-medieval periods. These route options would have a higher chance of being unable to avoid disturbing previously identified remains at the detailed design stage, and/or disturbing previously unidentified remains at the construction stage.

Based on the detailed assessment of archaeological and cultural heritage constraints and using the criteria set out in Section 4.2.2 of this report, the least preferred route options are C, D and E, as these are among the longest route options and contain numerous previously identified archaeological remains.

Similarly, Route Options I and J both contain three known non-designated assets, and take somewhat circuitous routes between the two grid connection points. Therefore, these are also identified as least preferred.

While Route Option F contains few or no previously identified remains, it takes a somewhat circuitous route between the two grid connection points, which increases the overall amount of ground disturbance required and therefore increases the overall risk of previously unidentified archaeological remains being disturbed during construction. Route Option H contains only a single previously recorded asset, and is jointly the shortest route; however the asset recorded in Route Option H extends across a significant proportion of the route corridor and would be difficult to avoid at design stage. Therefore, Route Options F and H are neither the most nor least preferred options.

Route Options A and B both contain known non-designated assets, but these are discrete assets that do not extend significant distances within the route corridors meaning that they can be avoided at design stage. They also take the most direct routes between the two grid connection points, thereby reducing the overall risk of previously unidentified archaeological remains being disturbed during construction. Route Option G contains no previously identified remains, is located primarily in commercial forestry, and is jointly the shortest distance between the two grid connections. Route Options A, B and G are therefore the most preferred options.

Table A6.2.1: Route preference from an archaeological and cultural heritage perspective

Route Option	Archaeological and Cultural Heritage preferability
A	Among preferred route options – short distance and able to avoid known assets.
B	Among preferred route options – short distance and able to avoid known assets.
C	Among the longest route options and contain numerous previously identified remains that would be difficult to avoid. Among least preferred route options, but potentially viable with appropriate mitigation.
D	Among the longest route options and contain numerous previously identified remains that would be difficult to avoid. Among least preferred route options, but potentially viable with appropriate mitigation.
E	Among the longest route options and contain numerous previously identified remains that would be difficult to avoid. Among least preferred route options, but potentially viable with appropriate mitigation.
F	It contains a single previously identified archaeological asset which does not extend across a significant width of the route option. Potentially viable option.
G	Among preferred route options – it contains no previously identified archaeological assets. Shortest route at 3.5 km long.
H	It contains a single previously identified archaeological asset which does extends across a significant width of the route option. Potentially viable option.
I	Contains three previously identified archaeological assets and takes a circuitous route Among least preferred route options, but potentially viable with appropriate mitigation.
J	Contains three previously identified archaeological assets and takes a circuitous route. Among least preferred route options, but potentially viable with appropriate mitigation.

A6.3 Landscape and Visual Amenity

A6.3.1 General study area

Section A4.3 of Appendix 4 Environmental Baseline describes the main landscape elements and visual amenity identified within the study area, including landscape designations and Landscape Character Types (LCT), settlements, transport routes, core footpaths and recreational landscapes which could be directly affected by the proposed development. The degree of interaction of each route option with these identified landscape and visual receptors has been considered in order to identify differentiators, if any exist, between the route options under consideration.

As detailed in Section 4.3.2.2 of this report, six criteria have been applied at the initial route corridor appraisal stage for landscape and visual amenity as outlined below:

- Landscape Sensitivity – to find the best possible landscape 'fit'. To avoid landscapes with greatest potential sensitivity to change (from OHLs).
- 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 residents in settlements, users of main transport routes, and users of key recreational areas.
- 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 natural or semi-natural woodland 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 OHL and likely concerns. A judgement of high indicated that a particular aspect would most likely be adversely affected by the introduction of an OHL and a judgement of low indicated that the route option would likely avoid adverse effects on this criterion. A judgement of none means that the criteria is not of concern e.g. if were no residential properties within the vicinity of a route then the likely effects on residential amenity would be considered 'none'.

For this project all the route options go through broadly an identical landscape, although there is some differences for those route options which include sections within the north of the study area; as such there is little difference in the appraisals of the criteria listed above.

A field survey was undertaken during October 2021 during which the northern slopes of Glenshimmeroch had been recently felled, however it should be noted that the rotating nature of commercial forestry means that this is a dynamic situation and the actual location of mature forestry within the study area will change over time. Therefore where commercial forestry is referenced it does not distinguish between areas of recently felled forestry and mature forestry.

A6.3.2 Route Option A

This route does not cross any landscape designations of regional, national or international importance. The route runs through a landscape dominated by commercial forestry, although the future baseline would also include the turbines from the consented wind farms.

Heading west from the proposed Troston Loch POC the route crosses the undulating northern slopes of Glenshimmeroch, initially within approximately 330 m of commercial forestry land and then approximately 1.3 km of moorland landscape. The route then crosses Black Water burn before looping to the south-west through a further 1.9 km of commercial forestry and connecting with the proposed Glenshimmeroch collector substation. This route follows an undulating path at around 250 m AOD with the higher plateaus of Meikle Bennan (344 m AOD), Garlaffin (327 m AOD) and Glenshimmeroch

Hill (343 m AOD) all to the south of the route. This route crosses between seven to eight watercourses.

It is considered unlikely that any significant landscape effects would be identified should the development be located within Route Option A. The main landscape effects would likely arise from the introduction of the OHL into the 1.3 km section (segments 1 and 2) of untouched moorland landscape and across a small number of watercourses. Overall the sensitivity of the landscape to the proposed development has been judged as low.

Route Option A would be perceptible, all be it from a minimum distance of 1 km, from the residential properties Fingland and Auchenshinnoch; the properties at Glenshimmeroch are 780 m south of the proposed connection point and currently separated by mature trees adjacent to the properties and forestry. This route option would be visible from an approximate 3-4 km section of the National Byway Cycle Route and the western end of Route Option A would be visible to users of the SUW.

Route Option A benefits from not being on the higher ground within the study area and as such would often be backclothed by landform; and also the commercial forestry it is often in close proximity to. This route option would benefit from greater visual screening and backclothing when the commercial forestry in the vicinity of the route is mature. This route option would be screened from all views from the south and east of the higher ground located within the centre of the study area.

It is not anticipated that any residential receptors would experience significant visual effects; there would likely be localised non-significant effects on users of the National Byway Cycle Route.

With respect to the criteria detailed above the susceptibility of Route Option A has been judged as follows:

- Landscape Sensitivity – Low;
- Residential Amenity – Low;
- Visual Amenity – Low;
- Landscape Designations – None;
- Length of corridor – 3.7 km; and
- Forestry – Low (commercial forestry only).

A6.3.3 Route Option B

This route does not cross any landscape designations of regional, national or international importance. The route runs through a landscape dominated by commercial forestry, although the future baseline would also include the turbines from the consented wind farms.

Heading west from the proposed Troston Loch POC the route crosses the undulating northern slopes of Glenshimmeroch, initially within approximately 330 m of commercial forestry land and then approximately 1.3 km of moorland landscape. The route then crosses Black Water burn before looping to the south-west and then south, through a further 2 km of commercial forestry and connecting with the proposed Glenshimmeroch collector substation. This route follows an undulating path at around 250 m AOD with the higher plateaus of Meikle Bennan (344 m AOD) and Glenshimmeroch Hill (343 m AOD) to the south of the route. It heads around the eastern peak of Garlaffin (327 m AOD), just

below the highest ground, before connecting with the proposed Glenshimmeroch substation connector point. This route crosses six to seven watercourses.

It is considered unlikely that any significant landscape effects would be identified should the development be located within Route Option B. The main landscape effects would likely arise from the introduction of the OHL into the 1.3 km section of untouched moorland landscape (segments 1 and 2) and across a small number of watercourses. Overall the sensitivity of the landscape to the proposed development has been judged as low.

Route Option B would be perceptible, all be it from a minimum distance of 1 km, from the residential properties Fingland and Auchenshinnoch; the properties at Glenshimmeroch are 780 m south of the proposed connection point and currently separated by mature trees adjacent to the properties and forestry. This route option would be visible from an approximate 3-4 km section of the National Byway Cycle Route. It's path to the east of Garlaffin may screen the western end (segment 6) of Route Option B for users of the SUW.

Route Option B benefits from generally not being on the higher ground within the study area and as such would often be backclothed by landform; and also the commercial forestry it is often in close proximity with. This route option would benefit from greater visual screening and backclothing when the commercial forestry in the vicinity of the route is mature. A short section at the western end of this route option is on higher ground close to the peak of Garlaffin. This route option would be screened from the majority of views from the south and east of the higher ground located within the centre of the study area.

It is not anticipated that any residential receptors would experience significant visual effects; there would likely be localised non-significant effects on users of the National Byway Cycle Route.

With respect to the criteria detailed above the susceptibility of Route Option B has been judged as follows:

- Landscape Sensitivity – Low;
- Residential Amenity – Low;
- Visual Amenity – Low;
- Landscape Designations – None;
- Length of corridor – 3.8 km; and
- Forestry – Low (commercial forestry only).

A6.3.4 Route Option C

This route does not cross any landscape designations of regional, national or international importance. The route crosses moorland to the immediate north of a landscape dominated by commercial forestry.

Heading west from the proposed Troston Loch POC the route crosses the undulating northern slopes of Glenshimmeroch, initially within approximately 330 m of commercial forestry land and then heading west and then north across approximately 900 m of moorland landscape. The route then turns westward and crosses an unnamed the U141S local road (640 m south of Auchenshinnoch) and continues westward through open moorland broadly adjacent to the road for approximately 2.5 km, at which point the route crosses the SUW and heads south for approximately 1 km, again across open moorland,

before connecting with the proposed Glenshimmeroch collector substation from the north-north-west. This western stretch of this route option would potentially be perceptible from the property at Marskaig, although any views would be partially screened by landform and vegetation. An existing 33 kV OHL is present within sections (segments 7 and 9) of this potential route option. This route crosses nine to ten watercourses.

It is considered unlikely that any significant landscape effects would be identified should the development be located within Route Option C. The main landscape effects would likely arise from the introduction of the OHL into a 4.4 km length of moorland landscape and across a small number of watercourses. Overall the sensitivity of the landscape to the proposed development has been judged as medium.

Route Option C would be perceptible from the residential properties Fingland and Auchenshinnoch; the properties at Glenshimmeroch are 780 m south of the proposed connection point and currently separated by mature trees adjacent to the properties and forestry. This route option would be visible from an approximate 4 km section of the National Byway Cycle Route and it would pass directly over a section of the SUW.

Whilst Route Option C benefits from being on the lowest lying ground, it would not benefit from screening or backclothing provided by commercial forestry and is located within a landscape where longer distance views of the OHL would be possible from the north and west.

Whilst perceptible from Fingland and Auchenshinnoch it is not anticipated that any residential receptors would experience significant visual effects; however, there would potentially be localised significant effects on users of the National Byway Cycle Route and SUW.

With respect to the criteria detailed above the susceptibility of Route Option C has been judged as follows:

- Landscape Sensitivity – Medium;
- Residential Amenity – Low;
- Visual Amenity – Medium;
- Landscape Designations – None;
- Length of corridor – 5 km; and
- Forestry – Low (commercial forestry only)

A6.3.5 Route Option D

This route does not cross any landscape designations of regional, national or international importance. The route is partly within a landscape dominated by commercial forestry.

Heading west from the proposed Troston Loch POC the route crosses the undulating northern slopes of Glenshimmeroch, initially within approximately 330 m of commercial forestry land and then heading west and then north across approximately 900 m of moorland landscape. The route then turns westward and crosses an unnamed local road (640 m south of Auchenshinnoch) and continues westward through open moorland broadly adjacent to the road for 1.4 km, at which point the route turns sharply southwards (segment 8) and passes through commercial forestry for 1.7 km (segments 4 and 8), before connecting with the proposed Glenshimmeroch collector substation from the north.

An existing 33 kV OHL is present within sections (segment 7) of this potential route option. This route crosses seven to nine watercourses.

It is considered unlikely that any significant landscape effects would be identified should the development be located within Route Option D. The main landscape effects would likely arise from the introduction of the OHL into a 2.5 km length of moorland landscape and across a small number of watercourses. Overall the sensitivity of the landscape to the proposed development has been judged as low.

Route Option D would be perceptible from the residential properties Fingland and Auchenshinnoch; the properties at Glenshimmeroch are 780 m south of the proposed connection point and currently separated by mature trees adjacent to the properties and forestry. This route option would be visible from an approximate 2.5-3 km section of the National Byway Cycle Route and the western end of Route Option A would be visible to users of the SUW.

A large section (segment 7) of Route Option D benefits from being on lower lying ground within the study area, however this same section would not benefit from screening or backclothing provided by commercial forestry and is located within a landscape where longer distance views of the OHL would be possible from the north and west. The western section (segments 4 and 5) of this Route Option would benefit from its proximity with commercial forestry, although it is also passing over higher ground and therefore potentially more visible when the forestry is cleared.

Whilst perceptible from Fingland and Auchenshinnoch it is not anticipated that any residential receptors would experience significant visual effects; there would potentially be localised significant effects on users of the National Byway Cycle Route.

With respect to the criteria detailed above the susceptibility of Route Option D has been judged as follows:

- Landscape Sensitivity – Low;
- Residential Amenity – Low;
- Visual Amenity – Low;
- Landscape Designations – None;
- Length of corridor – 4.5 km; and
- Forestry – Low (commercial forestry only).

A6.3.6 Route Option E

This route does not cross any landscape designations of regional, national or international importance. The route is partly within a landscape dominated by commercial forestry.

Heading west from the proposed Troston Loch POC the route crosses the undulating northern slopes of Glenshimmeroch, initially within approximately 330 m of commercial forestry land and then heading west and then north across approximately 900 m of moorland landscape. The route then turns westward and crosses an unnamed local road (640 m south of Auchenshinnoch) and continues westward through open moorland broadly adjacent to the road for 1.4 km, at which point the route turns sharply southwards (segment 8) and passes through commercial forestry for 1.7 km (segments 4 and 6), before connecting with the proposed Glenshimmeroch collector substation from the east.

An existing 33 kV OHL is present within sections of this potential route option. This route crosses six to eight watercourses.

It is considered unlikely that any significant landscape effects would be identified should the development be located within Route Option E. The main landscape effects would likely arise from the introduction of the OHL into a 2.5 km length of moorland landscape and across a small number of watercourses. Overall the sensitivity of the landscape to the proposed development has been judged as low.

Route Option E would be perceptible from the residential properties Fingland and Auchenshinnoch; the properties at Glenshimmeroch are 780 m south of the proposed connection point and currently separated by mature trees adjacent to the properties and forestry. This route option would be visible from an approximate 2.5-3 km section of the National Byway Cycle Route.

A large section (segment 7) of Route Option E benefits from being on lower lying ground within the study area, however this same section would not benefit from screening or backclothing provided by commercial forestry and is located within a landscape where longer distance views of the OHL would be possible from the north and west. The western section of this route option would benefit from its proximity with commercial forestry, although it is also passing over higher ground and therefore potentially more visible when the forestry is cleared.

Whilst perceptible from Fingland and Auchenshinnoch it is not anticipated that any residential receptors would experience significant visual effects; there would potentially be localised significant effects on users of the National Byway Cycle Route.

With respect to the criteria detailed above the susceptibility of Route Option E has been judged as follows:

- Landscape Sensitivity – Low;
- Residential Amenity – Low;
- Visual Amenity – Low;
- Landscape Designations – None;
- Length of corridor – 5 km; and
- Forestry – Low (commercial forestry only).

A6.3.7 Route Option F

This route does not cross any landscape designations of regional, national or international importance. The route runs through a landscape dominated by commercial forestry, although the future baseline would also include the turbines from the consented wind farms.

Heading west from the proposed Troston Loch POC the route crosses the undulating northern slopes of Glenshimmeroch, initially within approximately 330 m of commercial forestry land and then heading west approximately 1.3 km of moorland landscape. The route then turns sharpy to the south (segment 10) and through commercial forestry for 1.4 km, in between the peak of Meikle Bennan (344 m AOD) to the west and Kilnair Hill (329 m AOD) to the east. The route then turns sharply to the west (segment 15) and passes through a further 1.1 km of commercial forestry on the upper southern slopes of

Glenshimmeroch Hill before connecting with the proposed Glenshimmeroch collector substation from the east. This route crosses nine watercourses.

It is considered unlikely that any significant landscape effects would be identified should the development be located within Route Option F. The main landscape effects would likely arise from the introduction of the OHL into a 1.3 km length of moorland landscape (segments 1 and 2) and across a small number of watercourses. Overall the sensitivity of the landscape to the proposed development has been judged as low.

Route Option F would be perceptible, all be it from a minimum distance of 1 km, from the residential properties Fingland and Auchenshinnoch; the properties at Glenshimmeroch are 780 m south of the proposed connection point and currently separated by mature trees adjacent to the properties and forestry. This route option would be visible from an approximate 2.5-3 km section of the National Byway Cycle Route. It is unlikely to be perceptible for users of the SUW.

The eastern section (segments 1 and 2) of Route Option F benefits from not being on the higher ground within the study area, however this same section would not benefit from screening or backclothing provided by commercial forestry and is located within a landscape where longer distance views of the OHL would be possible from the north and west. The central and western sections (segments 10, 14 and 15) of this route option would benefit from their proximity with commercial forestry, although they are also passing over higher ground and therefore potentially more visible when the forestry is cleared. The central section (segments 10 and 14) of this route option is within close proximity to the consented wind farms and as such parts of the forestry is likely to be cleared and the OHL would often be viewed within the context of the consented turbines.

It is not anticipated that any residential or recreational receptors would experience significant visual effects.

With respect to the criteria detailed above the susceptibility of Route Option F has been judged as follows:

- Landscape Sensitivity – Low;
- Residential Amenity – Low;
- Visual Amenity – Low;
- Landscape Designations – None;
- Length of corridor – 4.4 km; and
- Forestry – Low (commercial forestry only).

A6.3.8 Route Option G

This route does not cross any landscape designations of regional, national or international importance. The route runs through a landscape dominated by commercial forestry, although the future baseline would also include the turbines from the consented wind farms.

Heading south-west from the proposed Troston Loch POC the route crosses the undulating landscape through commercial forestry for approximately 3.6 km, in between the peaks of Meikle Bennan (344 m AOD) to the west and Kilnair Hill (329 m AOD) to the east. The route crosses the upper southern slopes of Glenshimmeroch Hill before

connecting with the proposed Glenshimmeroch collector substation from the east. This route crosses seven watercourses.

It is considered unlikely that any significant landscape effects would be identified should the development be located within Route Option G. Overall the sensitivity of the landscape to the proposed development has been judged as low.

The perceptibility of Route Option G would largely depend on the rotational nature of the commercial forestry within the vicinity of the route. Whilst this Route Option does cross some of the higher ground within the study area, it avoids proximity to residential properties and recreational receptors. The development would be generally screened to views from within the north and west of the study area by intervening landform; and is unlikely to be perceptible from either the SUW or the National Byway Cycle Route. The properties at Glenshimmeroch are 780 m south of the proposed connection point and currently separated by mature trees adjacent to the properties and forestry.

The eastern and central sections (segments 11, 13 and 14) of this route option are within close proximity to the consented wind farms and as such parts of the forestry is likely to be cleared and the OHL would often be viewed within the context of the consented turbines.

It is not anticipated that any residential or recreational receptors would experience significant visual effects.

With respect to the criteria detailed above the susceptibility of Route Option G has been judged as follows:

- Landscape Sensitivity – Low;
- Residential Amenity – Low;
- Visual Amenity – Low;
- Landscape Designations – None;
- Length of corridor – 3.5 km; and
- Forestry – Low (commercial forestry only).

A6.3.9 Route Option H

This route does not cross any landscape designations of regional, national or international importance. The route runs through a landscape dominated by commercial forestry, although the future baseline would also include the turbines from the consented wind farms.

Heading south-west from the proposed Troston Loch POC the route crosses the undulating landscape through commercial forestry for approximately 3.9 km. This route follows an undulating path to the south of Kilnair Hill (329 m AOD), Glenshimmeroch Hill (343 m AOD) and Garlaffin (327 m AOD). The route crosses the upper southern slopes of Glenshimmeroch Hill before connecting with the proposed Glenshimmeroch collector substation from the east. This route crosses four watercourses.

It is considered unlikely that any significant landscape effects would be identified should the development be located within Route Option H. Overall the sensitivity of the landscape to the proposed development has been judged as low.

The perceptibility of Route Option H would largely depend on the rotational nature of the commercial forestry within the vicinity of the route, particularly to the south and east.

Whilst this route option does cross some of the higher ground within the study area, it avoids proximity to residential properties and recreational receptors. The development would be generally screened to views from within the north and west of the study area by intervening landform; and is unlikely to be perceptible from either the SUW or the National Byway Cycle Route. The properties at Glenshimmeroch are 780 m south of the proposed connection point and currently separated by mature trees adjacent to the properties and forestry.

The eastern and central sections (segments 11 and 12) of this route option are within close proximity to the consented wind farms and as such parts of the forestry is likely to be cleared and the OHL would often be viewed within the context of the consented turbines.

It is not anticipated that any residential or recreational receptors would experience significant visual effects.

With respect to the criteria detailed above the susceptibility of Route Option H has been judged as follows:

- Landscape Sensitivity – Low;
- Residential Amenity – Low;
- Visual Amenity – Low;
- Landscape Designations – None;
- Length of corridor – 3.9 km; and
- Forestry – Low (commercial forestry only).

A6.3.10 Route Option I

This route does not cross any landscape designations of regional, national or international importance. The western half of the route runs through a landscape dominated by commercial forestry, although the future baseline would also include the turbines from the consented wind farms.

Heading north-east from the proposed Troston Loch POC across approximately 450 m of commercial forestry land, this route heads to the south-western slopes of Lochlee Hill, before turning to the north-west and then directly west across approximately 2.5 km of moorland landscape. The route then crosses Black Water burn before looping to the south-west through a further 1.9 km of commercial forestry and connecting with the proposed Glenshimmeroch collector substation. This route follows an undulating path between 240 m and 330 m AOD with the higher plateaus of Meikle Bennan (344 m AOD), Garlaffin (327 m AOD) and Glenshimmeroch Hill (343 m AOD) all to the south of the route. This route crosses between seven to eight watercourses.

It is considered unlikely that any significant landscape effects would be identified should the development be located within Route Option I. The main landscape effects would likely arise from the introduction of the OHL into the 2.5 km section (segments 18 – 21) of untouched moorland landscape and across a small number of watercourses. Overall the sensitivity of the landscape to the proposed development has been judged as low.

Route Option I would be perceptible from the residential properties Fingland and Auchenshinnoch. The property at Fingland, in particular, would have views of a considerable stretch of the eastern section of the OHL, but from a minimum distance of

400 m. The properties at Glenshimmeroch are 780 m south of the proposed connection point and currently separated by mature trees adjacent to the properties and forestry. This route option would be visible from an approximate 4 km section of the National Byway Cycle Route and the western end of Route Option I would be visible to users of the SUW.

Route Option I benefits from not being on the higher ground within the study area and as such would often be backclothed by landform; and also the commercial forestry when it is in close proximity to it. This route option would benefit from greater visual screening and backclothing when the commercial forestry in the vicinity of the route is mature. This route option would be screened from all views from the south of the higher ground located within the centre of the study area.

It is not anticipated that any residential receptors would experience significant visual effects; there would likely be localised non-significant effects on users of the National Byway Cycle Route.

With respect to the criteria detailed above the susceptibility of Route Option I has been judged as follows:

- Landscape Sensitivity – Low;
- Residential Amenity – Low;
- Visual Amenity – Low;
- Landscape Designations – None;
- Length of corridor – 5 km; and
- Forestry – Low (commercial forestry only).

A6.3.11 Route Option J

This route does not cross any landscape designations of regional, national or international importance. The western half of the route runs through a landscape dominated by commercial forestry, although the future baseline would also include the turbines from the consented wind farms.

The routes heads north-west from the proposed Troston Loch POC across approximately 280 m of commercial forestry land, before crossing approximately 2.5 km of moorland landscape first heading northerly to the east of Lochwinnie Hill, before turning directly westwards. The route then crosses Black Water burn before looping to the south-west through a further 1.9 km of commercial forestry and connecting with the proposed Glenshimmeroch collector substation. This route follows an undulating path between 240 m and 330 m AOD with the higher plateaus of Meikle Bennan (344 m AOD), Garlaffin (327 m AOD) and Glenshimmeroch Hill (343 m AOD) all to the south of the route. This route crosses between seven to eight watercourses.

It is considered unlikely that any significant landscape effects would be identified should the development be located within Route Option J. The main landscape effects would likely arise from the introduction of the OHL into the 2.5 km section (segments 16, 18 – 21) of untouched moorland landscape and across a small number of watercourses. Overall the sensitivity of the landscape to the proposed development has been judged as low.

Route Option J would be perceptible from the residential properties Fingland and Auchenshinnoch. The property at Fingland, in particular, would have views of a considerable stretch of the eastern section of the overhead line, but from a minimum distance of 400 m. The properties at Glenshimmeroch are 780 m south of the proposed connection point and currently separated by mature trees adjacent to the properties and forestry. This route option would be visible from an approximate 4 km section of the National Byway Cycle Route and the western end of Route Option J would be visible to users of the SUW.

Route Option J benefits from not being on the higher ground within the study area and as such would often be backclothed by landform; and also the commercial forestry when it is in close proximity to it. This route option would benefit from greater visual screening and backclothing when the commercial forestry in the vicinity of the route is mature. This route option would be screened from all views from the south and east of the higher ground located within the centre of the study area.

It is not anticipated that any residential receptors would experience significant visual effects; there would likely be localised non-significant effects on users of the National Byway Cycle Route.

With respect to the criteria detailed above the susceptibility of Route Option J has been judged as follows:

- Landscape Sensitivity – Low;
- Residential Amenity – Low;
- Visual Amenity – Low;
- Landscape Designations – None;
- Length of corridor – 4.7 km; and
- Forestry – Low (commercial forestry only).

A6.3.12 Summary

From a landscape perspective there is very little separating the different route options, with all routes crossing a broadly identical landscape with equal susceptibility to adverse landscape impacts. However, there is a slight preference to retain the route on the slopes of Glenshimmeroch and avoid crossing the valley floor, watercourses and unnamed local road within the north of the study area.

From a visual amenity perspective there is little separating the different route options, due to the lack of visual receptors within the study area and its vicinity. Any routes which can either run adjacent to, or through, areas of commercial forestry would benefit from screening and backclothing.

Route Options A, B, F, G and H are all equally preferred with very little likelihood of creating significant effects upon landscape character or visual amenity. Route Option C, whilst still a viable option, is the least preferred as it is the closest route option to residential receptors, the SUW and the National Byway Cycle Route; whilst being the furthest from the commercial forestry. From a landscape character perspective Route Option C crosses open moorland in contrast to the other routes which primarily cross commercial forestry and consented wind farm development land.

Table A6.3.1: Route preference from a landscape and visual amenity perspective

Route Option	Landscape and visual amenity preferability
A	Preferred route
B	Preferred route
C	Least preferred route, but still viable with limited anticipated landscape and visual impacts
D	Acceptable route with minimal anticipated landscape and visual impacts
E	Acceptable route with minimal anticipated landscape and visual impacts
F	Preferred route
G	Preferred route
H	Preferred route
I	Acceptable route with minimal anticipated landscape and visual impacts
J	Acceptable route with minimal anticipated landscape and visual impacts

A6.5 Hydrology, Hydrogeology, Geology and Soils

A6.5.1 General study area

The main geological, hydrological and peat-related interests and constraints identified within the study area are covered in Appendix 4 (Section A4.5). The main sensitivities that require consideration are private water supply (PWS) intakes and infrastructure, surface watercourses and waterbodies, and areas of peatland. The study area has a high risk of flooding along the Black Water watercourse channel, and across a wider area of flat ground at the base of Lochwhinnie Hill.

One PWS intake (for Glenshimmeroch) is located 250 m south-east of the proposed Glenshimmeroch Collector Substation. This intake is located downslope of the substation and therefore any development at this location will require careful management to avoid impacts to the water supply source. All routes are affected by this.

There are no specific sensitivities relating to bedrock or superficial geology that have influence on the routeing options. As groundwork for OHLs is minimal, there are also no specific sensitivities relating to groundwater or potential GWDTE that need to be considered.

The following sections discuss the level of interaction for each route option, with any key sensitivities identified.

A6.5.2 Route Option A

Route Option A includes between seven and eight watercourse crossings. One short section of up to 70 m of Class 1 peatland is present within route segment 2, although this is fully avoidable by careful route planning. A small area of peat over 2.5 m deep has been identified in part of segments 23 and 1, although this may be avoidable by careful design.

Route Option A (segments 2 and 3) passes close to the northern extent of the wider area shown to be at high risk of flooding at the base of Lochwhinnie Hill, and crosses the watercourse channel where high flood risk is shown to be confined to the immediate area of the watercourse.

A6.5.3 Route Option B

Route Option B has between six and seven watercourse crossings. As with Route Option A, one short section of up to 70 m of Class 1 peatland is present within route segment 2, although this is fully avoidable by careful route planning. A small area of peat over 2.5 m deep has been identified in part of segments 23 and 1, although this may be avoidable by careful design.

Route Option B (segments 2 and 3) passes close to the northern extent of the wider area shown to be at high risk of flooding at the base of Lochwhinnie Hill, and crosses the watercourse channel just beyond this where high flood risk is shown to be more widespread than the immediate area of the watercourse.

Route Option B (segment 6) passes upslope of the Glenshimmeroch PWS intake, with a minimum separation of 250 m from the intake location.

A6.5.4 Route Option C

Route Option C has between nine and ten watercourse crossings and between 840 and 1,190 m of blanket peat or Classes 1 or 2 peatland dependent on the route positioning. A small area of peat over 2.5 m deep has been identified in part of route segments 23 and 1, although this may be avoidable by careful design.

Route Option C avoids the large area at high risk of flooding but crosses the Fingland Lane and Black Water watercourses, which are both shown to be at risk of flooding.

A6.5.5 Route Option D

Route Option D has between seven and nine watercourse crossings and between 700 and 990 m of blanket peat or Classes 1 or 2 peatland dependent on the route positioning. A small area of peat over 2.5 m deep has been identified in part of route segments 23 and 1, although this may be avoidable by careful design.

Route Option D avoids the large area at high risk of flooding but crosses the Fingland Lane and Black Water watercourses, which are both shown to be at risk of flooding.

A6.5.6 Route Option E

Route Option E has between six and eight watercourse crossings and between 700 and 990 m of blanket peat or Classes 1 or 2 peatland dependent on the route positioning. A

small area of peat over 2.5 m deep has been identified in part of route segments 23 and 1, although this may be avoidable by careful design.

Route Option E follows a similar route to Route Option D, crossing the Fingland Lane and Black Water watercourses at the same locations.

Route Option E (segment 6) passes upslope of the Glenshimmeroch PWS intake, with a minimum separation of 250 m from the intake location.

A6.5.7 Route Option F

Route Option F has nine watercourse crossings and between 170 and 270 m of blanket peat or Classes 1 or 2 peatland dependent on the route positioning. A small area of peat over 2.5 m deep has been identified in part of route segments 23 and 1, although this may be avoidable by careful design.

Route Option F passes close to the northern and western extents of the wider area shown to be at high risk of flooding at the base of Lochwhinnie Hill, and crosses the watercourse channel just beyond this where high flood risk is shown to be more widespread than the immediate area of the watercourse (where segment 2 turns into segment 10).

Route Option F passes upslope of the Glenshimmeroch PWS intake, with a minimum separation of 150 m from the intake location.

A6.5.8 Route Option G

Route Option G has seven watercourse crossings and between 200 and 560 m of blanket peat or Classes 1 or 2 peatland dependent on route positioning. A small area of peat up to 1.5 m deep has been identified in part of segment 11, although this may be avoidable by careful design.

Route Option G (segment 11) crosses the Black Water watercourse further upstream than Routes A – F, at a location where the area at high risk of flooding is minimal.

Route Option G (segment 15) passes upslope of the Glenshimmeroch PWS intake, with a minimum separation of 150 m from the intake location.

A6.5.9 Route Option H

Route Option H has four watercourse crossings and between 200 and 560 m of blanket peat or Classes 1 or 2 peatland. A small area of peat up to 1.5 m deep has been identified in part of segment 11, although this may be avoidable by careful design.

Route Option H (segment 11) crosses the Black Water watercourse at the same location as Route Option G, at a location where the area at high risk of flooding is minimal.

Route Option H (segment 15) passes upslope of the Glenshimmeroch PWS intake, with a minimum separation of 150 m from the intake location.

A6.5.10 Route Option I

Route Option I has between 7 and 12 watercourse crossings and between 1.0 and 1.6 km of blanket peat or Classes 1 or 2 peatland dependent on route positioning. A small area of peat up to 2.5 m deep has been identified in part of segment 17, although this should be avoidable by careful design.

Route Option I (segments 21 and 3) crosses the Black Water channel a short distance beyond the wider area shown to be at high risk of flooding, with the crossing at a location where high flood risk is shown to be more widespread than the immediate area of the watercourse.

A6.5.11 Route Option J

Route Option J has between 9 and 14 watercourse crossings and between 1.2 and 1.7 km of blanket peat or Classes 1 or 2 peatland dependent on route positioning. A small area of peat over 2.5 m deep has been identified in part of segments 23 and 1, although this may be avoidable by careful design.

Route Option J (segments 21 and 3) crosses the Black Water channel a short distance beyond the wider area shown to be at high risk of flooding, with the crossing at a location where high flood risk is shown to be more widespread than the immediate area of the watercourse.

A6.5.12 Summary

Table A6.5.1: Route preference from a hydrology, geology and peat perspective

Route Option	Hydrology, geology and peat preferability
A	**Route Option A is the preferred route.** Route Option A includes seven to eight watercourse crossings. A small area of potentially avoidable peat is present within the route corridor.
B	Route Option B includes six to seven watercourse crossings. A small area of potentially avoidable peat is present within the route corridor. The route is approximately 250 m upslope from a PWS intake.
C	Route Option C has between nine and ten watercourse crossings and between 840 and 1,190 m of blanket peat or Class 1/2 peatland.
D	Route Option D has between seven and nine watercourse crossings and between 700 and 990 m of blanket peat or Class 1/2 peatland.
E	Route Option E has between six and eight watercourse crossings between 700 and 990 m of blanket peat or Class 1/2 peatland. The route is approximately 250 m upslope from a PWS intake.
F	Route Option F has nine watercourse crossings, between 170 and 270 m of blanket peat or Class 1/2 peatland. The route is approximately 150 m upslope from a PWS intake.
G	Route Option G has seven watercourse crossings and between 200 and 560 m of blanket peat or Class 1/2 peatland. The route is approximately 150 m upslope from a PWS intake.

Route Option	Hydrology, geology and peat preferability
H	Route Option H has four watercourse crossings and between 200 and 560 m of blanket peat or Class 1/2 peatland. The route is approximately 150 m upslope from a PWS intake.
I	Route Option I has between 7 and 12 watercourse crossings and between 1.0 and 1.6 km of blanket peat or Class 1/2 peatland. A small area of potentially avoidable peat is present within the route corridor.
J	Route Option J has between 9 and 14 watercourse crossings and between 1.2 and 1.7 km of blanket peat or Class 1/2 peatland.

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 Glenshimmeroch substation collector point and the Troston Loch Wind Farm POC. There are existing forestry tracks that cross all the proposed route options and the SUW that crosses Route Option C (route segment 9). 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 commercial forestry in the western section of the study area (marked as route segments 3, 4 and 5 on Figure 13 in Appendix 1) and can partially utilise the existing forestry tracks. However, additional access tracks may have to be constructed to allow access to the proposed OHL route, or consideration given to the use of trackway panels, and/or 4x4/low tyre pressure vehicles, if appropriate. Where no existing tracks are present further tree removal and ground condition surveys may be required.

Segments 23, 1 and 2 shown on Figure 13 bypasses Lochwinnie Hill along its southern side to then cut across the Clachandow Rig in a westward direction. No existing forestry tracks are present therefore additional access tracks may have to be constructed to allow access to the proposed OHL route, or consideration given to the use of trackway panels, and/or 4x4/low tyre pressure vehicles, if appropriate. Further ground condition surveys may be required to establish potential routes for vehicles. Additionally, steeper gradients on the hill sides might have an adverse impact on construction traffic access.

A6.6.3 Route Option B

Route Option B passes through commercial forestry in the western section of the study area (marked as segments 3, 4 and 6 on Figure 13). However, no existing forestry tracks are available therefore additional access tracks may have to be constructed to allow access to the proposed OHL route, or consideration given to the use of trackway panels, and/or 4x4/low tyre pressure vehicles, if appropriate. Further tree removal and ground condition surveys may be required.

Segments 23, 1 and 2 match Route Option A and its assessment above.

A6.6.4 Route Option C

Route Option C passes through the northern section of the study area (marked as segments 20, 22, 7 and 9 on Figure 13) north of the U141S and cuts through the SUW (segment 9), no existing tracks are available therefore additional access tracks may have to be constructed to allow access to the proposed OHL route or consideration given to the use of trackway panels, and/or 4x4/low tyre pressure vehicles, if appropriate. Further ground condition surveys will be required. Topography is generally undulating over these segments.

Segments 23 and 1 shown on the Figure 13 traverse Lochwinnie Hill along its southern and western side. Joining Segment 22 it then turns in a northerly direction to connect to Segment 20 across the U141S, and then runs parallel to the road (segment 7). No existing fracks are present therefore additional access tracks may have to be constructed to allow access to the proposed OHL route, or consideration given to the use of trackway panels, and/or 4x4/low tyre pressure vehicles, if appropriate. Further ground condition surveys will be required. Additionally, steeper gradients on the hill sides might have an adverse impact on construction traffic access. However, Route Option C can utilise the U141S as principal access.

A6.6.5 Route Option D

Route Option D passes through commercial forestry area in the western section of the study area (marked as segments 8, 4 and 5 on Figure 13), Partial use of the existing forestry tracks might be possible (segment 5 on Figure 13). However, no existing forestry tracks are available in segments 8 and 4 therefore additional access tracks will have to be constructed to allow access to the proposed OHL route or consideration given to the use of trackway panels, and/or 4x4/low tyre pressure vehicles, if appropriate. Further tree removal and ground condition surveys will be required.

Route segments 23 and 1 shown on the Figure 13 bypass Lochwinnie Hill along its southern and western side to then cut through in a northward direction across the U141S (utilising Segments 22 and 20) and join Segment 7 along the U141S's northern verge. No existing forestry tracks are present therefore additional access tracks will have to be constructed to allow access to the proposed OHL route or consideration given to the use of trackway panels, and/or 4x4/low tyre pressure vehicles, if appropriate. Further ground condition surveys will be required. Additionally, steeper gradients on the hill sides might have an adverse impact on construction traffic access.

A6.6.6 Route Option E

Route Option E passes through commercial forestry in the western section of the study area (marked as segments 8, 4 and 6 on Figure 13), Partial use of the existing forestry tracks might be possible (Segment 5 on Figure 13). However, where no existing forestry tracks are available (segments 8 and 4) additional access tracks may have to be constructed to allow access to the proposed OHL route or consideration given to the use of trackway panels, and/or 4x4/low tyre pressure vehicles, if appropriate. Further tree removal and ground condition surveys will be required.

Segments 23, 1, 22, 20 and 7 match Route Option D and its assessment above.

A6.6.7 Route Option F

Route Option F passes through segments 23, 1 and 2 shown on the Figure 13 and they bypass Lochwinnie Hill along its southern side (segment 1) to then cut across the Clachandow Rig in a westward direction (segment 2). No existing forestry tracks are present therefore additional access tracks may have to be constructed to allow access to the proposed OHL route or consideration given to the use of trackway panels, and/or 4x4/low tyre pressure vehicles, if appropriate. Further ground condition surveys will be required. Additionally, steeper gradients on the hill sides might have an adverse impact on construction traffic access.

Segments 10, 14 and 15 pass through commercial forestry in the central section of the study area. Partial use of the existing forestry tracks is possible, however, where no tracks are available additional access tracks may have to be constructed or consideration given to the use of trackway panels, and/or 4x4/low tyre pressure vehicles, if appropriate. Further tree removal and ground condition surveys will be required.

A6.6.8 Route Option G

Route Option G passes through segments 11, 13, 14 and 15 shown on the Figure 13. Segment 11 passes through commercial forestry where limited forestry access tracks are available. Potential use of the proposed access tracks for the Troston Loch and Glenshimmeroch Wind Farms might be possible, however, where no tracks are available new tracks may have to be constructed or consideration given to the use of trackway panels, and/or 4x4/low tyre pressure vehicles, if appropriate. Further ground condition surveys will be required.

Segments 13, 14 and 15 pass through commercial forestry in the central section of the study area. Partial use of the existing forestry tracks is possible (segments 14 and 15), however, where no tracks are available additional access tracks may have to be constructed or consideration given to the use of trackway panels, and/or 4x4/low tyre pressure vehicles, if appropriate. Further tree removal and ground condition surveys will be required.

A6.6.9 Route Option H

Route Option H passes through segments 11, 12 and 15 shown on the Figure 13. Segment 11 passes through commercial forestry where limited forestry access tracks are available. Potential use of the proposed access tracks for the Troston Loch and Glenshimmeroch Wind Farms might be possible, however, where no tracks are available new tracks will have to be constructed or consideration given to the use of trackway panels, and/or 4x4/low tyre pressure vehicles, if appropriate. Further ground condition surveys will be required.

Segments 12 and 15 pass through the commercial forestry in the southern section of the study area. Partial use of the existing forestry tracks is possible (segment 15), however, where no tracks are available additional access tracks will have to be constructed or consideration given to the use of trackway panels, and/or 4x4/low tyre pressure vehicles, if appropriate. Further tree removal and ground condition surveys will be required.

A6.6.10 Route Option I

Route Option I passes through the eastern and northern section of the study area (marked as segments 17, 18 and 19 on Figure 13) in the northern direction towards the U141S and joins with Segments 20 and 21 to then join with Segments 3, 4 and 5 and pass through commercial forestry in the western section of the study area.

Segments 17 and 18 pass along the western side of the Lochlee Hill where no existing tracks are available therefore, additional access tracks may have to be constructed to allow access to the proposed OHL route or consideration given to the use of trackway panels, and/or 4x4/low tyre pressure vehicles, if appropriate. Further ground condition surveys will be required. Additionally, steeper gradients on the hill sides might have an adverse impact on construction traffic access. Potential tree removal might be required in a section of Segment 17.

Segments 19, 20 and 21 align with the U141S therefore those could be utilised for access.

Segments 3, 4 and 5 match Route Option A and its assessment above.

A6.6.11 Route Option J

Route Option J passes through the eastern and northern section of the study area (marked as segments 23, 16, 18, 19, 20 and 21 on Figure 13) in the northern direction towards and along the U141S and joins with Segments 3, 4 and 5 and passes through commercial forestry in the western section of the study area.

Segments 23, 16 and 18 pass between Lochwinnie Hill and Lochlee Hill where no existing tracks are available therefore, additional access tracks may have to be constructed to allow access to the proposed OHL route or consideration given to the use of trackway panels, and/or 4x4/low tyre pressure vehicles, if appropriate. Further ground condition surveys will be required.

Segments 19, 20 and 21 align with the U141S therefore those could be utilised for access.

Segments 3, 4 and 5 match Route Option A and its assessment above.

A6.6.12 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 C is the preferred option as it may potentially utilise the U141S, with access along much of the OHL route from here using new access tracks or trackway panels and/or 4x4/low tyre pressure vehicles, if appropriate. It will therefore have potentially the lowest impact on the provision of new tracks with potentially/relatively minimal requirement for upgrades to the existing and proposed tracks as well as woodland area removal. Additionally, any adverse impacts on the existing traffic/movements along those tracks can be mitigated by a Construction Traffic Management Plan (CTMP) if such arise.

Table A6.6.1: Route preference from a Traffic and Transport perspective

Route Option	Traffic and Transport preferability
A	Route Option A can partially utilise the existing forestry tracks, however additional tracks may have to be constructed or potentially trackway panels can be used as a substitute (ground condition dependant). Segment 2 pass through the Lochwinnie Hill and Clachandow Rig and therefore would have steeper gradients than Route Option C and be more difficult to access.
B	Route Option B follows same route as Option A (segments 23, 1, 2, 3 and 4), and can partially utilise the existing forestry tracks, however additional tracks may have to be constructed or potentially trackway panels can be used as a substitute (ground condition dependant). Use of segment 6 might require additional tree removal therefore resulting in additional construction traffic. Segment 2 pass through the Lochwinnie Hill and Clachandow Rig and therefore would have steeper gradients than Route Option C and be more difficult to access.
C	Route Option C can utilise the U141S as principal access. New tracks required between U141S and the OHL, POC and collector substation may be required or potentially trackway panels as a substitute (ground condition dependant). Similar, to Route Options A and B it follows a route through segment 1 where steeper gradients might be expected however those should be of a lesser impact than for Options A and B.
D	Route Option D can potentially utilise U141S. Similarly, to Route Options A, B and C it follows through segment 1 where steeper ground might be expected and additionally follows segments 8, 4 and 5 where no existing tracks are present therefore further tree removal and additional construction traffic will be generated. Therefore, it is expected that this route might have a higher impact than Option C.
E	Route Option E can potentially utilise U141S. Similarly, to Route Options A, B, C and D it follows through segment 1 where steeper ground might be expected and additionally follows segments 8, 4 and 6 where no existing tracks are present therefore further tree removal and additional construction traffic will be generated. Therefore, it is expected that this route might have a higher impact than Option C.
F	Route Option F can partially utilise the proposed access tracks for the Glenshimmeroch Wind Farm as well as small sections of exiting forestry tracks, however additional tracks may have to be constructed or potentially trackway panels can be used as a substitute (ground condition dependant). Segment 2 pass through the Lochwinnie Hill and Clachandow Rig and therefore would have more of steeper gradients than Route Option C and be more difficult to access. Tree removal might be required as well as ground condition surveys.

Route Option	Traffic and Transport preferability
G	Route Option G can partially utilise the proposed access tracks for the wind farm as well as small sections of exiting forestry tracks, however additional tracks may have to be constructed or potentially trackway panels can be used as a substitute (ground condition dependant). Tree removal might be required as well as ground condition surveys.
H	Route Option H can partially utilise the proposed access tracks for wind farm as well as small sections of exiting forestry tracks, however additional tracks may have to be constructed or potentially trackway panels can be used as a substitute (ground condition dependant). Tree removal might be required as well as ground condition surveys.
I	Route Option I can utilise the U141S as principal access. New tracks required between U141S and the OHL, POC and collector substation may be required or potentially trackway panels as a substitute (ground condition dependant). Tree removal might be required as well as ground condition surveys.
J	Route Option J can utilise the U141S as principal access. New tracks required between U141S and the OHL, POC and collector substation may be required or potentially trackway panels as a substitute (ground condition dependant).

A6.7 Land Use and Recreation

A6.7.1 General study area

The route options pass through land which is currently used as either rough grazing land or commercial forestry. Part of the study area is planned for wind farm development. No formal recreation facilities or activities are located or take place within the study area, however the SUW and the National Byway Cycle Route pass through the study area. The SUW is a nationally important core path which is considered to be sensitive, and should be avoided if possible.

A6.7.2 Route Option A

Route Option A segments 1 and 2 pass through mostly rough grazing land (marshy grassland) while segments 23, 3, 4 and 6 pass through commercial forestry. Although the route passes through grazing land, it unlikely to have large impact on grazing apart from during the temporary construction stage. The impacts on forestry are discussed in Section A6.8.

Segment 23 and the initial part of segment 1 is part of the Troston Loch Wind Farm and the route passes between a proposed turbine and meteorological mast. Segments 3,4 and 5 are within the boundary of the Glenshimmeroch Wind Farm but avoid most of the proposed wind farm infrastructure apart from a wind farm track and potential borrow pit.

As noted within Section A6.3, this route option would be visible from an approximate 3-4 km section of the National Byway Cycle Route and only the western end (segment 5) of Route Option A would be visible to users of the SUW. Segments 3 and 4 are largely screened from views by forestry. There would likely be localised non-significant visual effects on users of the National Byway Cycle Route.

A6.7.3 Route Option B

The initial part of Route Option B is the same as Route Option A, following segments 23 and 1 to 4. The route then turns into segment 6 which passes to the east of Garlaffin. Segment 6 still avoids the majority of the Glenshimmeroch Wind Farm infrastructure apart from requiring the crossing of a wind farm track.

Although segments 1 and 2 of this route option are likely to be visible from the National Byway Cycle Route for approximately 3-4 km section, as segment 6 passes to the east of Garlaffin, views of this segment from the National Byway Cycle Route and the SUW would be blocked by forestry and landform. There would likely be localised non-significant visual effects on users of the National Byway Cycle Route.

A6.7.4 Route Option C

Route Option C follows segments 23 and 1 as per Route Option A and B before diverging north via segments 22, 20 and 7 and south via segment 9. Segments 1, 22, 20, 7 and 9 consist of rough grazing land. This route option mostly avoids the wind farm sites apart from at the start and the end where the route connects with the Troston POC and the Glenshimmeroch collector point.

This route requires both the National Byway Cycle Route and the SUW to be crossed twice. The national importance and high sensitivity of the SUW from a recreation and tourism perspective make the crossing of this pathway (particularly since it requires the SUW to be crossed twice) undesirable and should be avoided if possible. As noted in Section A6.3, there would be potentially localised significant effects on users of the National Byway Cycle Route and SUW.

A6.7.5 Route Option D

Route Option D is initially the same as Route Option C, following segments 23, 1, 22, 20 and 7, before veering off south at segment 8 and then along segment 4 and 5. This route option would affect both grazing land (segments 1, 22, 20, 7 and part of 8) and commercial forestry (segments 8, 4 and 5).

This route option would avoid crossing the SUW, although the National Byway would still need to be crossed twice (within segments 7 and 8). This route option would be visible from an approximate 2.5-3 km section of the National Byway Cycle Route and only the western end (segment 5) of Route Option D would be visible to users of the SUW. Once the route is within the forestry, the OHL is likely to be screened from views. As noted in Section A6.3, there would potentially be localised significant visual effects on users of the National Byway Cycle Route.

A6.7.6 Route Option E

Route Option E is the same as Route Option D for the most part apart from the last segment where it turns to segment 6 rather than segment 5. Segment 6 is located within forestry and is further away from the SUW and National Byway than segment 5. As noted in Section A6.3, there would potentially be localised significant visual effects on users of the National Byway Cycle Route.

A6.7.7 Route Option F

The initial part of Route Option F is the same as Route Option A (segments 23, 1 and 2) affecting grazing land. The Route Option then passes through segments 10, 14 and 15. These segments take the route through commercial forestry and through the middle of the consented Glenshimmeroch turbines, requiring wind farm tracks to be crossed twice.

As indicated in Section A6.3, this route option would be visible from an approximate 2.5-3 km section of the National Byway Cycle Route, but it is unlikely to be perceptible for users of the SUW. Segments 10, 14 and 15 are quite a distance from the National Byway Cycle Route, SUW and other core paths and the OHL would be screened from views by the land form and forestry. It is not anticipated that any recreational receptors would experience significant visual effects.

A6.7.8 Route Option G

Route Option G segments 11 and 13 run south from the Troston Loch POC through the Troston Loch Wind Farm and the Glenshimmeroch Wind Farm. Following segment 13, the route joins segment 14 and from here on is the same as Route Option F. The current land use is commercial forestry while the proposed land use is the wind farm development. Route Option G would take the route through areas of wind turbines and require a number of wind farm tracks to be crossed.

All of the segments are a considerable distance from the National Byway Cycle Route, SUW and other core paths and for the most part the OHL would be screened from views by the land form and forestry. It is not anticipated that any recreational receptors would experience significant visual effects.

A6.7.9 Route Option H

The initial part of Route Option H is the same as Route Option G (segment 11) as is the end of the route (segment 15). Segment 12 passes through the east of Kilnair Hill before joining with segment 15. This results in the route passing in between fewer turbines and crossing fewer wind farm tracks.

Although segment 12 brings the route option a little closer to the Margree core path than Route Option G, it is still a considerable distance away and some screening would be afforded by the forestry. It is not anticipated that any recreational receptors would experience significant visual effects.

A6.7.10 Route Option I

Route Option I segment 17 runs north from the Troston Loch POC through the Troston Loch Wind Farm before heading west to segment 18. Segment 17 runs between two of the consented Troston Loch turbines and would require a wind farm track to be crossed. While the current land use is forestry, the proposed land use is wind farm development. Segments 18, 19, 20 and 21 pass through rough grazing land before joining with segment 3 and from here on the route is the same as for Route Option A, running through commercial forestry.

This route requires the National Byway Cycle Route to be crossed at least twice. As indicated in Section A6.3, this route option would be visible from an approximate 4 km section of the National Byway Cycle Route and the western end of Route Option I would be visible to users of the SUW. Section A6.3 notes that there would likely be localised non-significant effects on users of the National Byway Cycle Route.

A6.7.11 Route Option J

Route Option J segment 23 runs west from the Troston Loch POC to segment 16 which runs north around the western side of a consented Troston Loch turbine. Segment 16 then joins up with segment 18 and from here on the route is the same as Route Option I. This route option affects grazing land and commercial forestry.

As with Route Option I, this route would require the National Byway Cycle Route to be crossed at least twice, and would be visible from an approximate 4 km section of the National Byway Cycle Route and the western end of Route Option I would be visible to users of the SUW. As noted in Section A6.3, there would likely be localised non-significant effects on users of the National Byway Cycle Route.

A6.7.12 Summary

Route Option C is the least preferred route as it requires the SUW and the National Byway Cycle Route to be crossed. The SUW is a nationally important core path which is considered to be sensitive, and should be avoided if possible. Route Options A, B, F, G and H would have minimal or only localised non-significant visual effects on users of the recreational paths. These route options are therefore the preferred route options in terms of land use and recreation.

Table A6.7.1: Route preference from a Land Use and Recreation perspective

Route Option	Land use and recreation preferability
A	Existing land use includes rough grazing land and commercial forestry. The route avoids most of the wind farm infrastructure apart from crossing one wind farm track and potential borrow pit. There would likely be localised non-significant visual effects on users of the National Byway Cycle Route.
B	Existing land use includes rough grazing land and commercial forestry.

Route Option	Land use and recreation preferability
	The route avoids most of the wind farm infrastructure apart from crossing one wind farm track. There would likely be localised non-significant visual effects on users of the National Byway Cycle Route.
C	Existing land use includes mainly rough grazing land. The route mostly avoids the wind farm sites. The route would require the National Byway Cycle Route and the SUW to be crossed in two locations. As the SUW is a nationally significant core path, this option should be avoided if possible. There would be potentially localised significant visual effects on users of the National Byway Cycle Route and SUW.
D	Existing land use includes rough grazing land and commercial forestry. The route avoids most of the wind farm infrastructure apart from crossing one wind farm track and potential borrow pit. The route would require the National Byway Cycle Route to be crossed in two locations. There would potentially be localised significant effects on users of the National Byway Cycle Route.
E	Existing land use includes rough grazing land and commercial forestry. The route avoids most of the wind farm infrastructure apart from crossing one wind farm track. The route would require the National Byway Cycle Route to be crossed in two locations. There would potentially be localised significant visual effects on users of the National Byway Cycle Route.
F	Existing land use includes rough grazing land and commercial forestry. The route passes between proposed turbines and crosses wind farm tracks. Views of the OHL are from the National Byway, SUW and core paths are likely to be screened by land form and forestry and significant visual effects on recreational receptors are not anticipated.
G	Existing land use includes commercial forestry. The route passes between proposed turbines and crosses wind farm tracks. Views of the OHL are from the National Byway Cycle Route, SUW and core paths are likely to be screened by land form and forestry and significant visual effects on recreational receptors are not anticipated.
H	Existing land use includes commercial forestry. The route passes between proposed turbines and crosses wind farm tracks. Views of the OHL are from the National Byway Cycle Route, SUW and core paths are likely to be screened by land form and forestry

Route Option	Land use and recreation preferability
	and significant visual effects on recreational receptors are not anticipated.
I	Existing land use includes rough grazing land and commercial forestry. The route passes between proposed turbines and crosses a wind farm track. The route would require the National Byway Cycle Route to be crossed in two locations. There would potentially be localised significant visual effects on users of the National Byway Cycle Route.
J	Existing land use includes rough grazing land and commercial forestry. The route would require the National Byway Cycle Route to be crossed in two locations. There would potentially be localised significant visual effects on users of the National Byway Cycle Route.

A6.8 Forestry

A6.8.1 General study area

As mentioned in A4.8.2.1, approximately 63% of the study area is covered by forestry. Between the extent of the forestry coverage and the planned wind farm infrastructure at both Glenshimmeroch and Troston Loch, the options to avoid forestry within the study area are limited.

As can be seen on Figures 14A-J in Appendix 1, of the 23 route segments, 7 do not traverse through any forestry, these are all located within the northern most part of the study area.

At this stage, the preferred option from a forestry perspective would be to favour the route with least impact to the standing forest crops that will remain once the wind farms have been constructed and the forestry mitigation measures have been implemented (compensatory planting). In order to determine this objectively, the potential OHL route options were overlain atop the post-construction and mitigation forestry plans for both Glenshimmeroch Wind Farm and Troston Loch Wind Farm in order to provide an indication of the area within each route segment that would be covered with forestry post wind-farm-construction. Please note these areas were digitised from georeferenced pdf files of the forestry plans for both Glenshimmeroch and Troston Loch Wind Farms and are indicative only; this was considered the most practical approach for route option comparison purposes and is not intended to be extremely accurate. Areas have therefore been calculated in hectares and rounded to two decimal places. Accurate calculations of the required area(s) of forestry removal would be conducted once a detailed OHL design has been generated following EIA Screening, and is not considered necessary at this stage for optioneering purposes. Please note that the route options did not include any forestry falling within the Margree Wind Farm boundary and therefore Margree forestry is excluded from this analysis and discussion.

Table A6.8.1: Area of forestry present within each route segment (route segments are shown on Figures 14 and 15 in Appendix 1)

Route segment	Area (ha) covered by forestry within route segment	Forest
1	0.60	Troston
2	0.00	None
3	10.06	Glenshimmeroch & Kilnair
4	6.42	Glenshimmeroch & Kilnair
5	15.55	Glenshimmeroch & Kilnair
6	12.09	Glenshimmeroch & Kilnair
7	0.00	None
8	1.21	Glenshimmeroch & Kilnair
9	0.00	None
10	5.45	Glenshimmeroch & Kilnair
11	11.34	Troston and Glenshimmeroch & Kilnair
12	8.98	Glenshimmeroch & Kilnair
13	4.76	Glenshimmeroch & Kilnair
14	4.5	Glenshimmeroch & Kilnair
15	11.89	Glenshimmeroch & Kilnair
16	0.78	Troston
17	8.21	Troston
18	0.00	None
19	0.00	None
20	0.00	None
21	0.61	Glenshimmeroch
22	0.00	None
23	0.92	Troston
Total	**103.37**	

Table A6.8.2: Area of forestry present within each route option (route options are shown on Figures 14A to J in Appendix 1)

Route Option	Route segments	Total area of forestry within route option (ha)
A	23, 1, 2, 3, 4, 5	33.54
B	23, 1, 2, 3, 4, 6	30.09
C	23, 1, 22, 20, 7, 9	1.52
D	23, 1, 22, 20, 7, 8, 4, 5	24.70
E	23, 1, 22, 20, 7, 8, 4, 6	21.24
F	23, 1, 2, 10, 14, 15	23.37
G	11,13, 14, 15	32.49
H	11, 12, 15	32.21
I	17, 18, 19, 20, 21, 3, 4, 5	40.85
J	23, 16, 18, 19, 20, 21, 3, 4, 5	34.33

Based on the above table:

- Route Option C clearly contains the least area of forestry and would be most preferable route option from a forestry perspective;
- Route Options D, E and F include between 21 and 25 ha of forested area, and are considered to be of moderate favourability in comparison to the remainder of the route options; and
- Route Options A, B, G, H and J include areas of forestry between 30 and 35 ha, with Route Option I covering the largest area of forestry at close to 41 ha. These route options are considered to be the least favourable from a forestry perspective.

However, there are other factors which might influence the suitability of the route options from a forestry perspective, including (in no particular order of importance):

- The species present within the area that would be required to be felled;
- The role that species may have to play in the overall post-wind-farm-construction and mitigation forest management plan(s);
- The practicality of identifying species to be planted in compensation for the forested area to be felled for the OHL and areas available for said compensatory planting; and
- The age of the forest species to be felled.

How these factors influence suitability of each route option from an overall forestry perspective is discussed in more detail in sections A6.8.2 to A6.8.9 below.

A6.8.1.1 Route segments leading out from the Troston Loch Wind Farm POC

There are three potential route segments leading out from the proposed Troston Loch Wind Farm POC, namely segments 11, 17 and 23. Of these, an OHL would require the removal of less forestry in segment 23 than segments 11 and 17, both in terms of overall area of forestry and in terms of the area of forestry within the Troston Loch Wind Farm boundary. Route options including route segment 23 would therefore likely be preferable to those including segments 11 or 17 due to the smaller area of forestry that would need

to be removed for the installation and keeping installed of the potential Troston OHL. This has not been presumed, however, but has also been assessed based on the calculations set out in Table A6.8.1, above.

A6.8.1.2 Route segments leading into the Glenshimmeroch collector substation

With regard to the route segments leading into the Glenshimmeroch collector substation, route segment 9 is the most preferable, since it includes no forestry areas and would therefore require no forestry removal to install and keep installed the potential Troston OHL. The remaining potential route segments leading into Glenshimmeroch collector substation include route segments 5, 6 and 15 which include 15.55 ha, 12.09 ha and 11.89 ha of forestry, respectively.

A6.8.2 Route Option A

Route Option A includes route segments 23, 1, 2, 3, 4, and 5 and includes a total of 33.54 ha of forestry, broken down as follows:

- Route segments 1 and 23 include 1.52 ha of forest within the Troston Loch Wind Farm boundary;
- Route segment 2 contains no forestry; and
- Route segments 3, 4, and 5 include 32.02 ha of forestry within the Glenshimmeroch Wind Farm boundary.

Route segments 23 and 1 will pass through an areas that is currently stocked with 1 – 10 year Sitka spruce, and a small section of mixed broadleaves. These areas will not be affected by the construction of the Troston Loch Wind Farm infrastructure except to clear an area of Sitka spruce for the proposed substation adjacent to the existing forestry track, and it is therefore not expected that the species will change, or that the age range of the trees currently present within this route segment will change significantly in the near future. Route segments 23 and 1 would therefore require the removal of both the Sika spruce and a small area currently planted with broadleaved species.

The planting of broadleaved species within forestry management areas is encouraged to diversify species within plantations. The felling of broadleaved species would need to be compensated by replanting at least equal areas of broadleaved species elsewhere within the Troston forestry management area to ensure the total area covered by broadleaved species is maintained, as far as possible.

Most of the forest crops within route segment 3 are Sitka spruce, with three very small areas of Hybrid larch and a section of open ground on either side of a watercourse flowing in a northerly direction, as well as open ground associated with forestry tracks.

Route segment 4 is forested with Sitka spruce, although a small section of Norway spruce is present near the main forestry track providing access through the Glenshimmeroch Hill forest. These Norway spruce were planted in 2014 and are still young - these trees can be seen Figure A4.8.4 in Appendix 4.

Most of route segment 5 is also covered with Sitka spruce, although a small stand of Hybrid larch is present adjacent to the open ground near where the Glenshimmeroch collector substation will be located. At the time of the site visits undertaken in 2021, subcompartments 12a, 13a, 14a and 18c (all falling partially within route segment 5) had recently been felled – this corresponds with the areas identified as having been felled in

Figure 4 Phase 1 Habitat Survey (in Appendix 1). If Route Option A is selected as the preferred option, this would mean that restocking of the felled areas within the OHL would not be required, or should be prevented to avoid unnecessary loss of newly replanted saplings. Routeing the OHL through recently felled areas would mean the area of forestry required to be felled to accommodate an OHL would be reduced. However, an area approximately 100 m wide (50 m either side) of the proposed (final) OHL route would be required to remain felled and not be restocked in future.

Assuming a width of 100 m (50 m either side of the OHL) would be required to be felled and/or kept clear through the forestry along this route option, it is estimated that approximately 16.07 ha of forestry would be lost.

Neither the forestry within the Troston Loch Wind Farm boundary or the Glenshimmeroch Wind Farm boundary within this route option would be felled for wind farm construction or for wind blow mitigation purposes. All forested areas within this route would therefore require felling or to be kept clear (if already felled and not yet restocked).

A6.8.3 Route Option B

Route Option B consists of the same five initial route segments (23, 1, 2, 3 and 4), but differs from Route Option A by including route segment 6 instead of route segment 5. The majority of the discussion in A6.8.2 above therefore applies to Route Option B as well, with the exception of route segment 5.

Overall, Route Option B includes an area of approximately 30.09 ha of forestry (see Table A6.8.2, above), and can be broken up as follows:

- Route segments 1 and 23 include 1.52 ha of forest within the Troston Loch Wind Farm boundary;
- Route segment 2 contains no forestry; and
- Route segments 3, 4, and 6 include a total of 28.57 ha of forestry in the Glenshimmeroch Forest.

The majority of the trees in route segment 6 consist of Sitka spruce, most of which were planted in 1987 (age category 30+ years), with a small area of Norway spruce in subcompartments 12b, 12c and 12d (see Figure 3.3 of the Glenshimmeroch forestry plans in Appendix 7), near the main forestry track through the Glenshimmeroch Forest. These Norway spruce were planted in 2014 (age category 1-10 years). Subcompartment 18c near the Glenshimmeroch collector substation location had been recently felled at the time of the site visits undertaken in 2021. The Glenshimmeroch forestry plans in Appendix 7 show the subcompartment within which the Glenshimmeroch collector substation will be located as being planted with Sitka spruce, except in the area where the Margree-Blackcraig OHL is located.

Assuming a width of 100 m (50 m either side of the OHL) would be required to be felled and/or kept clear through the forestry along this route option, it is estimated that 17.92 ha of forestry would be lost.

Neither the forestry within the Troston Loch Wind Farm boundary or the Glenshimmeroch Wind Farm boundary within this route option would be felled for wind farm construction or for wind blow mitigation purposes. All forested areas within this route would therefore require felling or to be kept clear (if already felled and not yet restocked).

A6.8.4 Route Option C

Route Option C includes route segments 23, 1, 22, 20, 7 and 9.

- Route segments 1 and 23 include 1.52 ha of forestry within the Troston Loch Wind Farm boundary; and
- Route segments 22, 20, 7 and 9 includes no forested areas.

As mentioned in Section A6.8.2, segments 23 and 1 contain Sitka spruce of 1-10 years, and a small section of broadleaves which would require felling to accommodate an OHL. This route option would require the least amount of forestry to be cleared and kept clear, with 1.52 ha of forest crops needing to be felled, assuming a clearance width of 100 m (50 m either side of the OHL).

The forestry within this route option would require felling in addition to the areas to be felled for wind farm construction purposes.

A6.8.5 Route Option D

Route Option D includes route segments 23, 1, 22, 20, 7, 8, 4 and 5 and includes a total of 24.7 ha of forestry, broken down as follows:

- Route segments 1 and 23 include 1.52 ha of forest within the Troston Loch Wind Farm boundary;
- Route segments 22, 20 and 7 contain no forestry; and
- Route segments 4, 5 and 8 include 23.18 ha of forestry within the Glenshimmeroch Wind Farm boundary.

The forestry within route segments 23, 1, 4 and 5 were described previously and are not repeated here. Route segment 8 includes 1.21 ha of Sitka spruce over 30 years old (planted 1987) and is due to be felled in 2023.

Assuming a width of 100 m (50 m either side of the OHL) would be required to be felled and/or kept clear through the forestry along this Route Option, it is estimated that approximately 13.12 ha of forestry would be lost.

Neither the forestry within the Troston Loch Wind Farm boundary or the Glenshimmeroch Wind Farm boundary within this route option would be felled for wind farm construction or for wind blow mitigation purposes. All forested areas within this route would therefore require felling.

If construction of the OHL could be timed to follow closely behind the planned 2023 Sitka spruce felling, or if the felling were to be brought forward by a year or two to accommodate the installation of the Troston OHL, it is not anticipated that the differences in potential revenue from the harvesting of the forest crops would be significant. In contrast, the felling of the young Norway spruce would likely have the effect that even if compensatory planting is carried out, the planned harvesting of the Norway spruce would be set back by approximately 10 years. However, the Norway spruce covers only a comparatively small area and early felling in this area is not anticipated to have highly significant effects in the long-term.

A6.8.6 Route Option E

Route Option E includes route segments 23, 1, 22, 20, 7, 8, 4, and 6 and includes a total of 21.24 ha of forestry, broken down as follows:

- Route segments 1 and 23 include 1.52 ha of forest within the Troston Loch Wind Farm boundary;
- Route segments 22, 20 and 7 contain no forestry; and
- Route segments 4, 6 and 8 include 19.72 ha of forestry within the Glenshimmeroch Wind Farm boundary.

The forestry within route segments 23, 1, 4, 6 and 8 were described previously and are not repeated here.

Assuming a width of 100 m (50 m either side of the OHL) would be required to be felled and/or kept clear through the forestry along this Route Option, it is estimated that approximately 14.82 ha of forestry would be lost.

Neither the forestry within the Troston Loch Wind Farm boundary or the Glenshimmeroch Wind Farm boundary within this route option would be felled for wind farm construction or for wind blow mitigation purposes. All forested areas within this route would therefore require felling.

As for Route Option D, if construction of the OHL could be timed to follow closely behind the planned 2023 Sitka spruce felling, or if the felling were to be brought forward by a year or two to accommodate the installation of the Troston OHL, it is not anticipated that the differences in potential revenue from the harvesting of the forest crops would be significant. In contrast, the felling of the young Norway spruce would likely have the effect that even if compensatory planting is carried out, the planned harvesting of the Norway spruce would be set back by approximately 10 years. However, the Norway spruce covers only a comparatively small area and early felling in this area is not anticipated to have highly significant effects in the long-term.

A6.8.7 Route Option F

Route Option F includes route segments 23, 1, 2 10, 14 and 15 and includes a total of 23.37 ha of forestry, broken down as follows:

- Route segments 1 and 23 include 1.52 ha of forest within the Troston Loch Wind Farm boundary;
- Route segment 2 contains no forestry; and
- Route segments 10, 14 and 15 include 21.85 Ha of forestry within the Glenshimmeroch Wind Farm boundary.

Route segment 10 includes forest crops from subcompartments 1a, 2a and 3a. These all consist of Sitka spruce that were planted in 1987. Trees in subcompartment 2a and 3a are scheduled to be felled in 2028, although a portion of the trees in subcompartment 3a will be felled as wind blow mitigation near Turbine 5 of the Glenshimmeroch Wind Farm (see Figure 3.3 in Appendix 7).

Route segment 14 includes a portion of the forest crops from subcompartments 2a and 3b. These both include Sitka spruce that was planted in 1989. Subcompartment 2a was originally scheduled to be felled in 2028, but had recently been felled (from observations made during the site visits in 2021, aerial photography and Figure 4 Phase 1 Habitat Survey in Appendix 1). Subcompartment 3b was originally scheduled to be felled in 2020, but at the time of the site visits held in September and October 2021, felling had not yet been undertaken within this route segment 14.

Route segment 15 travels through forestry subcompartments 34a, 34c, 34d, 34x, 0b, 19a2, 19a3, 19c, 19j, 19k, , 22c, 22a, 22x, 31c, 31a and 18c. Most of the forest crops in these subcompartments consist of Sitka spruce, with a small section (34d) of Norway spruce having been planted in 2018, and Douglas Fir in subcompartment 22c. However, at the time of the site visits, subcompartments 19a2, 19a3, 19c, 19j, 19k and 31a had been felled. These felled areas correspond with those shown on Figure 4 (Phase 1 Habitat Survey in Appendix 1) and with recent aerial photography. It is assumed from the Glenshimmeroch forestry plan in Appendix 7 that these areas are to be restocked with Sitka spruce.

Subcompartment 33a (Sitka spruce) is to be felled as part of the wind blow mitigation strategy to the south of Turbine 4 and south-west of Turbine 6 of the Glenshimmeroch Wind Farm. Similarly, a section within Subcompartment 3a (Sitka spruce) in route segment 10 is due to be felled for wind blow mitigation relating to Turbine 5 of the Glenshimmeroch Wind Farm.

Assuming those subcompartments named above as having been felled, apart from 33a, will be restocked in the near future, an overhead line within this route segment would require felling or transplanting of the newly planted saplings. Since the trees in subcompartment 33a are to be removed for the wind farm, no further felling would be required in this area.

Assuming a width of 100 m (50 m either side of the OHL) would be required to be felled and/or kept clear through the forestry along this Route Option, it is estimated that approximately 21.41 ha of forestry would be lost. This figure excludes forestry to be felled as part of the wind farm's wind blow mitigation strategy and includes the recently felled areas that have been assumed will be restocked based on the Glenshimmeroch forestry plan in Appendix 7.

A6.8.8 Route Option G

Route Option G includes route segments 11, 13, 14 and 15 and includes a total of 32.49 ha of forestry, broken down as follows:

- Route segment 11 includes 11.34 ha of forestry, with ± 3.69 ha of forest located within the Troston Loch Wind Farm boundary, and ± 7.65 ha located within the Glenshimmeroch Wind Farm boundary; and
- Route segments 13, 14 and 15 include 21.16 ha of forestry within the Glenshimmeroch Wind Farm boundary.

Segment 11 would traverse through stands of Sitka spruce and Norway spruce which would be planted post-construction of the consented Troston Loch Wind Farm. Two small areas of broadleaved species are also planned to be located alongside the forestry tracks near to the substation location. Segment 11 also includes a section of wind farm access track that will remain clear and will not be restocked with tree species, and there is also an existing forestry track to which the same would apply.

Segment 13 travels through subcompartments 2a, 2d and 3b. Subcompartments 2a and 3b were both planted in 1987 with Sitka spruce. Subcompartment 2a is scheduled to be felled in 2028, and Subcompartment 3b was scheduled to be felled in 2020 – this area if currently felled and corresponds to the area around Kilnair Hill indicated as felled in Figure 4 Phase 1 Habitat Survey in Appendix 1.

Segments 14 and 15 were described in Section A6.8.7, above, and are not repeated here.

Assuming a width of 100 m (50 m either side of the OHL) would be required to be felled and/or kept clear through the forestry along this Route Option, it is estimated that approximately 28.29 ha of forestry would be lost. This figure excludes forestry to be felled as part of the Glenshimmeroch Wind Farm's wind blow mitigation strategy, all forestry tracks and wind farm access tracks, and includes the recently felled areas that have been assumed will be restocked based on the Glenshimmeroch forestry plan in Appendix 7.

A6.8.9 Route Option H

Route Option H includes route segments 11, 12 and 15 and includes a total of 31.6 ha of forestry, broken down as follows:

- Route segment 11 includes 11.34 ha of forestry, with ± 3.69 ha of forest located within the Troston Loch Wind Farm boundary, and ± 7.65 ha located within the Glenshimmeroch Wind Farm boundary;
- Route segments 12 and 15 include 20.87 ha of forestry within the Glenshimmeroch Wind Farm boundary.

Route segments 11 and 15 were described previously and are not repeated here.

Route segment 12 traverses through forestry to the east and south of Kilnair Hill, in order to circumvent Turbine 6 of the consented Glenshimmeroch Wind Farm. Part of Route segment 12 covers open ground which consists of semi improved acid grassland, marshy grassland, and continuous bracken (see Figure 4 in Appendix 1), but approximately two thirds of this segment covers forested areas. At the time of the site visits conducted in September, a large section of this area had been felled (see also Figure 4 in Appendix 1).

Route segment 12 travels through subcompartments 0b (open ground), 3a (Sitka spruce), 3c (Sitka spruce), 3d (open ground), 3i (Sitka spruce) and 3j (Sitka spruce). Subcompartments 3c and 3h are two of those that have been recently felled. Subcompartment 3a was planted in 1987 and is scheduled to be felled in 2028.

Assuming a width of 100 m (50 m either side of the OHL) would be required to be felled and/or kept clear through the forestry along this route option, it is estimated that approximately 28.54 ha of forestry would be lost. This figure excludes forestry to be felled as part of the Glenshimmeroch Wind Farm's wind blow mitigation strategy, all forestry tracks and wind farm access tracks.

A6.8.10 Route Option I

Route Option I consists of segments 17, 18, 19, 20, 21, 3, 4, 5, and includes a total area of 40.85 ha of forestry, broken down as follows:

- Route segment 17 which includes 8.21 ha of forest within the Troston Loch Wind Farm boundary;
- Route segments 18, 19 and 20 which have no forestry within them; and
- Route segments 21, 3, 4 and 5 which include 32.63 ha of forest within the Glenshimmeroch Wind Farm boundary.

Route segment 17 will travel north-eastwards from the Troston Loch Wind Farm POC before turning northwards and then north-westwards before travelling through open land. Only a small part of the forested area within segment 17 will be felled for the turbine

access track from the main existing forestry track to Turbine 3. Hence, most of the forest crops along a route within this segment would need to be felled in addition to the forestry that will need to be felled to enable the construction of the Troston Loch Wind Farm infrastructure. The trees that would need to be removed for the installation and keeping installed of the OHL in this segment are 1-10 year Sitka spruce. The removal of the young trees would likely have the effect that even if compensatory planting is carried out, the planned harvesting of these trees would be set back by approximately 10 years.

If an OHL were to be routed through the forestry present within route segment 21, this would require the removal of 35 year + Sitka spruce that is not scheduled to be felled for the wind farm or as part of the existing forestry management plan until after 2028. However, part of this route segment is not forested. It would be preferable from a forestry perspective to route the OHL outside of the forest within this segment before entering the forest within route segment 3.

The OHL would then follow route segments 3, 4 and 5, which were previously described in detail in A6.8.2 and are not repeated here.

Assuming a width of 100 m (50 m either side of the OHL) would be required to be felled and/or kept clear through the forestry along this route option, it is estimated that approximately 21.76 ha of forestry would be lost. This figure excludes forestry to be felled as part of the Glenshimmeroch Wind Farm's wind blow mitigation strategy, all forestry tracks and wind farm access tracks.

A6.8.11 Route Option J

Route Option J consists of segments 23, 16, 18, 19, 20, 21, 3, 4, 5, and includes a total area of 34.33 ha of forestry, broken down as follows:

- Route segments 23 and 16 which includes 1.7 ha of forest within the Troston Loch Wind Farm boundary;
- Route segments 18, 19 and 20 which have no forestry within them; and
- Route segments 21, 3, 4 and 5 which include 32.63 ha of forest within the Glenshimmeroch Wind Farm boundary.

Route segments 23 and 16 will pass through an area that is currently stocked with 1 – 10 year Sitka spruce, and a small section of mixed broadleaves. These areas will not be affected by the construction of the Troston Loch Wind Farm infrastructure except to clear an area of Sitka spruce for the proposed substation adjacent to the existing forestry track, and it is therefore not expected that the species will change, or that the age range of the trees currently present within this route segment will change significantly in the near future. Route segments 23 and 16 would therefore require the removal of both the Sika spruce and a small area currently planted with broadleaved species.

The planting of broadleaved species within forestry management areas is encouraged to diversify species within plantations. The felling of broadleaved species would need to be compensated by replanting at least equal areas of broadleaved species elsewhere within the Troston forestry management area to ensure the total area covered by broadleaved species is maintained, as far as possible.

Route segments 3, 4, and 5 were described in Section A6.8.2 and are not repeated here.

Assuming a width of 100 m (50 m either side of the OHL) would be required to be felled and/or kept clear through the forestry along this Route Option, it is estimated that approximately 16.25 ha of forestry would be lost. This figure excludes forestry to be felled as part of the Glenshimmeroch Wind Farm's wind blow mitigation strategy, all forestry tracks and wind farm access tracks.

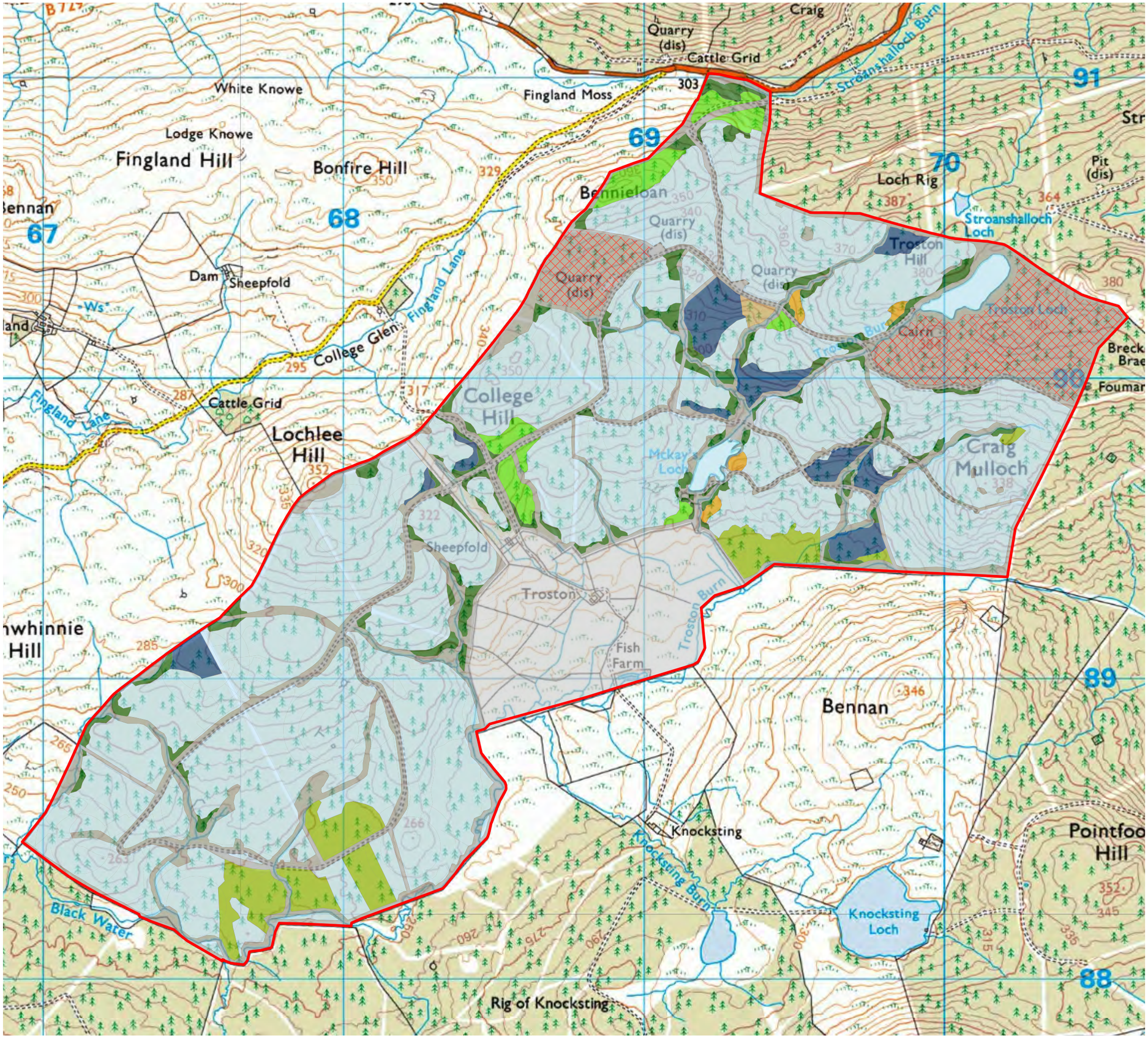
A6.8.12 Summary

Table A6.8.3: Route preference from a Forestry perspective

Route Option	Forestry preferability
A	Approximately 16.07 ha of forestry consisting of 1-10 years Sitka spruce and a small section of broadleaved species to be planted as part of the Troston forestry restructuring plan to be felled for the OHL in addition to the forestry that will be felled for the wind turbine and wind farm access track. Parts of Segment 5 have already been felled and could remain felled within the OHL route segment if replanting has not yet commenced in the areas near the Glenshimmeroch Collector Substation location, subject to discussion with the forestry owners. Neither the forestry within the Troston Loch Wind Farm boundary or the Glenshimmeroch Wind Farm boundary within this route option would be felled for wind farm construction or for wind blow mitigation purposes. All forested areas within this route would therefore require felling.
B	Approximately 17.92 ha of forestry consisting of Sitka spruce (30+ years), and a section of Norway spruce planted in 2014 would require to be felled and kept clear for the OHL. Neither the forestry within the Troston Loch Wind Farm boundary or the Glenshimmeroch Wind Farm boundary within this route option would be felled for wind farm construction or for wind blow mitigation purposes. All forested areas within this route would therefore require felling.
C	Approximately 1.52 ha of forestry consisting of 1-10 years Sitka spruce and a small section of broadleaved species to be planted as part of the Troston forestry restructuring plan would be required to be felled for the OHL in addition to the forestry that will be felled for the wind turbine and wind farm access track. This route option is the most preferable from a forestry perspective, since it would require the felling of the least area of forestry.
D	Approximately 13.12 ha of forestry would require to be felled for the installation of the OHL in addition to the felling required for the construction of the wind farm infrastructure. However, most of the trees in these areas are over 30 years old and consist mostly of Sitka spruce, some of which is scheduled to be felled in 2028. Potential opportunity to bring felling of Sitka spruce forward to coincide or closely precede construction of the OHL, thus reducing the area of forestry requiring felling specifically for the OHL.

Route Option	Forestry preferability
E	Approximately 14.82 ha of forestry would require to be felled for the installation of the OHL in addition to the felling required for the construction of the wind farm infrastructure. However, most of the trees in these areas are over 30 years old and consist mostly of Sitka spruce, some of which is scheduled to be felled in 2028. Potential opportunity to bring felling of Sitka spruce forward to coincide or closely precede construction of the OHL, thus reducing the area of forestry requiring felling specifically for the OHL.
F	Approximately 21.41 ha of forestry would require to be felled for the installation of the OHL in addition to the felling required for the construction of the wind farm infrastructure. Felling currently ongoing or scheduled within the near future being undertaken as part of forestry management near Kilnair Hill. Potential opportunity to coincide OHL construction within areas to be felled as part of forest management. Small sections within Segment 10 and 14 to be felled and kept clear as part of wind blow mitigation felling for Glenshimmeroch Wind Farm. Also, potential opportunity to negotiate with forestry owners not to replant within areas recently felled if OHL route is to be constructed within this route option.
G	Approximately 28.29 ha of forestry would require to be felled for the installation of the OHL in addition to the felling required for the construction of the wind farm infrastructure. Opportunity to coincide construction of the OHL with the current or near future felling in this area. No forestry within this route is planned to be felled and kept felled for wind farm infrastructure or related wind blow mitigation.
H	Approximately 28.54 ha of forestry would require to be felled for the installation of the OHL in addition to the felling required for the construction of the wind farm infrastructure. Opportunity to coincide construction of the OHL with the current or near future felling in this area. No forestry within this route is planned to be felled and kept felled for wind farm infrastructure or related wind blow mitigation.
I	Approximately 21.76 ha of forestry would need to be removed to accommodate the installation and keeping installed of an OHL within this route option. Very little of the forest crops within the forested route segments will require felling for the construction of the wind farms; hence, the majority of the forestry within this OHL route option would need to be removed in addition to the forest crops that will need to be felled for the wind farms.
J	Approximately 16.25 ha of forestry would need to be removed to accommodate the installation and keeping installed of an OHL within this route option. Very little of the forest crops within the forested route segments will require felling for the construction of the wind farms; hence, the majority of the forestry within this OHL route option would need to be removed in addition to the forest crops that will need to be felled for the wind farms.

APPENDIX 7 WIND FARM FORESTRY PLANS



Forestry Study Area

Species

- Felled
- Lodgepole pine
- Hybrid larch
- Loch
- Mixed broadleaves
- Norway spruce
- Other land
- Open ground
- Scots pine
- Sitka spruce
- Sitka spruce/Hybrid larch

1:12,500 Scale @ A3

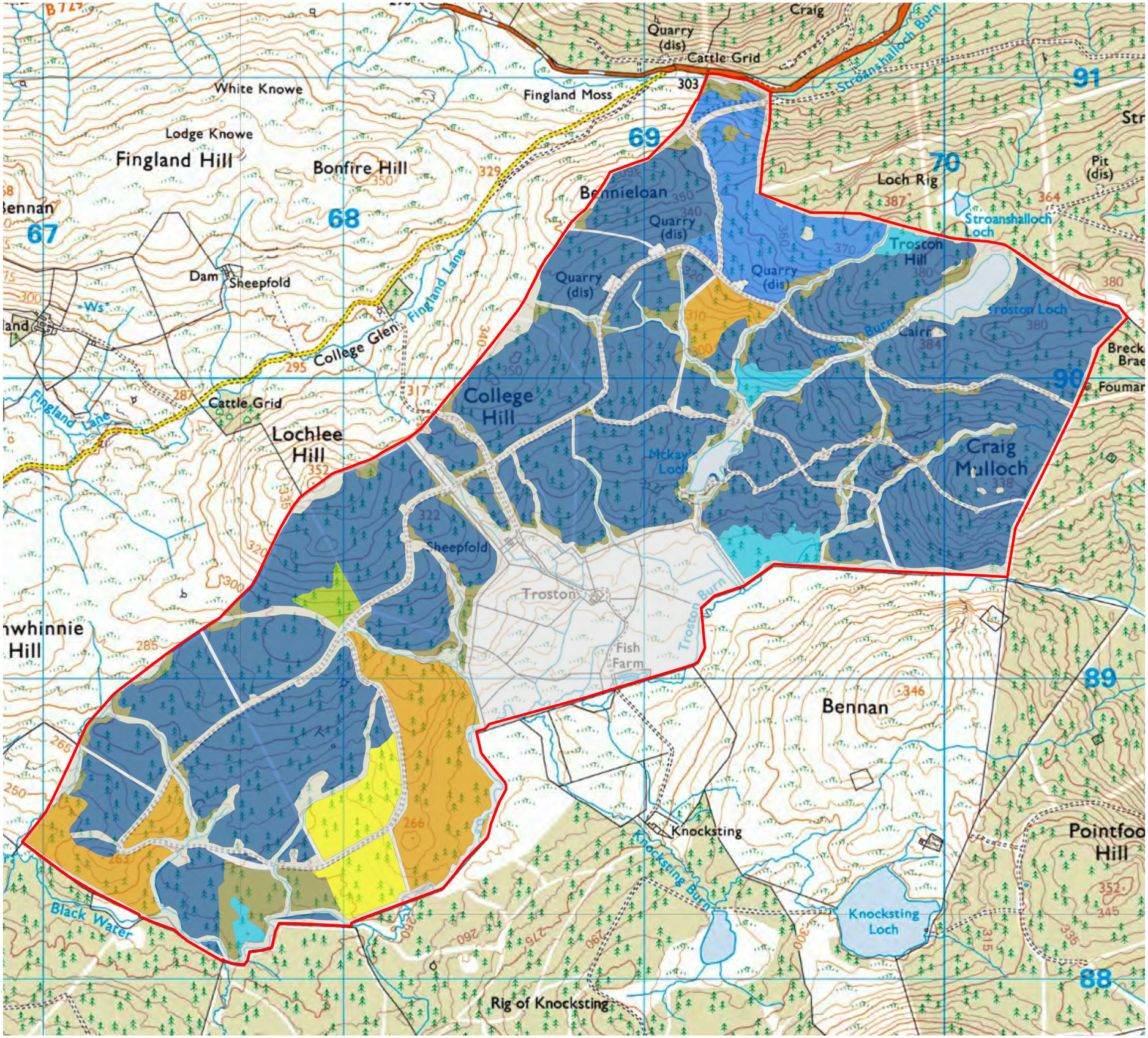
N

0 0.3 0.6 km

Produced By: JA	Ref: 2104-REP-13.3
Checked By: ABA	Date: 28/01/2019

Baseline Species Plan
Figure 13.3

Troston Loch Wind Farm
EIA Report



Forestry Study Area

Felling Phase

- No felling
- Phase 2: 2021-2025
- Phase 3: 2026-2030
- Phase 4: 2031-2035
- Phase 5: 2036-2040
- Long term retentions
- Natural reserves
- Outside plan period

1:12,500 Scale @ A3

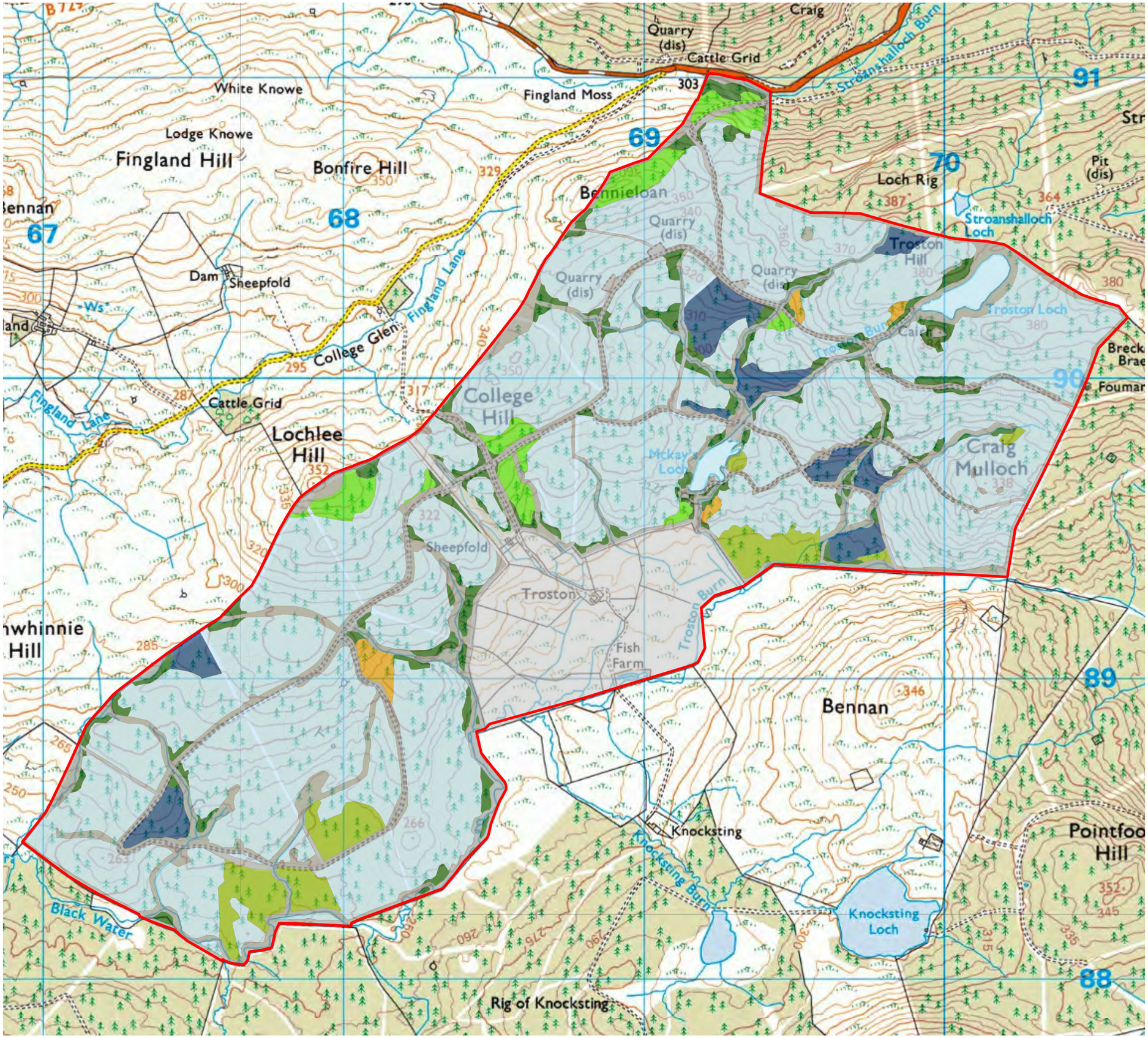
N

0 0.3 0.6 km

Produced By: JA	Ref: 2104-REP-13.4
Checked By: ABA	Date: 28/01/2019

Baseline Felling Plan
Figure 13.4

Troston Loch Wind Farm
EIA Report



Forestry Study Area

Species

- Lodgepole pine
- Loch
- Mixed broadleaves
- Norway spruce
- Open ground
- Other land
- Road
- Scots pine
- Sitka spruce
- Sitka spruce/Hybrid larch

1:12,500 Scale @ A3

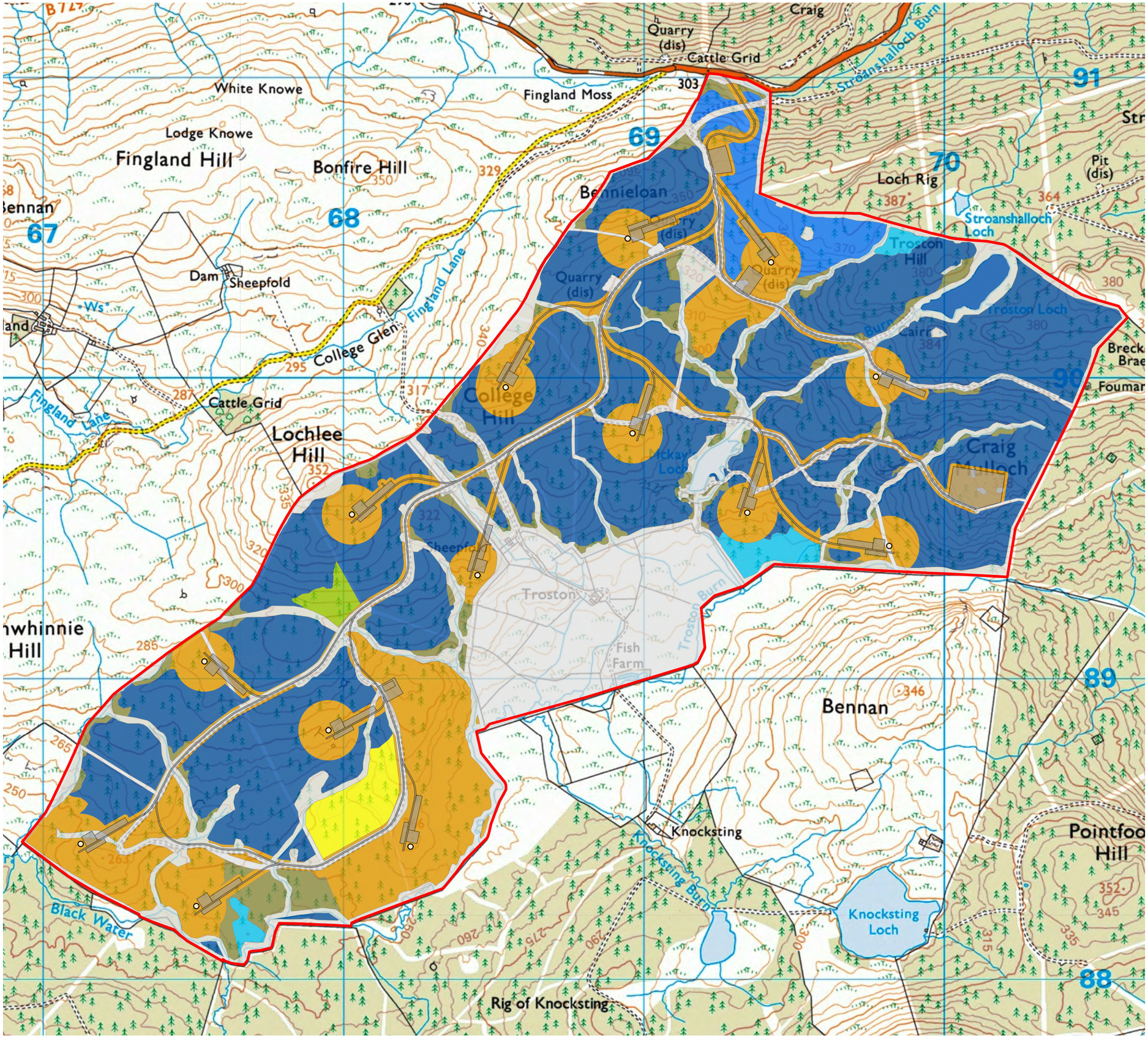
0 0.3 0.6 km

N

Produced By: JA	Ref: 2104-REP-13.5
Checked By: ABA	Date: 28/01/2019

Baseline Restocking Plan
Figure 13.5

Troston Loch Wind Farm
EIA Report



Site Boundary

Site Infrastructure

Felling Phases

- No felling
- Phase 2: 2021 - 2025
- Phase 3: 2026 - 2030
- Phase 4: 2031 - 2035
- Phase 5: 2036 - 2040
- Long term retentions
- Natural reserves
- Outside plan period

1:12,500 Scale @ A3

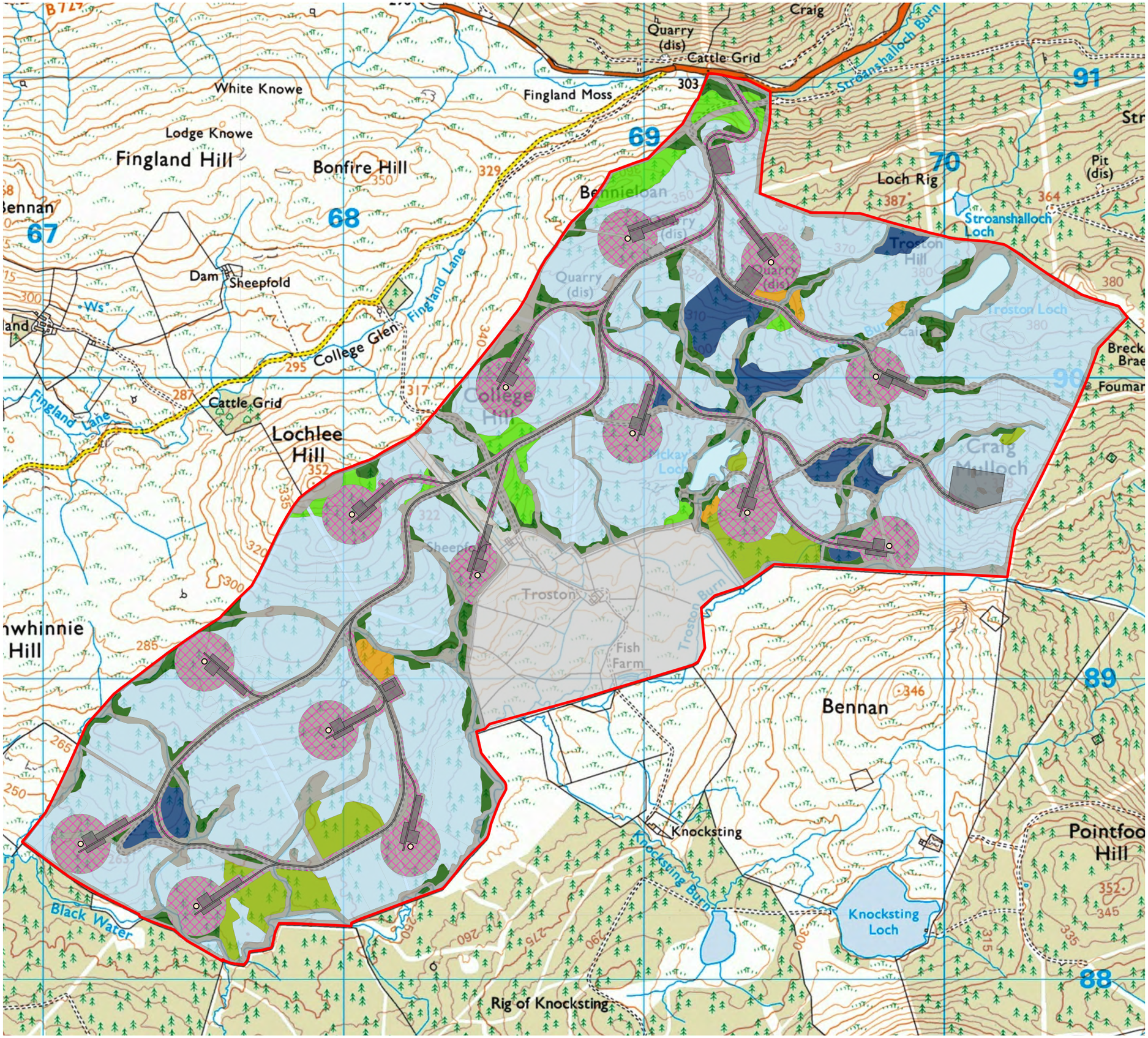
0 0.3 0.6 km

N

Produced By: JA	Ref: 2104-REP-13.1
Checked By: ABA	Date: 11/09/2019

Wind Farm Felling Plan
Figure 13.1

Troston Loch Wind Farm
SEI Report



dga forestry

EDF renewables

ARCUS

- Forestry Study Area
- Site Infrastructure

Species

- Lodgepole pine
- Loch
- Mixed broadleaves
- Norway spruce
- Open ground
- Other land
- Scots pine
- Sitka spruce
- Sitka spruce/Hybrid larch
- Wind farm open ground

1:12,500 Scale @ A3

N

0 0.3 0.6 km

Produced By: JA	Ref: 2104-REP-13.2
Checked By: ABA	Date: 17/09/2019

Wind Farm Restocking Plan
Figure 13.2

Troston Loch Wind Farm
SEI Report

Scottish Woodlands

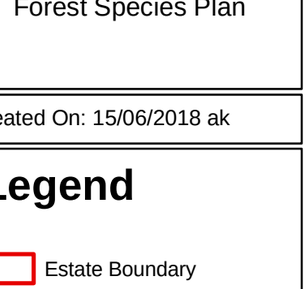
Figure 13.1

Glenshimmeroch
Forest Species Plan

Created On: 15/06/2018 ak

Legend

- Estate Boundary
- DF
- SS
- NS
- JL
- HL
- MC
- MC/MB
- MC/OG
- MB
- NMB/OG
- NMB
- OG
- OL
- UP



Scottish Woodlands Ltd
Research Park, Riccarton
Edinburgh, EH14 4AP

1:12,000
Scale Correct at A3

264000 265000 266000 267000

589000 588000 587000 586000

264000 265000 266000 267000

589000 588000 587000 586000

Scottish Woodlands

Figure 13.2

Glenshimmeroch Infrastructure Construction Felling & Replanting

Created On: 28/06/2018

Legend

- Wind Turbine Positions
- Estate Boundary
- Substitute Replanting Area
- Borrow Pit Felling
- Substation
- Track felling
- Keyhole Felling
- Construction Compound
- Site Tracks 5m Wide
- DF
- SS
- NS
- JL
- HL
- MC
- MC/MB
- MC/OG
- MB
- NMB/OG
- NMB
- OG
- OL
- UP

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1:12,000
Scale Correct at A3

264000 265000 266000 267000

589000 588000 587000 586000

Scottish Woodlands

Figure 13.3

Glenshimmeroch
Windblow Mitigation Felling

Created On: 28/06/2018

Legend

- Wind Turbine Positions
- Estate Boundary
- Substitute Replanting Area
- Borrow Pit Felling
- Substation
- Track felling
- Keyhole Felling
- Construction Compound
- Mitigation Felling
- Site Tracks 5m Wide
- DF
- SS
- NS
- JL
- HL
- MC
- MC/MB
- MC/OG
- MB
- NMB/OG
- NMB
- OG
- OL
- UP

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Scale Correct at A3

Figure 31.1: Glenshimmeroch & Kilnair Forests Stocking Schedule.

Forest	Cpt	Sub Cpt	Species	Area (ha)	Planting Year	YC	LTFP Fell Phase	LTFP Fell Year
Glenshimmeroch	0	a	OG	153.32				
Glenshimmeroch	0	b	OG	44.13				
Glenshimmeroch	0	c	OG	6.55				
Glenshimmeroch	1	a	SS	3.25	1987	20	Beyond Phase 7	
Glenshimmeroch	1	b	SS	2.30	1987	20	Beyond Phase 7	
Glenshimmeroch	1	c	HL	0.35	1987		Beyond Phase 7	
Glenshimmeroch	1	d	HL	0.09	1987		Beyond Phase 7	
Glenshimmeroch	1	x	OG	1.76				
Glenshimmeroch	2	a	SS	22.80	1987		Phase 4	2028
Glenshimmeroch	2	b	HL	0.22	1987		Phase 4	2028
Glenshimmeroch	2	c	SS	0.08	1987		Phase 4	2028
Glenshimmeroch	2	x	OG	1.40				
Glenshimmeroch	3	a	SS	8.82	1987	20	Phase 4	2028
Glenshimmeroch	3	b	SS	6.78	1987	20	Phase 2	2020
Glenshimmeroch	3	c	SS	2.26	1987		Phase 2	2020
Glenshimmeroch	3	d	OG	2.12				
Glenshimmeroch	4	a	SS	9.01	1987	22	Phase 1	2020
Glenshimmeroch	4	b	SS	1.44	1987	22	Phase 1	2020
Glenshimmeroch	4	c1	SS	0.21	1987	22	Phase 1	2020
Glenshimmeroch	4	d	SS	0.10	1987	22	Phase 1	2020
Glenshimmeroch	4	e	SS	0.22			Phase 1	
Glenshimmeroch	4	f	SS	1.22	1987	22	Phase 1	2020
Glenshimmeroch	4	g	SS	0.04	1987	22	Phase 1	2020
Glenshimmeroch	4	h	SS	0.04	1987	22	Phase 1	2020
Glenshimmeroch	4	i	SS	0.17	1987	22	Phase 1	2020
Glenshimmeroch	4	j	SS	0.01	1987	22	Phase 1	2020
Glenshimmeroch	4	k	SS	0.02	1987	22	Phase 1	2020
Glenshimmeroch	4	s	SS	0.21			Phase 1	
Glenshimmeroch	4	t	UP	0.05	0	22	Phase 1	2020
Glenshimmeroch	4	x	OG	0.74				
Glenshimmeroch	5	a	SS	15.23	1987	20	Phase 3	2023
Glenshimmeroch	5	b	OG	0.14				
Glenshimmeroch	5	x	OG	0.82				
Glenshimmeroch	6	a	SS	8.46	1987	18	Beyond Phase 7	
Glenshimmeroch	6	a1	SS	0.17	1987	18	Beyond Phase 7	
Glenshimmeroch	6	b	SS	0.14	1987	18	Beyond Phase 7	
Glenshimmeroch	6	x	OG	1.10				
Glenshimmeroch	7	a	SS	1.83	1987	20	Beyond Phase 7	
Glenshimmeroch	7	b	HL	0.63	1987		Beyond Phase 7	
Glenshimmeroch	7	x	OG	1.71				
Glenshimmeroch	8	a	SS	6.60	1987	16	Phase 3	2023
Glenshimmeroch	8	b	SS	3.23	1987	18	Phase 3	2023
Glenshimmeroch	8	c	OG	1.85				
Glenshimmeroch	8	x	OG	4.10				
Glenshimmeroch	9	a	SS	6.68	1987	18	Phase 2	2020
Glenshimmeroch	9	b	NS	0.72	2014		Phase 1	2013
Glenshimmeroch	9	c	SS	0.30	1987		Beyond Phase 7	
Glenshimmeroch	9	d	NS	0.48	2014		Phase 1	2013
Glenshimmeroch	9	x	OG	1.25				
Glenshimmeroch	10	a	SS	3.80	1987	22	Phase 1	2013
Glenshimmeroch	10	a1	SS	0.31	1987	22	Phase 1	2013
Glenshimmeroch	10	b	SS	1.08	2002		Beyond Phase 7	
Glenshimmeroch	10	c	SS	0.76	1987	22	Beyond Phase 7	
Glenshimmeroch	10	d	SS	0.14	1987	22	Beyond Phase 7	
Glenshimmeroch	10	e	SS	0.09	1987	22	Beyond Phase 7	
Glenshimmeroch	10	g	SS	0.17	1987	22	Phase 1	2013
Glenshimmeroch	10	x	OG	1.29				
Glenshimmeroch	11	a	SS	14.42	1987	22	Phase 3	2023
Glenshimmeroch	11	b	OG	0.23				
Glenshimmeroch	11	x	OG	0.38				
Glenshimmeroch	12	a	SS	13.95	1987	22	Phase 2	2020
Glenshimmeroch	12	b	NS	0.48	2014		Phase 1	2013
Glenshimmeroch	12	c	NS	1.35	2014		Phase 1	2013
Glenshimmeroch	12	d	NS	0.12	2014		Phase 1	2013
Glenshimmeroch	12	e	OG	0.65				

Forest	Cpt	Sub Cpt	Species	Area (ha)	Planting Year	YC	LTFP Fell Phase	LTFP Fell Year
Glenshimmeroch	12	x	OG	0.12				
Glenshimmeroch	13	a	SS	10.36	1987	20	Phase 2	2013
Glenshimmeroch	13	b	HL	1.37	1987		Phase 2	2013
Glenshimmeroch	13	d	OG	0.39				
Glenshimmeroch	13	e	OG	0.10				
Glenshimmeroch	14	a	SS	11.13	1987	20	Phase 2	2020
Glenshimmeroch	14	b	HL	0.64	1987		Phase 2	
Glenshimmeroch	14	c	HL	0.46	1987		Phase 2	2020
Glenshimmeroch	14	x	OG	1.67				
Glenshimmeroch	15	a	SS	6.82	1987	18	Phase 3	2023
Glenshimmeroch	15	b	SS	2.71	1987	18	Phase 3	2023
Glenshimmeroch	15	x	OG	2.21				
Glenshimmeroch	16	b	OG	1.38				
Glenshimmeroch	16	c	OG	2.39				
Glenshimmeroch	16	x	OG	4.92				
Glenshimmeroch	17	a	SS	5.32	2016	24	Phase 1	
Glenshimmeroch	17	b	NMB	0.22	2016	24	Phase 1	
Glenshimmeroch	17	x	OG	0.81				
Glenshimmeroch	18	c	OG	2.69	0		Phase 1	2020
Glenshimmeroch	18	c	SS	0.22	2018		Phase 1	
Glenshimmeroch	18	c	SS	2.85	2018		Phase 1	
Glenshimmeroch	18	c	SS	1.44	2018		Phase 1	
Glenshimmeroch	18	i	OG	0.23				
Glenshimmeroch	18	x	OG	0.14				
Glenshimmeroch	19	a	OG	0.10				
Glenshimmeroch	19	a2	SS	0.10	1988	22	Phase 1	2013
Glenshimmeroch	19	a3	SS	0.08	1988	22	Phase 1	2013
Glenshimmeroch	19	b	MC	0.71	1988	22	Phase 1	2013
Glenshimmeroch	19	b	SS	2.19	2016	22	Phase 1	
Glenshimmeroch	19	c	SS	9.42	1988	22	Phase 1	2013
Glenshimmeroch	19	d	OG	2.26				
Glenshimmeroch	19	e	OG	1.89				
Glenshimmeroch	19	i	SS	0.31	1988	22	Phase 1	2013
Glenshimmeroch	19	j	SS	0.31	1988	22	Phase 1	2013
Glenshimmeroch	19	k	SS	1.45	1988	22	Phase 1	2013
Glenshimmeroch	20	a	SS	1.46	1988	20	Phase 1	2013
Glenshimmeroch	20	b	SS	0.79	1988	20	Phase 1	2013
Glenshimmeroch	20	x	OG	0.77				
Glenshimmeroch	21	a	SS	1.57	2018	22	Phase 1	
Glenshimmeroch	21	b	SS	0.44	2018	20	Phase 1	
Glenshimmeroch	21	c	OG	1.17	0	0	Phase 1	2023
Glenshimmeroch	21	c	NMB	0.27	2018	22	Phase 1	
Glenshimmeroch	21	d	NMB	0.14	2018	20	Phase 1	
Glenshimmeroch	21	x	OG	1.33				
Glenshimmeroch	22	a	SS	2.73	2018		Phase 1	
Glenshimmeroch	22	a	SS	0.69	2018		Phase 1	
Glenshimmeroch	22	b	SS	0.34	1988		Phase 1	2020
Glenshimmeroch	22	c	DF	0.48	2018		Phase 1	
Glenshimmeroch	22	d	OG	3.00	0		Phase 1	2020
Glenshimmeroch	22	f	DF	0.25	2018		Phase 1	
Glenshimmeroch	22	f	DF	0.30	2018		Phase 1	
Glenshimmeroch	22	x	OG	0.92				
Glenshimmeroch	22	x	OG	0.14				
Glenshimmeroch	23	a	MC	3.14	1988		Phase 3	2023
Glenshimmeroch	23	b	MC	1.77	2016		Phase 1	
Glenshimmeroch	23	c	MC	0.32	1988		Phase 3	2023
Glenshimmeroch	23	c	NMB	0.05	0		Phase 3	
Glenshimmeroch	23	d	MC	0.12	1988		Phase 3	2023
Glenshimmeroch	23	d	NMB	0.07	0		Phase 3	
Glenshimmeroch	23	e	OG	0.62				
Glenshimmeroch	23	f	OG	0.19				
Glenshimmeroch	23	g	OG	0.09				
Glenshimmeroch	23	h	NMB	0.78	2016		Phase 1	
Glenshimmeroch	23	x	OG	1.34				
Glenshimmeroch	24	a	SS	8.82	2016	24	Phase 1	
Glenshimmeroch	24	b	SS	3.28	2018	24	Phase 1	
Glenshimmeroch	24	x	OG	1.19				

Forest	Cpt	Sub Cpt	Species	Area (ha)	Planting Year	YC	LTFP Fell Phase	LTFP Fell Year
Glenshimmeroch	25	a	SS	6.83	1988	20	Phase 2	2020
Glenshimmeroch	25	a	SS	1.54	2016	20	Phase 2	
Glenshimmeroch	25	b	HL	0.81	1988		Phase 2	2020
Glenshimmeroch	25	c	MB	0.21	1991		Beyond Phase 7	
Glenshimmeroch	25	d	MB	0.15	1991		Beyond Phase 7	
Glenshimmeroch	25	g	MC	3.16	1988	20	Phase 2	2020
Glenshimmeroch	25	g	OG	0.19				
Glenshimmeroch	25	x	OG	1.33				
Glenshimmeroch	26	a	SS	4.33	1988	20	Phase 4	2028
Glenshimmeroch	26	b	SS	1.14	1988	20	Phase 4	2028
Glenshimmeroch	26	b1	SS	0.11	1988	20	Phase 4	2028
Glenshimmeroch	26	c	NMB	0.93	1988		Beyond Phase 7	
Glenshimmeroch	26	d	SS	0.21	1988			
Glenshimmeroch	26	f	SS	0.09	1988	20	Phase 4	2028
Glenshimmeroch	26	h	SS	0.42	1988	20	Phase 4	2028
Glenshimmeroch	26	x	OG	2.88	0			
Glenshimmeroch	27	a	DF	2.80	2018		Phase 4	
Glenshimmeroch	27	b	SS	2.35	2018		Phase 4	
Glenshimmeroch	27	d	OG	0.14				
Glenshimmeroch	27	i	OG	0.56	0	0	Phase 1	2028
Glenshimmeroch	27	x	OG	0.00				
Glenshimmeroch	27	x	OG	0.42				
Glenshimmeroch	28	a	SS	2.47	1988	18	Phase 4	2028
Glenshimmeroch	28	d	OG	0.33	0	0	Phase 1	2028
Glenshimmeroch	28	d	NMB	0.43	2018	18	Phase 1	
Glenshimmeroch	28	x	OG	0.48				
Glenshimmeroch	29	a	SS	0.44	1988	18	Phase 4	2028
Glenshimmeroch	29	x	OG	0.73				
Glenshimmeroch	30	a	SS	0.98	1988	18	Phase 4	2028
Glenshimmeroch	30	x	OG	0.15				
Glenshimmeroch	31	a	SS	4.50	2018		Phase 1	
Glenshimmeroch	31	c	OG	0.42	0		Phase 1	2020
Glenshimmeroch	31	x	OG	0.15				
Glenshimmeroch	32	a	SS	0.90	2002		Beyond Phase 7	
Glenshimmeroch	32	b	NMB	0.30	2002		Beyond Phase 7	
Glenshimmeroch	32	x	OG	0.34				
Glenshimmeroch	33	a	SS	2.50	1981	20	Phase 3	2023
Glenshimmeroch	33	b	HL	0.30	1981		Phase 3	2023
Glenshimmeroch	33	x	OG	0.27				
Glenshimmeroch	34	b	SS	5.85	1981	22	Phase 3	2023
Glenshimmeroch	34	c	SS	0.44	1988	20	Phase 3	2023
Glenshimmeroch	34	d	HL	0.10	1981		Phase 3	2023
Glenshimmeroch	34	d	SS	6.26	1981	22	Phase 3	2023
Glenshimmeroch	34	d	OG	2.00				
Glenshimmeroch	34	d	NS	0.39	2018	22	Phase 4	
Glenshimmeroch	35	a	SS	1.67	1991	16	Beyond Phase 7	
Glenshimmeroch	35	b	SS	0.99	1991	16	Beyond Phase 7	
Glenshimmeroch	35	c	SS	0.91	1991	16	Beyond Phase 7	
Glenshimmeroch	35	d	SS	0.83	1991	18	Beyond Phase 7	
Glenshimmeroch	35	e	MC/MB	0.78	1981		Beyond Phase 7	
Glenshimmeroch	35	f	SS	0.75	1991	16	Beyond Phase 7	
Glenshimmeroch	35	g	NMB	0.29	1991		Beyond Phase 7	
Glenshimmeroch	35	h	NMB	0.09	1991		Beyond Phase 7	
Glenshimmeroch	35	i	NMB	0.09	1991		Beyond Phase 7	
Glenshimmeroch	35	k	SS	0.11	1991	16	Beyond Phase 7	
Glenshimmeroch	35	x	OG	2.31				
Glenshimmeroch	36	a	MC	0.60	1991	20	Beyond Phase 7	
Glenshimmeroch	36	b	MC	0.48	1991	20	Beyond Phase 7	
Glenshimmeroch	36	c	NMB	0.26	1991	20	Beyond Phase 7	
Glenshimmeroch	36	d	MC	0.21	1991	20	Beyond Phase 7	
Glenshimmeroch	36	e	NMB	0.20	1991		Beyond Phase 7	
Glenshimmeroch	36	f	MC	0.16	1991	20	Beyond Phase 7	
Glenshimmeroch	36	g	NMB	0.10	1991		Beyond Phase 7	
Glenshimmeroch	36	h	NMB	0.20	1991	20	Beyond Phase 7	
Glenshimmeroch	36	i	NMB	0.16	1991		Beyond Phase 7	
Glenshimmeroch	36	j	OG	0.57				
Glenshimmeroch	36	x	OG	0.24				
Glenshimmeroch	37	a	MC	0.48	1991	22	Beyond Phase 7	

Forest	Cpt	Sub Cpt	Species	Area (ha)	Planting Year	YC	LTFP Fell Phase	LTFP Fell Year
Glenshimmeroch	37	b	NMB	0.29	1991		Beyond Phase 7	
Glenshimmeroch	37	c	NMB	0.28	1991		Beyond Phase 7	
Glenshimmeroch	37	d	NMB	0.16	1991		Beyond Phase 7	
Glenshimmeroch	37	x	OG	0.31				
Glenshimmeroch	38	a	NMB	0.42	1991		Beyond Phase 7	
Glenshimmeroch	38	b	MC	0.52	1991	22	Beyond Phase 7	
Glenshimmeroch	38	c	NMB	0.15	1991		Beyond Phase 7	
Glenshimmeroch	39	a	NMB	0.32	1991		Beyond Phase 7	
Glenshimmeroch	39	x	OG	0.10				
Kilnair Hill	1	a	SS	10.53	1981		Phase 4	2029
Kilnair Hill	1	b	SS	6.43	1981		Phase 4	2029
Kilnair Hill	1	c	SS	6.29	1981		Phase 4	2029
Kilnair Hill	1	d	OG	4.49	0			
Kilnair Hill	1	e	SS	4.44	1981		Phase 4	2029
Kilnair Hill	1	f	SS	3.86	1981		Phase 4	2029
Kilnair Hill	1	g	SS	3.51	1981		Phase 4	2029
Kilnair Hill	1	h	SS	1.45	1981		Phase 4	2029
Kilnair Hill	1	i	HL	0.63	1981		Phase 4	2029
Kilnair Hill	1	j	SS	0.13	1981		Phase 4	2029
Kilnair Hill	2	a	SS	7.06	1981		Phase 2	2019
Kilnair Hill	2	a	OG	0.11	0		Phase 1	2014
Kilnair Hill	2	a	SS	1.74	2016		Phase 1	2014
Kilnair Hill	2	a	NMB/OG	0.50	2016		Phase 1	2014
Kilnair Hill	2	a	SS	1.45	2016		Phase 1	2014
Kilnair Hill	2	d	HL	0.99	1981		Phase 2	2019
Kilnair Hill	3	a	SS	10.04	1981		Phase 2	2019
Kilnair Hill	3	a	SS	2.25	2016		Phase 1	2014
Kilnair Hill	3	b	SS	8.89	1981		Phase 1	2014
Kilnair Hill	3	c	SS	6.24	1981		Phase 1	2014
Kilnair Hill	3	c	UP	0.22	0		Phase 1	2014
Kilnair Hill	3	c	SS	1.31	2016		Phase 1	2014
Kilnair Hill	3	d	SS	5.32	2016		Phase 1	2014
Kilnair Hill	3	e	SS	4.92	1981		Phase 1	2014
Kilnair Hill	3	f	OG	3.45	0		Phase 1	2014
Kilnair Hill	3	g	SS	0.96	1981		Phase 1	2014
Kilnair Hill	3	h	SS	2.20	1981		Phase 2	2019
Kilnair Hill	3	i	OG	1.61	0		Phase 1	2014
Kilnair Hill	3	j	OG	0.31	0		Phase 1	2014
Kilnair Hill	3	k	JL	0.52	1981		Phase 2	2019
Kilnair Hill	3	l	JL	0.43	1981		Phase 1	2014
Kilnair Hill	3	m	OG	0.41	0		Phase 1	2014
Kilnair Hill	3	n	OG	0.29	0		Phase 1	2014
Kilnair Hill	3	p	SS	0.15	1981		Phase 1	2014
Kilnair Hill	3	q	SS	0.12	1981		Phase 1	2014
Kilnair Hill	3	r	SS	0.11	1981		Phase 1	2014
Kilnair Hill	3	s	SS	0.09	1981		Phase 1	2014
Kilnair Hill	4	a	SS	10.56	1981		Phase 2	2019
Kilnair Hill	4	b	SS	9.50	1981		Phase 3	2024
Kilnair Hill	4	c	SS	4.35	1986		Phase 3	2024
Kilnair Hill	4	d	OG	1.69	0			
Kilnair Hill	4	e	UP	0.87	0		Phase 2	2019
Kilnair Hill	4	f	MC/OG	0.43	0		Long Term Retention	
Kilnair Hill	4	g	SS	0.33	1981		Phase 2	2019
Kilnair Hill	4	h	SS	0.32	1986		Long Term Retention	
Kilnair Hill	4	i	SS	0.19	1981		Phase 2	2019
Kilnair Hill	4	j	OG	0.19	0			
Kilnair Hill	4	k	SS	0.15	1981		Phase 3	2024
Kilnair Hill	4	l	OG	0.14	0			
Kilnair Hill	5	a	SS	5.57	1981		Phase 3	2024
Kilnair Hill	5	b	SS	4.42	1981		Phase 3	2024
Kilnair Hill	5	c	SS	3.84	1981		Phase 3	2024
Kilnair Hill	5	d	SS	2.88	1986		Phase 3	2024
Kilnair Hill	5	e	OG	2.80	0			
Kilnair Hill	5	f	SS	2.21	1981		Phase 3	2024
Kilnair Hill	5	g	SS	1.64	1981		Long Term Retention	
Kilnair Hill	5	h	OG	0.84	0			
Kilnair Hill	5	i	JL	0.32	1981		Phase 3	2024
				715.40				