

Spittal to Loch Buidhe to Beauly 400 kV OHL Connection
Environmental Impact Assessment
Volume 5, Appendix 13.1 – R:
Woodland Reports
Carbisdale and Inveroykel Woodlands

July 2025





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1. Introduction

- 1.1 Scottish and Southern Electricity Networks (SSEN) Transmission, hereafter referred to as 'the Applicant', owns, operates, develops and maintains the high voltage electricity transmission system in the north of Scotland and the Scottish islands. Due to the growth in renewable electricity generation in the north and north-east of Scotland, upgrade of the transmission network is required to provide the necessary increase in transmission capacity. The Applicant is applying for consent under Section 37 of the Electricity Act 1989 to construct and operate a new double circuit 400 (kilovolt) kV overhead line (OHL).
- 1.2 This report provides an assessment of woodland impact related to the Spittal to Loch Buidhe to Beauly 400 kV OHL Connection project (the 'Proposed Development'). The report details the woodland area affected by the Operational Corridor (OC), new access tracks (permanent), and additional felling required due to windblow risk within individual ownerships. It also includes mitigation considerations and compensatory planting recommendations.

2. Purpose of this Woodland Report

- 2.1 As part of the Environmental Impact Assessment (EIA) process, it was identified that construction of the OHL and associated access tracks would cross a number of woodland areas within both public and private landholdings. The landholding property boundaries are identified in Figure 1: Woodland Impacted by the Proposed Development.
- 2.2 This document provides an assessment of the woodland areas that are affected by the Proposed Development, including the requirement for woodland removal and management recommendations to mitigate the impact of the woodland removal.
- 2.3 Field surveys of the woodland areas have been undertaken and have been used to determine the various woodland characteristics to identify the woodland removal required and recommended. This document also sets out the area, in hectares (ha), of compensatory planting required to ensure no net loss of woodland is achieved.

3. Woodland Property

- 3.1 Carbisdale and Inveroykel properties are publicly owned and managed by Forest and Land Scotland (FLS), covering extensive woodland areas. These woodlands are located west of the Kyle of Sutherland estuary, approximately 4 to 6 km northwest of Ardgay, depending on the point of entry. The nearest major public road is the A836.
- 3.2 These woodlands are largely enclosed in the larger landscape between the River Carron to the south and the Kyle of Sutherland estuary to the northeast, with a few minor watercourses crossing the property boundaries. Among the woodlands of Inveroykel, Strathcarron Wood is a privately owned area enclosed within Inveroykel Wood. For this report, the woodlands have been differentiated between Inveroykel South, which forms part of West Strathcarron Wood; Inveroykel North, where



Viewfield and Hilton Wood are located; and Carbisdale, situated at the northernmost edge of the Proposed Development near the estuary.

- 3.3 Central Grid reference for Carbisdale and Inveroykel within the Proposed Development is NH 55913 94110.
- 3.4 The site features an extensive and upgraded network of tracks spanning the entire property, providing access to different regions within the woodlands. Refer to **Figure 1: Woodland Impacted by the Proposed Development**.

4. Development Requirements

4.1 400 kV Operational Corridor

- 4.1.1 With reference to **Figure 1: Woodland Impacted by the Proposed Development,** the Overhead Line (OHL) sections relevant to Carbisdale extend from Tower S24 to over 300 m south of Tower S32 in the north of the properties and S37 and S38 in the south. Towers S33 to S36 are located within Strathcarron ownership.
- 4.1.2 The Study Area for this assessment is based around an operational corridor of 90 m. The Applicant defines the OC as the area in which it has rights to remove woodland for the purposes of creation of new OHL, resilience and maintenance of OHLs, or protection of electrical plant as required by the Electricity Safety, Quality and Continuity Regulations (ESQCR) 2002 regulations and The Electricity Act 1989. The OC is defined as to the distance at which a tree could fall and cause damage to the OHL, resulting in a supply outage. As a result, the final OC width would be based on the safety distance required from the OHL centreline to allow for a mature tree falling towards the OHL, taking account of topography and tree height at maturity.
- 4.1.3 The OC width that has been assessed and identified for the safe build and energisation of the new OHL through areas of conifer woodland is 90 m (45 m either side of the OHL centreline). Further details can be found in **Section 13.3** of **Volume 2, Chapter 13: Forestry** which outlines the extent of the study area.
- 4.1.4 The OC width that has been assessed and identified for the safe build and energisation of the OHL through the areas of broadleaves is also 90 m (45 m either side of the OHL centreline). This has been assessed as a maximum OC width required at these woodland locations, with the potential of further narrowing of the OC prior to construction to allow greater tree retention depending on factors such as tree height, topography, crown reduction or other mitigation strategies¹.

¹As specified by the 'Red Zone' set out in paragraph 41 of the Forest Industry Safety Accord. (2020) Safety Guide 804 Electricity at Work: Forestry. [pdf] Available at: FISA 804 (ukfisa.com).



4.2 Access Track Route Design

- 4.2.1 An existing infrastructure network within the property provides access to various areas of the woodlands and is in proximity to the Proposed Development features; however, new sections of both temporary and permanent roads will be constructed within and outside the OC. These roads will serve as the primary vehicle access route for the Proposed Development, as illustrated in Figure 1: Woodland Impacted by the Proposed Development, and will undergo maintenance and upgrades as part of the construction scope.
- 4.2.2 New access tracks, also detailed in **Figure 1: Woodland Impacted by the Proposed Development**, will be built to service Towers from S24 to S32 and from S37 to S38.
- 4.2.3 The access track corridor width required for clearing through the woodland is 20 m (10 m on either side of the centreline), but this will be evaluated in situ to determine the suitability for further tree retention.
- 4.2.4 The construction of these new access tracks will increase the impact of woodland removal along routes located outside the OC. The affected woodland along the new access tracks will consist of a similar composition to that found within the OC, featuring a combination of coniferous plantations, depending on the specific location of the roads. Refer to Table 9.1 below.
- 4.2.5 Tree felling, stump removal and residue mulching will be required for the installation of new access tracks and at each tower location for the formation of temporary construction working areas.
- 4.2.6 These roads will serve as the main arterial construction route. Tree felling and timber extraction will be able to utilise existing tracks, prior to any construction activity.
- 4.2.7 Where existing tracks require maintenance or upgrading, this may involve the removal of trees and scrub to facilitate the works, particularly to accommodate the creation of additional passing places. While much of the upgrade activity would fall within standard forest access maintenance, which typically involves the removal of scrub, regeneration, and crown management, some sections may require additional tree clearance within a corridor of up to 12 m in width.

5. Woodland Characteristics

5.1 A desk-based study of the woodland areas was conducted, to identify current woodland environmental designations and classifications.



- 5.2 The web-based data provided by Scottish Forestry and referencing the Scottish Government's Ancient Woodland Inventory (AWI), and
 - The Scottish Forestry Map Viewer provides spatial data on the Native Woodland Survey of Scotland (NWSS) and classifies the woodland types into four categories² ³:
 - 1. Native woodland
 - 2. Nearly-native woodland
 - 3. Open land habitat
 - 4. Plantations on Ancient Woodland Sites (PAWS)
- 5.3 The woodlands within this ownership are situated on gentle slopes in Viewfield and Hilton woodlands, transitioning into steeper foothills towards the north of the ownership in Carbisdale and the south in West Strathcarron woodlands. Inveroykel's general aspect is southeast-facing in the northern sections and south-facing in the southern sections (West Strathcarron wood). In contrast, Carbisdale features constantly shifting aspects due to its small hills and steep banks, predominantly facing east and southeast. The woodland elevation ranges from approximately 20 m to 170 m above sea level.
- 5.4 Within this landscape, the Proposed Development passes through conifer plantations of different conifer species, most of which were planted with commercial interest.
- 5.5 The route primarily passes through coniferous plantations classified as Long-Established Woodland of Plantation Origin (LEPO) 2b, with most LEPO sites located in Carbisdale to the north and West Strathcarron wood to the south of the Operational Corridor (OC). LEPO classifications fall under the Ancient Woodland Inventory (AWI). Additionally, woodlands classified as Native Woodlands, mostly native pinewoods, are present in both Carbisdale and West Strathcarron, similar to the LEPO sites. These Native Woodlands have been identified through the NWSS. Refer to **Table 5.1**.
- 5.6 All designated and classified woodlands mentioned above are primarily located within the Proposed Development areas at Inveroykel and Carbisdale. In some instances, these woodlands share both classifications.

https://scottishforestry.maps.arcgis.com/apps/webappviewer/index.html?id=0d6125cfe892439ab0e5d0b74d9acc 18

² Scottish Forestry Map Viewer URL

³ Scottish Forestry Native Woodland Survey of Scotland: Glossary of Terms; URL: Main Title (forestry.gov.scot)

Native Woodland – woods where the canopy cover is composed mainly of native species (i.e., over 50%). Nearly Native Woodland - where native species make up between 40% and 50% of the canopy. These are woods that could have potential to be converted into native woodlands by altering their species mix. Open Land Habitat – areas with <20% canopy cover of trees and shrubs adjoining a native woodland. PAWS - Plantation on Ancient Woodland Sites. These are surveyed in the NWSS where they are recorded in the Scottish ancient woodland inventory (SAWI). These woodlands appear to have originated through natural regeneration sometime before the mid-19th century, but were later converted to planted wood.



5.7 The areas within the OC classified under the NWSS include native pinewood and sections categorized as an unidentifiable type, which exhibit characteristics similar to those surrounded by commercial conifer plantations composed of mixed species.

Table 5.1: Woodland Designations				
Item	Type of Impact	Woodland Designations	Area (ha)	
		AWI-LEPO 2b	15.46	
Operational Corridor	Permanent	NWSS- Native woodland	11.21	
Access track corridor	Temporary	AWI-LEPO 2b	2.75	
	Permanent	NWSS- Native woodland	1.08	
	Permanent	AWI-LEPO 2b	1.08	
Management Felling*	_	AWI-LEPO 2b	94.24	
	Temporary	NWSS- Native woodland	96.94	

^{*}Management Felling reference and details described in **Section 6**- Windblow Risk Impact.

- 5.8 Within the OC, LEPO 2b sites and Native Woodlands are jointly encountered within 3.10 ha of woodland in West Strathcarron wood and 4.78 ha in Carbisdale wood. The rest of the areas are either LEPO or Native Woodland classifications. Within the permanent Access tracks, 1.08 ha share designation for LEPO and Native Woodlands. Management Felling share designation for LEPO and Native woodlands of native pinewood type in approximately 93 ha.
- 5.9 LEPO areas of category 2b are present in Carbisdale Wood, located in the northern section of the OC within this ownership and in the West Strathcarron wood in the south part of the OC. These areas vary in composition, with some coupes consisting of young, pole-stage conifer plantations, (see **Plate 1**) while others contain semimature to commercially mature conifer trees (see **Plate 2**). The semi-mature stands primarily comprise Scots pine, Sitka spruce, larch, and fir, whereas the younger stands include a mix of broadleaved species, predominantly birch. Tree heights range from approximately 6 meters in the younger, more open stands characterised by an understorey of grass, bracken patches, ranked heather and rocky slopes, to around 26 m on small knolls, where fir, larch, spruce, and Scots pine occur mainly in pure stands rather than in mixed compositions. Refer to **Plate 3.**





<u>Plate 1</u>- LEPO 2b in the northern part of Carbisdale consists of a young plantation with a mix of larch, spruce, pine, and birch, averaging 6 m in height. The understorey is dense, featuring heather, bracken, and scattered boulders, with visible spruce regeneration. Grid reference: NH 56938 95868.





<u>Plate 2</u>- Native Woodland and LEPO 2b areas with semi-mature larch stand with Scots pine stand on the background. Those are located on small knolls in Carbisdale wood. The average tree height is about 24 m. A semi-open canopy with some spruce and pine natural regeneration is starting to establish in the understorey. Grid ref: NH 56638 95569.



<u>Plate 3.</u> LEPO 2b areas in Carbisdale Wood contain financially mature spruce stands, with trees averaging 26 m in height. The canopy is dense and unthinned, with scattered natural regeneration of spruce, western hemlock, and pine emerging in small light gaps. Grid reference: NH 56548 95500.



5.10 Amongst these semi-mature stands of commercial conifer species in both Native Woodlands and LEPO sites, some biologically semi-mature birch trees are scattered throughout the wood, where some show signs of coppice, suggesting some element of longevity of the woods. FLS data reveal that the commercial tree crop of the woodlands was planted in 1954. Refer to **Plate 4.**



<u>Plate 4-</u> Semi-mature birch trees (about 4 m tall) exhibiting coppice regrowth. Those elements of birch are scattered and encountered throughout the LEPO areas at Carbisdale. Grid reference: NH 56403 95392.

5.11 At West Strathcarron Wood, LEPO and Native Woodland designations are jointly encountered in some areas within the native pinewoods. These woodlands feature semi-mature Scots pine plantations of a commercial aspect, which have been previously subjected to thinning operations. The tree's average height is 24 m. Refer to **Plate 5**.





<u>Plate 5-</u> Scots pine plantation on West Strathcarron classified as Native Woodlandnative pinewood and LEPO 2b. Financial semi-mature Scots pine of average 24 m in height previously thinned stands with a dense heather understorey. Grid reference: NH 55604 91711.

5.12 Within the LEPO stands in West Strathcarron Small groups of larch trees are also scattered amongst the pinewoods as well as a small group of western red cedar trees also intersecting the OC. Trees average 16 m for larch and 25 m for western red cedar. Occasionally spruce trees are encountered in the mix potentially from natural regeneration of adjoining woodlands. Refer to **Plate 6.**



<u>Plate 6-</u> Western red cedar stands amongst the Scots pine in West Strathcarron wood within Inveroykel woodland in LEPO designations. Grid reference: NH 55605 91555.



5.13 Within Inveroykel wood, to the west of Viewfield wood, young woodlands with no classifications have been recently planted, presenting a mix of spruce and pine as the main commercial conifer mix. Scattered young birch has also regenerated throughout. Refer to **Plate 7**.



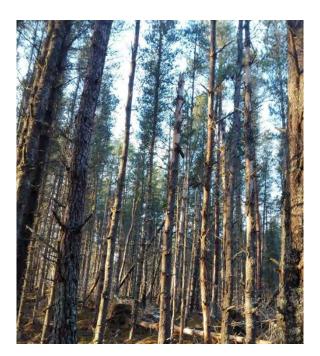
<u>Plate 7</u>- Conifer plantation composed of a mix of lodgepole pine and spruce, planted in 2020. The trees now average 2 m in height, while in some areas further north within the OC, they reach an average of 1 m. Grid reference: NH 55824 93722.

- 5.14 There is one area of Native Woodland of an unidentified type that intersects the OC within Inveroykel Wood, southeast of Hilton Wood. This young woodland, planted in 2020 as a commercial conifer plantation, consists primarily of lodgepole pine and spruce, with scattered larch present in the mix. The trees currently reach an average height of approximately 3 m. Refer to **Plates 8**.
- 5.15 Areas of non-classified woodland, comprising pole-stage conifer woodlands, are also present within Hilton Wood at Inveroykel. Refer to **Plate 9**.





<u>Plate 8.</u> Young plantation classified as Native Woodland within the Inveroykel forest. Tree mix of lodgepole pine, spruce and occasional larch trees of commercial aspect reaching 3 m average in height. Grid ref: NH 55946 94362.



<u>Plate 9-</u> In the non-classified woodlands northeast of Hilton Wood in Inveroykel, a pole-immature stand consists of lodgepole pine, Scots pine, and occasional spruce. The stand remains unthinned, with some trees showing broken tops due to windblow. The trees average 14 m in height. Grid reference: NH 55996 94587.

5.16 The woodlands within Inveroykel and Carbisdale are primarily managed for commercial purposes, featuring a mix of conifer species in both intimate mixtures and pure stands originally planted around 1954.



5.17 The site soils are predominately Humus-iron podzols.4

6. Windblow Risk Impact

- An assessment was undertaken of the risk of windblow/windthrow to areas of woodland adjacent to the OC which would be exposed due to the tree clearance required for the OC. This assessment was based on the professional judgement of the forestry surveyor with consideration being given to the soil and moisture regime, the topography, tree species, top height, exposure, altitude and aspect in relation to the prevailing wind direction and any previous management regimes. This assessment was undertaken from site visits and data available of the site. Reference was also made to Forest GALES 2.5 Forest Research decision support system where appropriate. Felling out with the OC to a windfirm boundary is termed Management Felling and is presented within Figure 1: Woodland Impacted by the Proposed Development.
- 6.2 Given the nature of some of the woodlands- those of semi-mature conifer woodlands of averaging height of 19 m with a mixture of both thinned and unthinned stands and the local characteristic of soils, topography and aspect, it is anticipated that the introduction of the OC will result in future windblow to the adjoining woods.
- 6.3 The woodland site affected by the Proposed Development has a 'Detailed Aspect Method of Scoring' (DAMS)⁵ windthrow hazard class score of 12 on the lower ground and up to 15 in the higher elevations, classified as moderately exposed. The site presents mineral soils with shallow rooting being mostly cool and moist.
- 6.4 Management felling is proposed to the areas adjacent to the OC and the access track corridors to minimise the future risk of windblow. However, certain areas within the woodland contain more open coupes, which are likely to remain windstable. These rather open coupes have been assessed and are therefore considered stable in the current conditions. Refer to **Table 9.4.**
- 6.5 While management felling is proposed by the Applicant as part of sound forestry practice, the decision to implement such operations ultimately rests with the forest owner, who must align any felling activities with their broader forest management plans and objectives. Felling permission for these areas must be obtained by the landowner through an application to Scottish Forestry. As part of this regulatory process, Scottish Forestry will consider the appropriateness of the proposed felling and will attach conditions requiring the restocking of felled areas to ensure continued sustainable forest management.

⁴ Scottish Government's Scotland's soils website https://soils.environment.gov.scot

⁵ Detailed Aspect method of Scoring (DAMS) Ref. Forest Research, "Forest Gales software programme" and Forestry Commission Leaflet 85 "Windthrow Hazard Classification"



7. Woodland Management Impact

- 7.1 The OHL will create additional challenges for the future management of the forest as it dissects existing management coupes and introduces an electrical hazard. The risks associated with the electrical hazard will be reduced by regular maintenance of the OC, so maintaining the compliance of the OC and reducing any need for future tree clearance operations within the "Red Zone".
- 7.2 The sterilisation of the OC, however, will have an impact on forest restructuring, potentially impacting the landowner's ability to utilise the forest's commercial viability in accordance with the UK Forestry Standard. Mitigation opportunities are discussed in the following **Section 8**.
- 7.3 The OHL will cross the woodland road network at either approximately 45 or 90 degrees and will be built to the regulatory safe height clearances above forest access tracks, which will reduce the hazard in respect of future timber haulage. It may still, however, impact on machine operations within the proximity of the OHL, such as stacking and loading. Mitigation of which could be incorporated into the access design, following discussions with the landowner.
- 7.4 The OHL may be restrictive to future in-forest machinery access. The requirement for dedicated forestry machine OHL crossing points will be discussed with the landowner and if required, will be identified once the OHL has been constructed, thus providing a safe OHL crossing point(s) for future working within the woodland.
- 7.5 The impact of the Proposed Development on the overall viability and continuity of woodland management has been considered. The affected woodland forms part of a larger estate comprising predominantly commercial conifer blocks. Although the proposed OC intersects several of these woodland compartments, it is not expected to compromise the implementation of forest operations or ongoing management. The OC traverses central sections of the woodland, where established access infrastructure is present on both sides, thereby maintaining operational accessibility. Consequently, no significant fragmentation or isolation of woodland units is anticipated, and the Proposed Development is not considered to materially affect the viability of the current or future management regime.
- 7.6 The impact of the Proposed Development on the overall viability and continuity of woodland management has been considered. The affected woodland forms part of a larger woodland comprising predominantly commercial conifer blocks. Although the proposed OC intersects several of these woodland compartments, it is not expected to compromise the implementation of forest operations or ongoing management. The OC traverses woodland sections of the woodland, where established access infrastructure is present on both sides, thereby maintaining operational accessibility. Consequently, no significant isolation of

⁶ As specified by the 'Red Zone' set out in paragraph 41 of the Forest Industry Safety Accord (FISA) Safety Guide 804. Electricity at Work: Forestry (2020) FISA 804 (ukfisa.com)



- woodland units is anticipated, and the Proposed Development is not considered to materially affect the viability of the current or future management regime.
- 7.7 The impacts arising from the Proposed Development are not anticipated to affect the wider woodland management regime, nor are they expected to necessitate any alteration to the current or planned species composition.

8. Mitigation Opportunities

- 8.1 Mitigation to reduce the extent of tree felling within the OC will be considered and incorporated in areas of broadleaved woodlands as part of the Proposed Development. Refer to Section 13.5.3 Good practice and Section 13.7.1 Mitigation within Volume 2, Chapter 13: Forestry. The Applicant will be using a process of 'managed resilience' which will seek to retain naturally regenerated broadleaved trees and shrubs as close as possible to the line to keep as much tree cover as possible. Smaller- and lower-growing tree species and shrubs can be retained closer to the OHL. OHL vegetation maintenance would take place on a 4-yearly cycle as required.
- 8.2 Impacts on woodland restock opportunities, resulting from the OC sterilisation, could be addressed through the amendment of the Felling Licence Application or the Long-Term Forest Plan (LTFP), adhered to the regulations of the Forestry and Land Management (Scotland) Act 2018, and in line with the UK Forestry Standard guidance to utilise wayleave corridors as designed Open Ground, repurposing currently unplanted areas to maintain the commercial productivity of the woodland.
- 8.3 Before the construction phase, these areas, along with access tracks, will be assessed for selective felling and also crown reduction to determine if greater tree retention is feasible. The final extent of tree retention will depend on the requirements of the Proposed Development, particularly ensuring the safety of OHL wiring operations during construction.
- The OC woodland removal area is required for the construction and operation of the new OHL infrastructure. Opportunities will be assessed for encouraging woodland regeneration within the OC, the identification of suitable areas cannot be guaranteed due to the requirement of maintaining the safe energisation of the OHL. Reference to **Tables 9.2 and 9.3** below will fully mitigate the loss of forest resource within the OC through compensatory planting of the equivalent area (ha) of woodland removed.
- 8.5 Impacts on tree windfirm stability within the remaining crop has been assessed and considered as noted in **Section 6**. Woodland loss and management felling have been minimised through retention of crops identified as likely to be windfirm.



8.6 Impact of stability within the remaining crop has been assessed and reported on above.

9 Woodland Removal Impact

Table 0.1	backbookk	Pomoval fo	r Infractructura

Item	Type of Infrastructure	Woodland type	Area (ha)
Operational corridor	Permanent	Broadleaved woodland	0.26
		Conifer woodland	33.67
Access track corridor	Permanent	Conifer woodland	1.08
	Temporary	Conifer woodland	2.75
Equipotential Zone (EPZ) Pulling Positions	Temporary	Conifer woodland	0.87

Table 9.2: Compensatory planting		
Compensatory Planting		38.63
Area		36.03

Table 9.3: Woodland Removal Impact of Infrastructure

Item	Woodland type	Area (ha)
Total Loss of Woodland Area	Conifer woodland	38.37
	Broadleaved woodland	0.26
Total Compensatory Planting Area off-site	Conifer woodland	34.75
	Broadleaved woodland	0.26
Total Restocking/ Replanting Area on-site	Conifer woodland	3.62
	Broadleaved woodland	0
Total Net Loss of Woodland Area		0

Table 9.4: Woodland Removal for Management Felling

Item	Type of Impact	Woodland type	Area (ha)
Management Felling	Temporary	Mature conifer plantation	116.93



Replanting / Restocking	Adhere to the Forestry and Land Management (Scotland) Act 2018.	116.93
Net Loss of Woodland Area		0

Note: Felling approval is via the Scottish Forestry Felling Licence Application process or Long-Term Forest Plan application or amendments process.

10. Compensatory Planting

10.1 Compensatory planting to achieve the area quantity (ha) of woodland removal as a result of the Proposed Development will be in accordance with the Scottish Government's Control of Woodland Removal Policy of no net loss of woodland. A compensatory planting strategy is set out in **Volume 5, Appendix 13.3: Compensatory Planting Strategy.**

