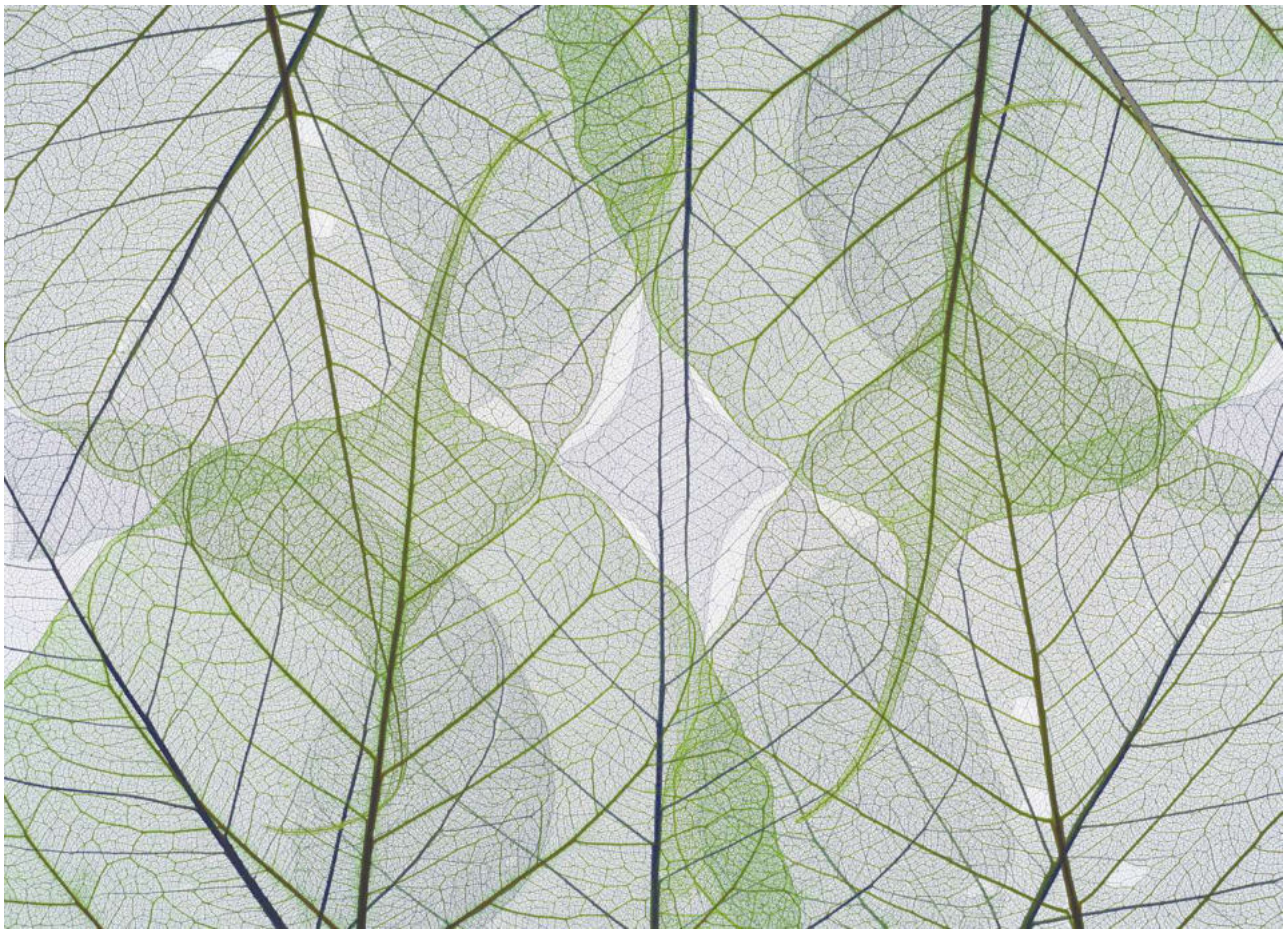

ScottishPower Renewables

Harestanes West Windfarm

Technical Appendix 14.1: Forestry Assessment

P663910

NOVEMBER 2024

RSK GENERAL NOTES

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1 INTRODUCTION

This Technical Appendix provides all the forestry information required for the Harestanes West Windfarm Environmental Impact Assessment (EIA) Report ('the EIA Report'), including:

- a baseline forestry assessment;
- the effect of the proposed Development on the forestry plantations;
- full information on the areas to be felled and the timber volumes to be removed;
- how the waste will be dealt with to minimise its effect on the environment; and
- mitigation measures in place including Compensatory Planting.

This report is presented as **Technical Appendix 14.1** of **Chapter 14: Other Issues** of the Harestanes West Windfarm EIA Report, and should be read in conjunction with the following EIA Report Chapters:

- Chapter 3: Proposed Development;
- Chapter 7: Landscape and Visual Impact Assessment;
- Chapter 8: Ecology and Biodiversity;
- Chapter 9: Ornithology; and
- Chapter 10: Geology, Peat, Hydrology and Hydrogeology.

1.1 Site Context

The Site (the area within the Application Boundary) is located in the Forest of Ae between Ae Village to the southeast and Thornhill to the northwest. The Site is primarily within the forestry area of The Forest of Ae, with the turbine area centred on National Grid Reference NX9599391814 as shown on **Figure 1.1** of the EIA Report**.** The Site lies wholly within the administrative boundary of Dumfries and Galloway Council.

The Site is dominated by The Forest of Ae comprising 6,959.49 hectares (ha), which is the total area of the forest as defined in the Ae Composite Land Management Plan. The land consists predominantly of commercial forestry. The 'turbine area' is located within the Old Forest part of The Forest of Ae The access track is located in the Kirkland, Queensberry and Old Forest blocks. The combined area of the Kirkland, Old Forest and Queensberry amount to 5,964.53 ha.

Black Loch Site of Special Scientific Interest (SSSI), located 2.3 km to the southeast of the Site, is the closest natural heritage designation.

1.2 Development Proposals

The proposed Development includes the following key elements:

- 12 wind turbines, six with a maximum height of 220 m and six with a maximum height of 200 m to blade tip, including foundations and aviation lighting;

- hardstanding areas at the base of each turbine, with an approximate total area of 3,856 m^2;
- transformer/switchgear housings located adjacent to turbines;
- site entrance from the A701, and 31.5 kilometres (km) of access track with associated watercourse crossings – of which 10.5 km are new access tracks and 21.00 km are upgrades to existing tracks;
- underground cabling linking the turbines with the substation;
- a permanent power performance assessment (PPA) anemometry mast and associated hardstanding area;
- an operations control building with parking and welfare facilities;
- a substation compound;
- a bellmouth and parking area adjacent to the A701;
- construction compound areas;
- extraction of material from up to three existing quarries owned and operated by Forestry and Land Scotland to provide suitable rock for access tracks, turbine bases and hardstanding; and
- health & safety and other directional site signage.
- Additional development components to improve the overall ecological, environmental and social benefits accruing from the proposed Development, as follows:
- peatland restoration;
- habitat improvement; and
- native woodland planting.

Full details of the project design are provided in **Chapter 3: Proposed Development** of the EIA Report, with the areas of proposed Development and enhancements shown in **Figure 3.1**. Greater detail of the proposed Development in relation to the habitat improvements is provided in **Technical Appendix 8.9** of **Chapter 8: Ecology and Biodiversity**.

2 LEGISLATION, POLICIES AND GUIDANCE

2.1 Scottish Forestry Strategy (2019)

The Scottish Forestry Strategy (SFS) is the Scottish Ministers' framework for taking forestry through the first half of this century and beyond. The SFS sets out the following commitments:

- to increase Scotland's woodland cover to 21% by 2032;
    - 12,000 ha per year from 2020/21;
    - 14,000 ha per year from 2022/23; and
    - 15,000 ha per year from 2024/25.
- Increase the contribution of forests and woodland to Scotland's sustainable and economic growth;
- Improve the resilience of Scotland's forests and woodlands and increase their contribution to a health and high-quality environment; and
- Increase the use of Scotland's forest and woodland resources to enable more people to improve their health, wellbeing and life chances.

2.2 Scottish Land Use Strategy (2016)

The Scottish Land Use Strategy (SLUS) is a strategic framework for achieving the *"best"* use from Scotland's land resource. It aims to achieve a more integrated approach to land use, maintaining the future capacity of the land resource and is based on the three pillars of sustainability: economy, environment and communities. Attaining multiple benefits from land is a key theme, and the focus on forestry is the identification of areas best for tree planting in an integrated land use system. To increase its role in addressing the challenge Scotland faces from climate change, a target of 100,000 ha of new woodland creation between 2012 - 2022 has been established. Regional Forestry and Woodland strategies developed by local authorities are identified as the delivery mechanism to promote good practice and multi benefit land use.

2.3 National Planning Framework 4 (2023)

The National Planning Framework 4 (NPF4) acknowledges the economic value of woodlands and forestry in addition to their ecological value. Policy 6 states the following:

c) Development proposals involving woodland removal will only be supported where they will achieve significant and clearly defined additional public benefits in accordance with relevant Scottish Government policy on woodland removal. Where woodland is removed, compensatory planting will most likely be expected to be delivered.

d) Development proposals on sites which include an area of existing woodland or land identified in the Forestry and Woodland Strategy as being suitable for woodland creation will only be supported where the enhancement and improvement of woodlands and the planting of new trees on the site (in accordance with the Forestry and Woodland Strategy) are integrated into the design.

2.4 Forestry and Land Management (Scotland) Act (2018)

The ability of woodlands to sequester carbon, and hence their role in possible mitigation of climate change is an important factor in shaping regulatory mechanisms. The felling of trees is regulated under the Forestry and Land Management (Scotland) Act 2018. Woodland removal, defined as *"the permanent removal of woodland for the purposes of conversion to another land use"* falls within the scope of the Forestry (Environmental Impact Assessment) (Scotland) Regulations 2017, except in cases when woodland removal is associated with onshore renewables development. In such cases, any significant environmental effects of woodland removal are assessed by the Scottish Government or the Local Authority depending on the capacity of a development.

2.5 Policy on the Control of Woodland Removal (2009)

The Scottish Government's policy document on the Control of Woodland Removal (CWR) Policy and accompanying Implementation Guidance (2019) (Appendix A) provides guidance on the policy and process for managing the implementation of the CWR Policy in respect of forestry removal on development sites. The principal aims of the CWR Policy are to provide a strategic framework for appropriate woodland removal and to support climate change mitigation and adaptation. The CWR Policy is built on the following principles:

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

The CWR Policy identifies the following criteria for areas where woodland removal may occur without a requirement for compensatory planting:

- Enhancing priority habitats and their connectivity;
- Enhancing populations of priority species;
- Enhancing nationally important landscapes, historic environment and geological Sites of Special Scientific Interest;
- Improving conservation of water resources;
- Improving conservation of soil resources; and
- Public safety.

Woodland removal with compensatory planting, is most likely to be appropriate where it would contribute significantly to:

- helping Scotland mitigate and adapt to climate change;
- enhancing sustainable economic growth or rural/community development;
- supporting Scotland as a tourist destination;
- encouraging recreational activities and public enjoyment of the outdoor environment;
- reducing natural threats to forests or other land; or
- increasing the social, economic or environmental quality of Scotland's woodland cover.

2.6 UK Forestry Standard

The overarching document for forestry management is the UK Forestry Standard (revised 2017) (UKFS). It is the reference standard for sustainable forest management in the UK. UKFS outlines the context for forestry, sets out the approach of the UK governments to forestry, defines standards and requirements and provides a basis for regulation and monitoring – including national and international reporting. UKFS's approach is based on applying criteria agreed at international and European levels to forest management in the UK. It has been endorsed by the UK and country governments and applies to all UK forests and woodlands. In its sustainable forest management guidelines with respect to climate change and soil, it advises that forest managers consider the balance of benefits of carbon and other eco system services before making the decision to restock on soils with peat depths exceeding 50 centimetres (cm). In general, there is a strong presumption against woodland removal, and restocking of harvested forests is a normal condition of felling approval being granted.

3 CONSULTATION UNDERTAKEN

Table 3.1 below presents a summary of the consultation undertaken in relation to forestry for the proposed Development.

Table 3.1 List of consultees and responses

Consultee and Date	Response	Comment
Scottish Forestry, 17th April 2023	Agree with scoping but; there is no mention of compensatory planting for lost woodland would like for this to be included & can only agree with scoping out that operation and decommissioning of windfarm has no impact on felling structure if evidence is provided for any possible adjacent 'non development' felling.	Compensatory planting details are included in this Technical Appendix to the EIA Report. It is not proposed to clear-fell the Site to accommodate the proposed Development.
Scottish Environmental Protection Agency (SEPA) 24th April 2023	Forest removal and forest waste A site layout which avoids large scale felling is preferred to avoid large amounts of waste material which can affect local water quality.	Noted, the proposed Development does not propose clear-felling of forestry.
Scottish Forestry, 1st October 2024	Forestry Appendix to identify any compensatory planting arrangements. This should include all tracks , turbine bases cable ways, connecting access tracks etc. Forestry Appendix to consider windblow and loss of trees from recent events, such as Storm Arwen.	Compensatory planting details are included in this Technical Appendix to the EIA Report. Consideration of windblow has factored in recent loss of trees such as from Storm Arwen.

4 BASELINE FORESTRY ASSESSMENT

4.1 Existing Forest Plans

The Forest of Ae plantation is managed by Forestry and Land Scotland (FLS).

The Ae Composite Land Management Plan (LMP) for Ae Forest runs from 2017 to 2027 (no approval date given).

4.2 Detailed Forestry Assessment

A walkover Forestry site assessment was carried out on 6th and 7th September 2023.

Ae Forest is owned and managed by Forestry Land Scotland (FLS). The forest is one large block with small areas of open space and cut by riparian channels. The Forest of Ae extends to 6,959.49 hectares. However, according to the FLS compartment schedule the proposed development is located within the Kirkland, Queensberry and Old Forest part of The Forest of Ae which extends to 5,964.53 hectares.

The primary objectives for the LMP are commercial conifer timber production with the principal species being Sitka spruce. Importance is placed on the design of harvesting coupes to retain windfirm edges and favourable aesthetic appearance of these coupes in the landscape. Designated areas are retained as 'treasured' for biodiversity, habitat and landscape where timber production is of lower relevance. Other activities of consideration are the existing Harestanes Windfarm, potential agricultural grazing and the 7 Stanes cycling routes. The LMP objectives will comply with the UK Forest Standard and certification under the UK Woodland Assurance Scheme.

Full details of the Ae composite LMP can be accessed via the following link:

https://forestryandland.gov.scot/what-we-do/planning/active/forest-of-ae

The following information has been taken from the National Forest Inventory 2020.

This is reasonably up to date and gives a very good picture of the forestry and non-forestry categories throughout the Site as shown below.

In addition to **Figure 14.1.1**, **Table 4.1** below, shows the total area of each land use category and what this represents as a percentage of the Site. The total areas and percentages of the Site (Forestry Land Scotland), in relation to the forestry features are:

- 450.56 ha of conifers which cover 38.62 % of the Site;
- 8.41 ha of broadleaved trees which cover 0.72% of the Site;
- 3.58 ha of windblow, which covers 0.31% of the Site. Although this is a small percentage of the whole site it equates to 0.79% of the area of conifers. This does indicate that the Site is quite susceptible to windblow and this should be taken into account when planning any further site felling. It should be noted that this data is prior to Storm Arwen of 26th November 2021 and subsequent storms. Therefore, the actual area of windblow will be greater than this;
- The total area of woodlands (i.e. conifers, broadleaved, felled etc) is 1,093.32 ha which equates to 93.71 % of the total area of the Site; and

- 180 ha (7%) of the Site is not classified (i.e. where the inventory did not register any specific feature).

Table 4.1 Areas and percentages of features covered by the National Forestry Inventory within the Application Boundary

Category	Area (ha)	Percentage of Site
Assumed woodland	19.33	1.66
Bare area	1.81	0.16
Broadleaved	6.06	0.52
Conifer	449.98	38.57
Failed	0.85	0.07
Felled	517.79	44.38
Grassland	60.19	5.16
Ground prep	2.92	0.25
Low density	5.26	0.45
Mixed mainly broadleaved	2.35	0.20
Mixed mainly conifer	0.58	0.05
Other vegetation	7.31	0.63
Quarry	0.32	0.03
Shrub	0.04	0.00
Windblow	3.58	0.31
Young trees	88.39	7.58
Total	**1166.75**	**100.00**
Total Woodland Features	**1093.32**	**93.71**
Total Non Woodland Features	**73.43**	**6.29**

4.2.1 Statutory Designations of Woodland

As shown in **Figure 14.1.2**, the woodland identified in light green is deemed to be Native woodland, the areas highlighted in pink are deemed to be Nearly Native Woodland and areas highlighted yellow are Plantations on Ancient Woodland Sites (PAWS).

4.2.2 Species

The Forest of Ae Composite LMP for the Kirkland, Old Forest and Queensberry area is detailed in the table (**Table 4.2** , which shows the broad category tree species mixtures).

The long-term plan for 2026 and 2026 indicates that the area of Sitka spruce will be reduced by 6% and the area of other mixed conifers will increase by 11%. Presumably this is to enhance species resilience and provide more the LISS areas. The area of mixed broadleaves will increase by 4%. Whereas the amount of open space is to be increased by 14%. The current Species mix for the Old Forest is broken down in **Table 4.3**.

Table 4.2 LMP proposed species and areas for Kirkland, Old Forest and Queensberry combined

Species	Area (ha)	Percentage (%)
Ash	3.53	0.06
Alder	1.5	0.03
Aspen	8.63	0.15
Beech	2.48	0.04
Other birch	0.3	0.01
Common alder	8.2	0.14
Douglas fir	15.42	0.27
Goat Willow	0.96	0.02
Hazel	1.2	0.02
Hybrid larch	0.42	0.01
Japanese larch	1.98	0.03
Lodgepole pine	44.4	0.78
Mixed broadleaves	155.91	2.76
Noble fir	8.2	0.14
Norway spruce	245.62	4.34
Oak	10.69	0.19
OMS	0.53	0.01
Downy birch	11.94	0.21
Pedunculate oak	0.25	0.00
Western red cedar	10.05	0.18
Rowan	22.69	0.40
Silver birch	11.56	0.20
Sessile oak	1.22	0.02

Species	Area (ha)	Percentage (%)
Scots pine	50.15	0.89
Sitka spruce	3358.09	59.35
Wild cherry	0.35	0.01
Western hemlock	2.24	0.04
Other broadleaves	6.88	0.12
Other conifers	2.41	0.04
Open Ground & other	1670.41	29.52
Grand Total	**5658.21**	**100.00**

Table 4.3 Species mixtures from current FLS compartment schedule for Kirkland, Old Forest and Queensberry combined.

Wooded Areas	2026		2036	
Species	Area (ha)	Percentage (%)	Area (ha)	Percentage (%)
Sitka spruce	3,841.86	64.41	3,593.13	60.24
Other Conifers	660.77	11.08	733.83	12.30
Mixed Broadleaves	321.39	5.39	335.91	5.63
Open Ground & Fallow	1,140.51	19.12	1,301.66	21.83
Totals	**5,964.53**	**100.00**	**5,964.53**	**100.00**

The LMP indicates Sitka spruce as the most suitable productive species, given that the soils are classified as wet peaty gleys across the higher ground. In addition, the potential for Scots pine and suitable mixed broadleaves in the moderately exposed and higher areas of the Site. There is the potential for increasing species resilience with the potential for the inclusion of Norway spruce, Douglas fir, Western red cedar and grand fir on the less exposed slopes.

The suitability for Sitka spruce is shown on **Figure 14.1.3** with the colour coding being as follows:

- Unsuitable – Red;

- Marginal – Orange;
- Suitable – Yellow; and
- Very Suitable – Green.

This confirms the visual evidence from the aerial view and the National Forest Inventory that Sitka spruce is suited to most areas of the Site.

It is expected that Sika spruce will remain the dominant productive species into the future based on its site suitability. However, the LMP indicates that it will need to be planted in mixtures with Lodgepole pine as a nurse crop on the less productive soil types.

Native broadleaves will be planted to maintain biodiversity and landscape benefits with the aim to have 5% coverage by 2070. Species such as downy birch, willow, rowan, alder and hawthorn are planned for the more exposed sites. Silver birch, rowan, hazel, alder oak and aspen will be planted on the lower slopes and less exposed sites.

4.2.3 Yield Classes

The sub compartment database spreadsheet provided by FLS has been used to provide information on plantation age and yield classes.

From an analysis of the FLS compartment schedule there is a varied range of age and yield classes. This indicates a reasonably even distribution of age classes between years 0 and 50, with a peak between years 20 and 30. It can be interpreted that restructuring of age classes has been effective with only 6.20% of trees planted before 197 (see table below).

There would appear to be a wide range of age classes in the sub compartments from young plantations to some which have reached the end of their financial rotation (i.e. reached the point of Maximum Mean Annual Increment) and are due to be clear felled. **Table 4.4** shows the planting years across in Kirkland, Old Forest and Queensberry portions of the Forest of Ae based on the Forestry and Land Scotland compartments schedule.

Table 4.4 Age Classification in the Kirkland, Old Forest and Queensberry combined.

Age Classification	Area (ha)	Percentage %
0 - 10	814.05	19.30
10 - 20	774.09	18.35
20 - 30	1,295.89	30.72
30 - 40	871.93	20.67
40 - 50	200.60	4.76

Age Classification	Area (ha)	Percentage %
50 - 60	27.70	0.66
60+	233.86	5.54
Total	**4,218.12**	**100.00**

Although yield classes extend from YC 2 to 24, that for the productive components are favourable to generating moderate harvesting yields. Sitka spruce yield classes range from 8 to 24 with the average by area being YC16. The bulk of the Sitka spruce plantations lie in the YC 14 to 24 range. This indicates that the trees are above average for the UK from a productivity point of view. See **Table 4.5** for further information.

Table 4.5 Yield Class for all species in the Kirkland, Old Forest and Queensberry combined.

Yield Class	Area (ha)	Percentage (%)
2	68.68	1.67
4	61.55	1.50
6	26.43	0.64
8	106.92	2.60
10	77.84	1.89
12	243.05	5.91
14	629.16	15.29
16	1,274.44	30.98
18	799.92	19.44
20	225.09	5.47
22	232.32	5.65
24	368.61	8.96
Total	**4,114.01**	**100.00**

The normal age for felling Sitka spruce YC18 would be 52 to 54 years old. The FLS compartment schedule analysis shows that 93.80% of plantations are less than 50 years old, with the remainder (19%) being beyond normal harvesting age for YC18.

The average yield classes base on the FLS schedule are expected to be:

- Sitka Spruce - Yield Class 16 – 22;
- Other Conifers – Yield Class 12 – 14; and
- Mixed Broadleaves – Yield Class 2 – 4.

Approximately 305 hectares have been thinned since 2007, predominantly Sitka spruce, to a lesser extent Norway spruce and a small amount of Lodgepole pine. The LMP suggests that thinning will be done on a five-year cycle and limited to mineral soils with a DAMS score of less than 17. It was noticeable from the site survey that thinned compartments had suffered windblow events especially following Storm Arwen (indicated by the fallen direction of windblown trees).

4.2.4 Felling Phases

The FLS felling plans show the areas that are planned for felling over the next 5 years and the indication from the data is that most of this is clear felling. It is assumed that all the 2022 areas have already been felled and were earmarked for re-planting over the winter of 2023/24.

From proposed Development's design, the felling required would be as per **Table 4.6**. The information for each sub-compartment includes: area (ha); tree species, approximate age; and the volume of timber to be removed.

Once the final plans have been drawn up and the area of felling is known, a meeting with Scottish Forestry would be needed to establish whether CP is required. If CP is needed, a discussion with the appropriate landowner would be the next stage to identity a suitable planting site.

4.2.5 Timber Size

The mensuration data for the plantations can be found in the sub compartment schedule **Table 4.6 below.**

4.2.6 Timber Quality

The quality of the timber is typical for these plantations' types of species and age. It was noted that there was a prevalence of Sitka spruce regen stems in amongst planted stems in most survey areas.

The following photographs, **Figure 14.1.4 to Figure 14.1.7,** of the plantations are included to give the reader a better idea of the size and quality of the timber and are illustrative of the types of timber present on the Site.

Table 4.6 Details of area and forestry removal as a result of the proposed Development

Comp No.	Area (Ha)	Area Lost to Turbines gross (Ha) - *does not include Windfirm edge or infrastructure*	Area Lost to Turbines net (Ha) - *does not include Windfirm edge or infrastructure*	Area lost to Infrastructure gross (Ha) - *does not include Turbine or Wind fim edge*	Area Lost to Infrastructure net (Ha) - *does not include Turbine or Wind fim edge*	Area Lost to Windfirm Edge gross (Ha) - *does not include Turbine or Infrastructure*	Area Lost to Windfirm Edge net (Ha) - *does not include Turbine or Infrastructure*	Gross Area Loss *(Turbine + Infrastructure + Windfirm Edge less 15% for open ground, rides etc)* (Ha)	Net Area Loss *(Turbine + Infrastructure + Windfirm Edge less 15% for open ground, rides etc)* (Ha)	Species	Planting Year	Yield Class	Age	Volume per Ha (m^3)	Approx Volume to be removed (m^3)	Approx Tonnage to be removed (Conversion factor of 1.08)	Wagon Loads (25t per load)	Wagon loads of Brash (woodchip) to be removed @ circa 25% of timber volume (25t loads)
5300	8.67	0.32	0.27	0.6653	0.565505	3.008771	2.5574554	3.99	*3.39239335*	Unplanted	0	0	0	0				
5311	17.82		0.00	0.343493	0.2919690 5	1.0805	0.918425	1.42	*1.21039405*	SS/NS	1935	16	89	583	705.66	653.39	26.14	0.26
5312	24.84 6	0.08	0.06	1.316925	1.1193862 5		0	1.39	*1.18408825*	SS/NS	2015	14	9	n/a		0.00	0.00	0.00
5313	20.52	0.00	0.00	0.535959	0.4555651 5	0.001565	0.0013303	0.54	*0.4582962*	SS	2001	24	23	351	160.86	148.95	5.96	0.06
5315	23.71	0.35	0.30	2.911357	2.4746534 5	5.944708	5.0530018	9.21	*7.8272505*	SS	1989	22	35	630	4931.17	4565.90	182.64	1.83
5316	24.68		0.00	1.302493	1.1071190 5	0.013967	0.011872	1.32	*1.118991*	SS	1994	18	30	390	436.41	404.08	16.16	0.16
5317	18.46		0.00	2.6300394	2.2355334 9	1.0097	0.858245	3.64	*3.09377849*	SS	1994	18	30	390	1206.57	1117.20	44.69	0.45
5318	28.01		0.00	2.1200283	1.8020240 55		0	2.12	*1.802024055*	SS	1986	22	38	713	1284.84	1189.67	47.59	0.48
5321	30.52	0.86	0.73	0.055112	0.0468452	0.9843	0.836655	1.90	*1.61367995*	SS	1989	22	35	630	1016.62	941.31	37.65	0.38
5322	31.99		0.00	0.832083	0.7072705 5	0.027429	0.0233147	0.86	*0.7305852*	SS	2018	16	6	n/a				
5323	51.43		0.00	0.163969	0.1393736 5		0	0.16	*0.13937365*	SS	1991	22	33	586	81.67	75.62	3.02	0.03
5342	3.4		0.00		0	0.008116	0.0068986	0.01	*0.0068986*	SS used schedule data	2006	20	18	189	5.67	5.25	0.21	0.00
5343	5.31		0.00		0	0.189561	0.1611269	0.19	*0.16112685*	SS used schedule data	2007	16	17	75	8.25	7.64	0.31	0.00
5344	40.78	1.35	1.15	2.54379	2.1622215	20.216732	17.184222	24.11	*20.49360455*	To be felled before construction	0	0	0	n/a				
5345	18.37	0.02	0.02		0	0.193019	0.1640662	0.21	*0.1810432*	SS used schedule data	2009	8	15	30	30.00	27.78	1.11	0.01
5346	17.45	0.24	0.21	0.3888975	0.3305628 75	2.498297	2.1235525	3.13	*2.660944975*	Unplanted	0	0	0	n/a				
5347	40.74	1.76	1.49	3.18571	2.7078535	24.443506	20.77698	29.39	*24.9791523*	SS	2015	18	9	n/a				
5348	15.74	0.33	0.28		0	0.447043	0.3799866	0.78	*0.66157285*	SS	1997	18	27	n/a				
5349	33.36		0.00		0	0.000133	0.0001131	0.00	*0.00011305*	SS	0	0	0	n/a				
5350	18.87	0.40	0.34	1.137785	0.9671172 5	4.486039	3.8131332	6.03	*5.124395*	SS	2019	8	5	n/a				

Comp No.	Area (Ha)	Area Lost to Turbines gross (Ha) - *does not include Windfirm edge or infrastructure*	Area Lost to Turbines net (Ha) - *does not include Windfirm edge or infrastructure*	Area lost to Infrastructure gross (Ha) - *does not include Turbine or Wind fim edge*	Area Lost to Infrastructure net (Ha) - *does not include Turbine or Wind fim edge*	Area Lost to Windfirm Edge gross (Ha) - *does not include Turbine or Infrastructure*	Area Lost to Windfirm Edge net (Ha) - *does not include Turbine or Infrastructure*	Gross Area Loss *(Turbine + Infrastructure + Windfirm Edge less 15% for open ground, rides etc)* (Ha)	Net Area Loss *(Turbine + Infrastructure + Windfirm Edge less 15% for open ground, rides etc)* (Ha)	Species	Planting Year	Yield Class	Age	Volume per Ha (m^3)	Approx Volume to be removed (m^3)	Approx Tonnage to be removed (Conversion factor of 1.08)	Wagon Loads (25t per load)	Wagon loads of Brash (woodchip) to be removed @ circa 25% of timber volume (25t loads)
5351	54.26	0.68	0.58	7.444052	6.3274442	7.821162	6.6479877	15.95	*13.5557337*	SS	2015	18	9	n/a				
5352	14.09	0.84	0.72	2.569674	2.1842229	9.764091	8.2994774	13.18	*11.2018916*	SS	2015	16	9	n/a				
5355	18.35	0.00	0.00	0.293549	0.24951665	1.21166	1.029911	1.51	*1.28292625*	SS	2015	18	9	n/a				
5356	35.17	0.99	0.84	1.246177	1.05925045	5.278533	4.4867531	7.52	*6.38859575*	SS	2000	24	24	303	1935.74	1792.36	71.69	0.72
5357	34.08	0.27	0.23	1.88962	1.606177	4.231818	3.5970453	6.40	*5.43597015*	SS	1994	14	30	257	1397.04	1293.56	51.74	0.52
5358	19.91		0.00		0	0.034829	0.0296047	0.03	*0.02960465*	SS	0	0	0	n/a				
5359	26.78		0.00	0.1838886	0.15630531		0	0.18	*0.15630531*	SS, windblown	1983	20	41	704	110.04	101.89	4.08	0.04
5360	15.99	0.21	0.18	2.252122	1.9143037	4.299724	3.6547654	6.76	*5.7479414*	SS/NS	1981	20	43	750	4310.96	3991.63	159.67	1.60
5361	19.94	1.27	1.08	1.655527	1.40719795	0.027734	0.0235739	2.96	*2.51415465*	SS	2007	16	17	75	188.56	174.59	6.98	0.07
5364	28.84	1.30	1.10	1.395247	1.18595995	2.792591	2.3737024	5.48	*4.66080925*	Unplanted/Open	0	0	0	n/a				
5368	24.49	0.78	0.66	3.866443	3.28647655	1.589739	1.3512782	6.23	*5.298118*	SS	2008	16	16	59	312.59	289.43	11.58	0.12
5369	30.08	3.13	2.66	2.120433	1.80236805	20.377624	17.32098	25.63	*21.7840669*	SS	2000	18	24	233	5075.69	4699.71	187.99	1.88
5370	28.25		0.00	0.1136405	0.096594425	0.777597	0.6609575	0.89	*0.757551875*	SS	1994	16	30	337	255.29	236.38	9.46	0.09
5371	29.81	1.53	1.30	1.1246176	0.95592496	0.02879	0.0244715	2.69	*2.28385701*	SS	2007	16	17	75	171.29	158.60	6.34	0.06
5451	22.09		0.00	0.180776	0.1536596		0	0.18	*0.1536596*	SS	2019	14	5	n/a				
5452	30.82		0.00	0.1429173	0.121479705		0	0.14	*0.121479705*	SS	1998	18	26	287	34.86	32.28	1.29	0.01
5453	25.14		0.00	0.1477125	0.12555625		0	0.15	*0.125555625*	SS	1995	16	29	258	32.39	29.99	1.20	0.01
5460	46.49		0.00	0.0488955	0.041561175		0	0.05	*0.041561175*	SS	1994	12	30	214	8.89	8.24	0.33	0.00
5461	40.52		0.00	0.07593645	0.06454598 3		0	0.08	*0.064545983*	SS	2009	18	15	81	5.23	4.84	0.19	0.00
5469	58.57		0.00	0.1388455	0.118018675		0	0.14	*0.118018675*	SS	1994	22	30	501	59.13	54.75	2.19	0.02
5470	42.36		0.00	0.14280105	0.12138089 3		0	0.14	*0.121380893*	SS	2004	16	20	166	20.15	18.66	0.75	0.01
5478	64.68		0.00	0.0973989	0.082789065		0	0.10	*0.082789065*	SS	1990	24	34	646	53.48	49.52	1.98	0.02
5479	18.11		0.00	0.164552	0.1398692		0	0.16	*0.1398692*	NS	1997	14	27	151	21.12	19.56	0.78	0.01
5480	19.87		0.00	0.2061345	0.175214325		0	0.21	*0.175214325*	SS	2006	16	18	75	13.14	12.17	0.49	0.00
5506	44.1		0.00	0	0		0	0.00	*0*	SS	2016	14	8		0.00	0.00	0.00	0.00
5507	30.46		0.00	1.573306	1.3373101		0	1.57	*1.3373101*	SS	2001	12	23	66	88.26	81.72	3.27	0.03

Comp No.	Area (Ha)	Area Lost to Turbines gross (Ha) - *does not include Windfirm edge or infrastructure*	Area Lost to Turbines net (Ha) - *does not include Windfirm edge or infrastructure*	Area lost to Infrastructure gross (Ha) - *does not include Turbine or Wind fim edge*	Area Lost to Infrastructure net (Ha) - *does not include Turbine or Wind fim edge*	Area Lost to Windfirm Edge gross (Ha) - *does not include Turbine or Infrastructure*	Area Lost to Windfirm Edge net (Ha) - *does not include Turbine or Infrastructure*	Gross Area Loss *(Turbine + Infrastructure + Windfirm Edge less 15% for open ground, rides etc)* (Ha)	Net Area Loss *(Turbine + Infrastructure + Windfirm Edge less 15% for open ground, rides etc)* (Ha)	Species	Planting Year	Yield Class	Age	Volume per Ha (m^3)	Approx Volume to be removed (m^3)	Approx Tonnage to be removed (Conversion factor of 1.08)	Wagon Loads (25t per load)	Wagon loads of Brash (woodchip) to be removed @ circa 25% of timber volume (25t loads)
5509	22.68		0.00	0.3056238	0.25978023		0	0.31	*0.25978023*	UP?								
5510	17.88		0.00	0.0114866	0.00976361		0	0.01	*0.00976361*	SS	2001	18	23	174	1.70	1.57	0.06	0.00
5512	61.59		0.00	0.2792706	0.23738001		0	0.28	*0.23738001*	SS/SP	2003	16/14	21	156	37.03	34.29	1.37	0.01
5513	7.92		0.00	0.095107	0.08084095		0	0.10	*0.08084095*	JL	1958	10	66	512	41.39	38.32	1.53	0.02
5514	10.31		0.00	0.1199046	0.10191891		0	0.12	*0.10191891*	NS/SP	2018	14	6	n/a				
5515	31.81		0.00	0.116202	0.0987717		0	0.12	*0.0987717*	SS	2018	14	6	n/a				
5516	21.14		0.00	0.12385125	0.10527356 3		0	0.12	*0.105273563*	LP	2024	12	0	n/a				
5517	16.11		0.00	0.0726573	0.06175870 5		0	0.07	*0.061758705*	SS/SP	2008	16/16	16	75	4.63	4.29	0.17	0.00
5518	62.63		0.00	0.2223856	0.18902776		0	0.22	*0.18902776*	SS	1991	14	33	327	61.81	57.23	2.29	0.02
5519	22.57		0.00	0.97245	0.8265825		0	0.97	*0.8265825*	SS/NS	1959	16/10	65	864	714.17	661.27	26.45	0.26
5520	41.28		0.00	3.139138	2.6682673	10.0133	8.511305	13.15	*11.1795723*	SS used schedule data	2013	11	11	n/a				
5521	72.21		0.00	6.599796	5.6098266	11.962979	10.168532	18.56	*15.77835875*	SS	2003	20	21	251	589.62	2598.22	103.93	1.04
5522	44.59		0.00	3.3956768	2.88632528		0	3.40	*2.88632528*	No schedule information - Used average data	1995	18	29	229	660.97	612.01	24.48	0.24
5523	30.49		0.00	0.289374	0.2459679		0	0.29	*0.2459679*	SS	2011	12	13	n/a				
5525	22.19		0.00	0.5085764	0.43228994		0	0.51	*0.43228994*	SS	2024	24	0	n/a	0.00	0.00	0.00	0.00
5526	12.12		0.00	0.0792736	0.06738256		0	0.08	*0.06738256*	SS	2007	16	17	57	3.84	3.56	0.14	0.00
5527	28.19		0.00	0.068646	0.0583491	0.507265	0.4311753	0.58	*0.48952435*	SS/NS used schedule data	1954	12	70	718	351.48	325.44	13.02	0.13
5528	53.50		0.00	0.00191825	0.00163051 3	0.006426	0.0054621	0.01	*0.007092613*	Unplanted (7.64ha)	0	0	2024	n/a				
5532	37.62		0.00	0.58557525	0.49773896 3		0	0.59	*0.497738963*	SS	1990	24	34	646	321.5394	297.7216387	11.908866	0.11908866
5536	21.65		0.00	0.030557	0.02597345		0	0.03	*0.02597345*	OG								
5537	55.01		0.00	0.234728	0.1995188		0	0.23	*0.1995188*	SS	1993	16	31	369	73.62244	68.16892333	2.7267569	0.02726757
5538	43.36		0.00	0.1437662	0.12220127		0	0.14	*0.12220127*	SS	1993	18	31	408	49.85812	46.16492422	1.846597	0.01846597

Comp No.	Area (Ha)	Area Lost to Turbines gross (Ha) - *does not include Windfirm edge or infrastructure*	Area Lost to Turbines net (Ha) - *does not include Windfirm edge or infrastructure*	Area lost to Infrastructure gross (Ha) - *does not include Turbine or Wind fim edge*	Area Lost to Infrastructure net (Ha) - *does not include Turbine or Wind fim edge*	Area Lost to Windfirm Edge gross (Ha) - *does not include Turbine or Infrastructure*	Area Lost to Windfirm Edge net (Ha) - *does not include Turbine or Infrastructure*	Gross Area Loss *(Turbine + Infrastructure + Windfirm Edge less 15% for open ground, rides etc)* (Ha)	Net Area Loss *(Turbine + Infrastructure + Windfirm Edge less 15% for open ground, rides etc)* (Ha)	Species	Planting Year	Yield Class	Age	Volume per Ha (m^3)	Approx Volume to be removed (m^3)	Approx Tonnage to be removed (Conversion factor of 1.08)	Wagon Loads (25t per load)	Wagon loads of Brash (woodchip) to be removed @ circa 25% of timber volume (25t loads)
5539	53.37		0.00	0.0404272	0.03436312		0	0.04	*0.03436312*	SS	1997	14	27	229	7.869154	7.286254148	0.2914502	0.0029145
5544	26.02		0.00	0	0		0	0.00	*0*	OG								
5545	36.13		0.00	0.0863625	0.07340812 5		0	0.09	*0.073408125*	MB								
5546	38.61		0.00	0.4481565	0.38093302 5		0	0.45	*0.380933025*	SS	2001	14	23	139	52.94969	49.02749118	1.9610996	0.019611
5547	13.10		0.00	0.0780492	0.06634182		0	0.08	*0.06634182*	SS	1993	14	31	327	21.69378	20.08682883	0.8034732	0.00803473
5550	19.48		0.00	0.036838	0.0313123	3.728314	3.1690669	3.77	*3.2003792*	SS/NS used schedule data	1953	14	71	812	2598.71	2406.21	96.25	0.96
5551	44.58		0.00	0.17259975	0.14670978 8		0	0.17	*0.146709788*	SS	1995	14	29	229	33.60	31.11	1.24	0.01
5552	19.11		0.00	0	0		0	0.00	*0*	SS	1995	12	29	214	0.00	0.00	0.00	0.00
5553	19.95		0.00	0.0008175	0.0006948 75		0	0.00	*0.000694875*	SS	1993	18	31	408	0.28	0.26	0.01	0.00
5554	73.15		0.00	0.01777185	0.0151060 73		0	0.02	*0.015106073*	SS	2015	18	9	n/a	0.00	0.00	0.00	0.00
5555	38.81		0.00	0.7734756	0.65745426		0	0.77	*0.65745426*	SS	2002	16	22	156	102.56	94.97	3.80	0.04
GC	TBC		0.00	0.3468	0.29478		0	0.35	*0.29478*	MB	1900	4	124	150	44.22	40.94	1.64	0.02
	2417.086	**16.73**	**14.22**	**68.60**	**58.31**	**149.01**	**126.66**	**234.34**	***199.19***						**29,735.13**	**29,584.80**	**1,183.39**	**11.83**

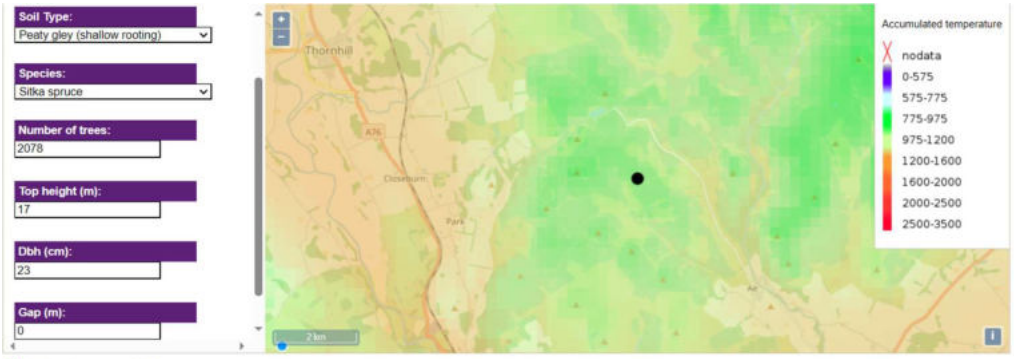
4.2.7 Windblow Risk

Windblow was noticeable throughout the Site and operations have been undertaken in recent years to remove this in conjunction with clear-felling coupes back to 'windfirm' edges. Storm 'Arwen' and successive storms have increased harvesting workload with the need to divert resource to clearance of the windblown area backlog.

Any felling of trees around the proposed turbine locations would need to be felled back to a windfirm edge or more likely the edge of the compartment/sub-compartment boundary.

The average Windthrow Hazard Classification (WHC) for Sitka spruce listed on the FLS schedule is 4 across the Old Forest block. Using T10 of the proposed Development as an example, the WHC is 5 which indicates that trees reach their critical height at 16 m in a non-thinned stand of trees. Critical height means the onset of windblow. Trees would reach their terminal height (height at which 40 % of the stand is expected to be windblown) at 19.5 m. The DAMS score for the T10 location is 18 which indicates high probability of windthrow once critical height is reached.

Figure 14.1.8 Forest Gales report for T10 compartment 5357



Eastings(m)	Northings(m)	Site Grid Reference	Exposure(DAMS)	Soil
295500	592100	NX955921	18	Peaty gley shallow rooting

Species	Top height (m)	Dbh (cm)	Trees (n/ha)	Gap (m)
Sitka spruce	17	23	2078	0

Type of damage	Critical Wind Speed (km/h)	Return Period (years)	Wind Damage Risk Status (1 low risk, 6 high risk)
Overturn	188.6	200	1
Windsnap/break	198.2	200	1

The LMP suggest that most of the harvesting will be clear felling. The LMP Management Map (see **Figure 14.1.9**) indicates the felling phases in detail between 2018 and 2065, with the majority being between 2023 and 2037. It is assumed that all the areas between 2018 and 2022 have already been felled and were earmarked for re-planting following a period of fallow.

5 FORESTRY FELLING PLANS FOR THE PROPOSED DEVELOPMENT

5.1 Key Objectives

In relation to forestry, the key objective of the proposed Development Plan has been to minimise the amount of tree felling, and all felling for the installation of wind turbines would be based on keyhole felling.

Figure 14.1.10a shows the minimum areas that would need to be felled to accommodate the transportation and construction of the proposed Development. **Figure 14.1.10b** shows the areas that would need to be kept clear of trees for the operation of the proposed Development.

5.1.1 Wind Turbine Buffers

Keyhole felling around each turbine location will be necessary. Areas within 98 m of the proposed 200 m turbines and 86 m of the 220 m turbines will be required to be felled and kept clear of forestry for the duration of the operational phase of the Proposed Development; this is the minimum area required for both ecological and turbine efficiency reasons. Forestry Land Scotland will expect to grow trees to full rotation and maximum mean annual increment. Therefore, potential top heights could reach between 24 m and 30 m above ground level adjacent to turbine keyhole areas. The objective has also been to retain the current windfirm edges of sub-compartments wherever possible and we have also taken into account the prevailing south westerly winds.

5.1.2 Access Tracks

Existing access tracks have been utilised wherever possible but where it has not been possible to use existing tracks the shortest possible route has been chosen subject to avoiding watercourses or other environmentally sensitive areas. The width of the access routes has been kept to the minimum required for the transportation of the construction materials. It would however be necessary to carry out some additional felling for passing places and on bends as required. A 20 m buffer has been applied for oversail when delivering turbine masts and blades.

5.1.3 Other Areas to be Felled

There would be a relatively small amount of felling to provide clear areas for the substation and compounds. Based on a 12.5 m buffer zone, for the proposed construction compounds and substation, the total area to be kept clear of trees is 1.3 ha.

6 HARVESTING METHOD AND UTILISATION OF TIMBER

Forestry works would be conducted in line with the 'Scottish Environment Protection Agency's guidance note – Land Use Planning System', as well as 'SEPA's Guidance Note LUPS-GU27 – Use of Trees Cleared to Facilitate Development on Afforested Land'.

The document states that the best practice for dealing with forest materials at development sites is as follows:

- Professional forester input to quantify the likely volume, markets, and economic uses of trees to be exported from the Site;
- Developer commitment to employ a professional forester to implement and maximise the removal of timber and forest residue on the Site;
- Quantify the likely volumes of material for which no economic off-site use can be found; and
- Identify if there are valid uses on site for material for which no economic off-site use can be found.

All forestry input in relation to the proposed Development's EIA Report is being provided by Wayne Scurrah, who is an Associate Member of the Institute of Chartered Foresters and has experience in providing forestry support for windfarm and other renewables developments.

FLS would arrange and oversee the actual felling and utilisation of the timber.

The method of felling and utilisation at this site will be based on whole tree utilisation. All the timber and branchwood would be removed from site so there would minimal arisings left on site. The method would be as indicated below.

A conventional harvester and forwarder would be used to fell and extract the timber from all felled areas. A forwarder would then be used to gather the brash. It would then be taken to roadside and put through a chipper which would chip all the brash which is blown in walking floor type trailer on an articulated lorry.

The round timber is likely to be sent to local timber markets for onward processing with the wood chip element being sold for biomass.

In considering yield, where the Sitka spruce was in mixture or was the dominant species, the Sitka spruce model was used.

Timber volumes are derived from using Forest Yield (Forest Research pc-based yield model software for forest management in Britain) using the age of the tree crops and an average estimated Yield Class of General Yield Class for Lodgepole pine and Sitka spruce crops across the felling range.

The default yield models used were Sitka spruce, no thinning, 2 m initial planting spacing, as these reflect the dominant species types at the Site. The Sitka spruce model was also used where Sitka spruce had achieved full canopy dominance species in a mixed stand.

Net areas have been used for the purposes of this assessment. This was calculated by deducting 15 % of the gross area to account for drainage ditches and open spaces within the crop.

A conversion factor of 1.08 has been used to convert the net volume into tonnage. This conversion factor was used to determine the number of lorry movements associated with the forestry aspect of the proposed Development based on an average 25 tonne payload per lorry, detailed in **Table 4.6**

The following areas would be kept clear of trees for the operation of the proposed Development:

- Areas within 98 m of the proposed turbine 200 m turbines and 86 m of 220 m turbines for keyholing around proposed turbines**;**
- New access tracks including 20 m buffer for oversail; and
- Substation and control building compounds.

These are shown in **Figure 14.1.10b**.

Based upon felling only those areas required for the construction and operation of the proposed Development, the Applicant does not propose any restocking of those areas. Should further felling be required outside of the above areas and back to compartment boundaries then this will be recalculated. Windblow has the potential to occur irrespective of tree felling, however removing windfirm edges does increase the risk of windblow.

The following areas would potentially be available for restocking:

- Areas outside the above initially cleared of forestry to a compartment boundary or to create a windfirm edge, to facilitate the construction of the proposed Development;
- Areas cleared of trees for widening around bends and junctions for component delivery; and
- Locations of temporary compounds.

6.1.1 Baseline Restocking Plan

Figure 14.1.16 shows the proposed future species following restocking as defined in the Land Management Plan prepared by Forestry Commission Scotland in 2016.

7 COMPENSATORY PLANTING

As this proposed Development involves the permanent removal of woodland for the purposes of conversion to another type of land use, the Scottish Government's Policy on Control of Woodland Removal (2009) has been fully considered to establish whether Scottish Forestry would require an area of new woodland establishment to compensate for the area felled.

The Scottish Forestry guidance to staff on implementing the Scottish Government's Policy on Control of Woodland Removal states that:

"Options to avoid or reduce the need for Compensation Planting should always be fully considered as part of the decision making process. Compensation Planting should be seen as the final option once all other solutions have been exhausted".

The guidance also states the following in relation to windfarm developments:

"With regards to windfarm development, trees cleared for turbines bases, access roads and any other wind farm related infrastructure (infrastructure felling) should be considered as part of a planning application (under the Electricity Act 1989 or the Town and Country Planning Act 1997) and the felling should be consented with Compensation Planting requirements".

A fundamental policy that has been followed throughout in relation to the design of the proposed Development has been to minimise the amount of permanent felling. This would ensure compliance with the Scottish Government's Policy on Control of Woodland Removal.

It is not considered that the proposed Development would qualify for change of land use without compensatory planting, as it could not contribute significantly to any of the relevant criteria detailed in Appendix C of The Scottish Government's Policy on Control of Woodland Removal.

However, the proposed Development would meet the acceptability criteria for woodland removal as the change of land use with compensatory planting would contribute significantly to *"helping Scotland to adapt to climate change"* by providing facilities appropriate for the development of renewable energy projects and significantly reduce net greenhouse gas emissions.

The maximum net area of land that would need to be planted (the SF default position) is an area equivalent to the area being kept clear of trees, which in this case is estimated to be **72.53** ha**,** excluding of any felling required out to windfirm edges (126.66 ha) as this would be restocked.

The proposals for habitat management and peatland restoration identified in **Chapter 3** of the EIA Report and described in further detail in **Technical Appendix 8.9** would form the basis of a restoration plan. As shown in **Annex 2** of this report, the area identified for habitat improvements and peatland restoration within the FLS forest area is approximately 17.7 ha (Area A), of which 2.82 ha would involve the restoration of degraded bog habitat, and approximately 15 ha would involve the planting of native broadleaved trees. Of these areas approximately 7.53 ha is currently afforested. It is considered that restocking and compensatory planting will not be required for this approximate 7.53 ha because the trees have established on unsuitable peaty soils

and/or would be replaced with native broadleaves. An area of approximately 17.7 ha of this forest has already been accounted for within the area requiring to be felled as part of the proposed Development; therefore, the area required to be kept clear of trees for the purpose of peatland restoration is 2.82 ha. The area agreed with FLS for peatland restoration in **Figure 1** of **Technical Appendix 8.9** is also shown on **Figure 14.1.10b** of this document[1].

7.1 Need for Compensatory Planting

The Scottish Government's Control of Woodland Removal Policy (2009) states the following:

> *"Woodland removal, without a requirement for compensatory planting, is most likely to be appropriate where it would contribute significantly to:*
>
> - *enhancing priority habitats and their connectivity;*
> - *enhancing populations of priority species;*
> - *enhancing nationally important landscapes, designated historic environments and geological Sites of Special Scientific Interest (SSSI);*
> - *improving conservation of water or soil resources; or*
> - *public safety."*

In line with the Scottish Government's Control of Woodland Removal Policy, the area that will need to be kept clear of trees throughout the operational life of the proposed Development and considered for compensatory planting (72.53 ha) will be subject to agreement with FLS post submission. The net area of felling required to accommodate the proposed Development infrastructure (i.e., all elements of the proposed Development other than habitat management, such as wind turbines, access tracks, compounds, crane pads, as well as felling to windfirm edges) is 199.19 ha, of which 126.66 ha would be replanted, and 72.53 ha would be required to be kept clear of forestry during the operational phase of the proposed Development.

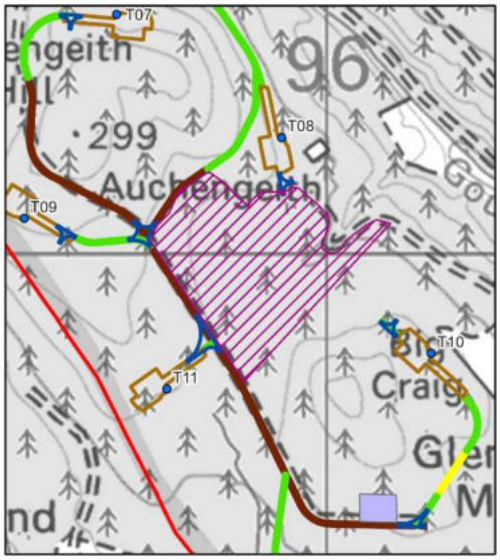
In addition, the HMP also commits the Applicant to the following:

- Area A: (totalling approximately 17.7 ha, of which an estimated 7.53 ha is currently afforested); 2.82 ha of peatland restoration and approximately 15 ha of native broadleaf planting, subject to post-consent peat surveys; and
- Area B (totalling approximately 53.6 ha) 13.13 ha of which will be riparian woodland.

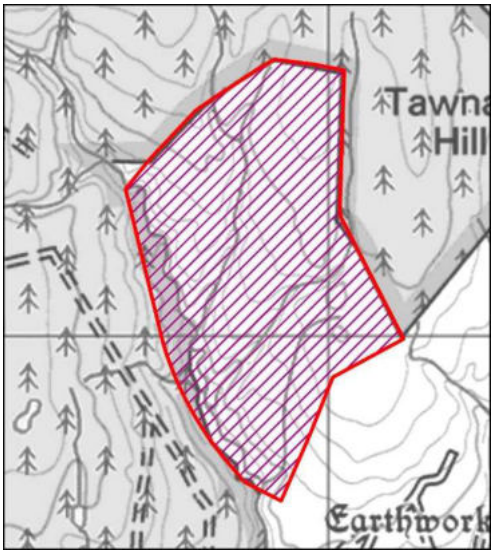
These areas are identified in the thumbnails below, and shown in the context of the wider Site in Figures 14.1.9, 14.1.10a, 14.1.10b and 14.1.11.

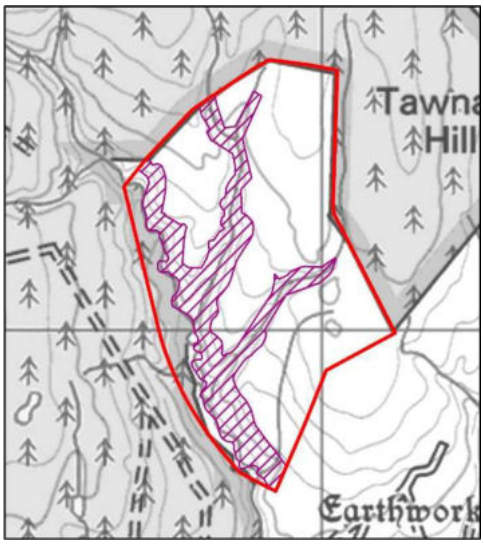
Based on the total areas in A and B the total area set aside for delivery of the above habitat improvements is 31.12 ha.

[1] Identified in Figure 14.1.9b as "Peatland Restoration Area" as shown in Technical Appendix 8.9



Thumbnail 1: Area A within the turbine area





Thumbnail 2: Area B east of the access track to the turbine area. **Thumbnail 3:** showing the area of proposed riparian planting within Area B.

8 MITIGATION

The following mitigation is committed to by the Applicant:

- All forestry plans and operations would fully comply with the UK Forestry Standard (2017);
- The plan to carry out keyhole felling for the wind turbine locations rather than clear felling would minimise the amount of felling required;
- The access roads have been designed to minimise the amount of tree felling, utilising existing tracks wherever practicable;
- The extraction of the timber produce would be carried out after the access roads have been installed, so as all the felled trees would be very close to the access roads, most of the timber extraction would be carried out on the hard road and not over the bare ground. This would avoid/minimise any damage to the soil;
- All felling would be carried out outside the bird nesting season, which is normally March to August, except where otherwise approved by the Ecological Clerk of Works;
- Site refuelling and maintenance areas would be sited well away from watercourses and best practice measures would be taken to mitigate risks of spillages; and
- A restoration plan to confirm the location and areas of CP required would be agreed with Scottish Forestry in advance of delivery. The restoration plan would be informed by the Outline Habitat Management Plan (**Technical Appendix 8.9** of the EIA Report). Should further areas for CP be required, once the area(s) for CP has been chosen, a full specification would be drawn up to include ground preparation, drainage, planting technique, stocking density, species, maintenance and protection.

9 CONCLUSION

This document has been prepared as a Technical Appendix to accompany the EIA Report and application for consent documentation for the Harestanes West Windfarm.

This Technical Appendix provides all the forestry information required for the Environmental Impact Assessment (EIA) Report, including:

- a baseline forestry assessment;
- the effect of the proposed Development on the forestry plantations;
- full information on the areas to be felled and the timber volumes to be removed;
- how the waste will be dealt with to minimise its effect on the environment; and
- mitigation measures in place including Compensatory Planting.

This Technical Appendix has been prepared on the basis of minimising to a practicable level the amount of forestry felling required to accommodate the proposed Development infrastructure, focusing on the proposed new access tracks, access tracks to be upgraded, proposed turbines, substation and construction compounds.

As a result of the proposed Development, based on the parameters adopted up to 199.19 net ha of forestry would require to be felled. Of this 72.53 net ha would require to be kept clear of forestry during the operational phase of the proposed Development and require compensatory planting, on agreement with Scottish Forestry. The area that will require restock replanting will be 126.66 net ha. In addition, approximately 31.12 ha will be set aside for habitat improvements.

10 REFERENCES

Forestry Commission Scotland – Ae Composite Land Management Plan.

Scottish Executive (2006) Scottish Forestry Strategy.

Forestry Commission (1996) Technical Paper 16: Designing Forest Edges to Improve Wind Stability.

Forestry Commission (2009) The Scottish Government's Policy on Control of Woodland Removal.

Forestry Commission (2015) Guidance to Forestry Commission Scotland staff on implementing the Scottish Government's Policy on Control of Woodland Removal.

Scottish Environment Protection Agency (2014) Land Use Planning System SEPA Guidance Note LUPS-GU27 – Use of Trees Cleared to Facilitate Development on Afforested Land.

Scottish Government (2023)National Planning Framework 4. https://www.gov.scot/publications/national-planning-framework-4/ [Accessed September 2024].

Forestry Commission (2017) The UK Forestry Standard – The Government's Approach to Sustainable Forestry.

Forestry Commission (1981) Yield Models for Forest Management.

11 FIGURES

Legend

Infrastructure

- Application Boundary
- Proposed Turbine Location
- Proposed Junction
- Proposed Hardstanding
- Existing Borrow Pit
- Proposed Meteorological Mast
- Proposed New Access Track
- Proposed Upgraded Track
- Proposed New Floating Access Track
- Proposed Substation and Control Building Compound
- Proposed Construction Compound
- Proposed Parking Area
- Habitat Management Plan Area

National Forest Inventory

- Assumed woodland
- Bare area
- Broadleaved
- Conifer
- Failed
- Felled
- Grassland
- Ground prep
- Low density
- Mixed mainly broadleaved
- Mixed mainly conifer
- Open water
- Other vegetation
- Quarry
- Road
- Shrub
- Urban
- Windblow
- Young trees

N

T01 T02 T03 T04 T05 T06 T07 T08 T09 T10 T11 T12

Area A

Area B

Rev	Date	By	Comment
D	26/11/24	DL	Revised Legend
C	29/10/24	DL	Revised Application Boundary
B	17/10/24	DL	Revised Legend

1:40,000 Scale @ A3

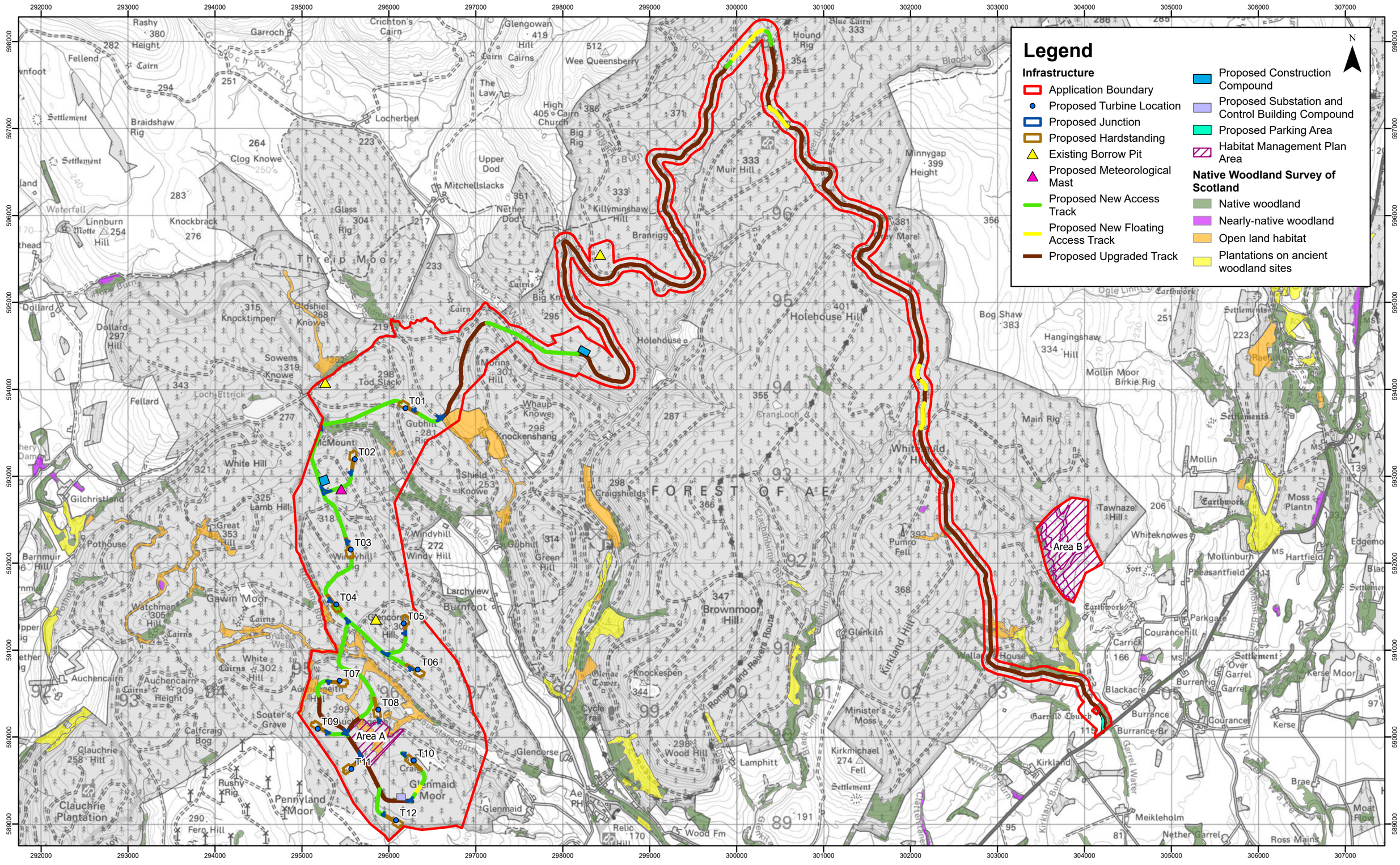
0 1 2 Km

Harestanes West Windfarm

Figure 14.1.1: Plan of Site and National Forestry Inventory Categories

Drg No	HSTW-RSK-I-068
Rev	D
Date	26/11/24
Figure	14.1.1

Datum: OSGB36
Projection: TM



Rev	Date	By	Comment
E	05/12/24	DL	Revised Legend
D	26/11/24	DL	Revised Legend
C	29/10/24	DL	Revised Application Boundary

ScottishPower Renewables

1:40,000 Scale @ A3

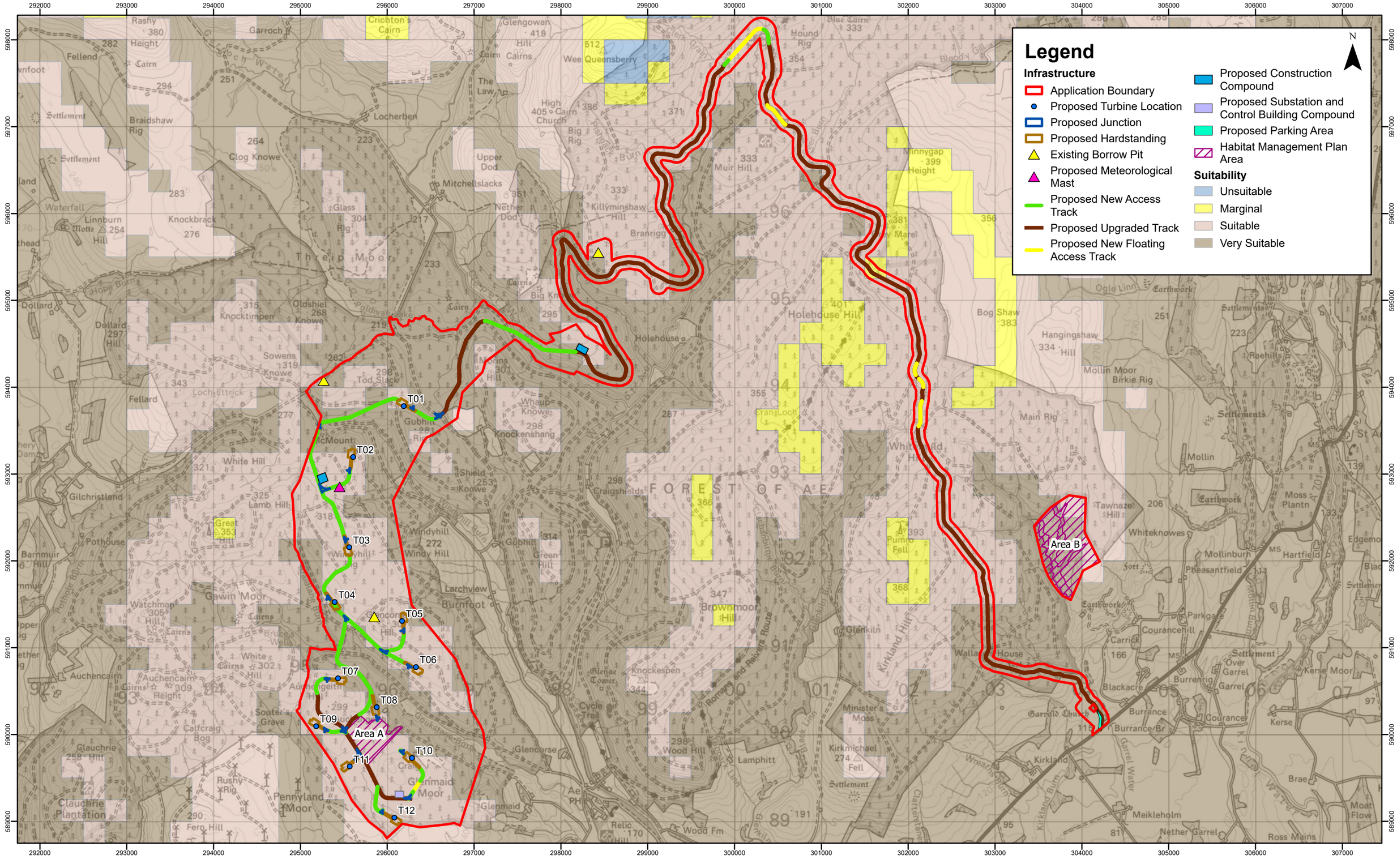
0 1 2 Km

Harestanes West Windfarm

Figure 14.1.2:
Native Woodland Survey of Scotland

Drg No	HSTW-RSK-I-069
Rev	E
Date	05/12/24
Figure	14.1.2

Datum: OSGB36
Projection: TM



ScottishPower Renewables	D	26/11/24	DL	Revised Legend	1:40,000 Scale @ A3	0 1 2 Km	**Harestanes West Windfarm** Figure 14.1.3: Climatic Site Suitability for Sitka Spruce
	C	29/10/24	DL	Revised Application Boundary			
	B	17/10/24	DL	Revised Layout			
	Rev	**Date**	**By**	**Comment**			

Drg No	HSTW-RSK-I-070	
Rev	D	Datum: OSGB36
Date	26/11/24	Projection: TM
Figure	14.1.3	

Legend

Infrastructure

- Application Boundary
- Proposed Turbine Location
- Proposed Junction
- Proposed Hardstanding
- Existing Borrow Pit
- Proposed Meteorological Mast
- Proposed Upgraded Track
- Proposed New Floating Access Track
- Proposed New Access Track
- Proposed Substation and Control Building Compound
- Proposed Construction Compound
- Proposed Parking Area
- Habitat Management Plan Area

Felling Year

- 0
- 2017 - 2022
- 2023 - 2027
- 2028 - 2032
- 2033 - 2037
- 2038 - 2042
- 2043 - 2047
- 2048 - 2052
- 2052 onwards

N

T01 T02 T03 T04 T05 T06 T07 T08 T09 T10 T11 T12

Area A

Area B

Rev	Date	By	Comment
E	04/12/24	DL	Revised Felling Coverage
D	26/11/24	DL	Revised Legend
C	29/10/24	DL	Revised Application Boundary

ScottishPower Renewables

1:40,000
Scale @ A3

0 1 2 Km

Harestanes West Windfarm

Figure 14.1.9:
Areas for Proposed Felling (2017-2052)

Drg No	HSTW-RSK-I-071	
Rev	E	Datum: OSGB36
Date	04/12/24	Projection: TM
Figure	14.1.9	

Legend

Infrastructure

- Application Boundary
- Proposed Turbine Location
- Proposed Junction
- Proposed Hardstanding
- Existing Borrow Pit
- Proposed Meteorological Mast
- Proposed New Access Track
- Proposed New Floating Access Track
- Proposed Upgraded Track
- Proposed Construction Compound
- Proposed Substation and Control Building Compound
- Proposed Parking Area
- Habitat Management Plan Area/Permanent Loss

Forestry Information

- Permanent Loss from Infrastructure
- Forestry loss occurs from Turbines
- Windfirm Edge
- Loss occurs due to Wind Firm Edge
- Forestry Compartment

Felling Year

- 0
- 2017 - 2022
- 2023 - 2027
- 2028 - 2032
- 2033 - 2037
- 2038 - 2042
- 2043 - 2047
- 2048 - 2052
- 2052 onwards

N

292000 293000 294000 295000 296000 297000 298000 299000 300000 301000 302000 303000 304000 305000 306000 307000

598000 597000 596000 595000 594000 593000 592000 591000 590000 589000

Rev	Date	By	Comment
F	04/12/24	DL	Revised Felling Year Coverage
E	26/11/24	DL	Revised Legend
D	30/10/24	DL	Revised Application Boundary

ScottishPower Renewables

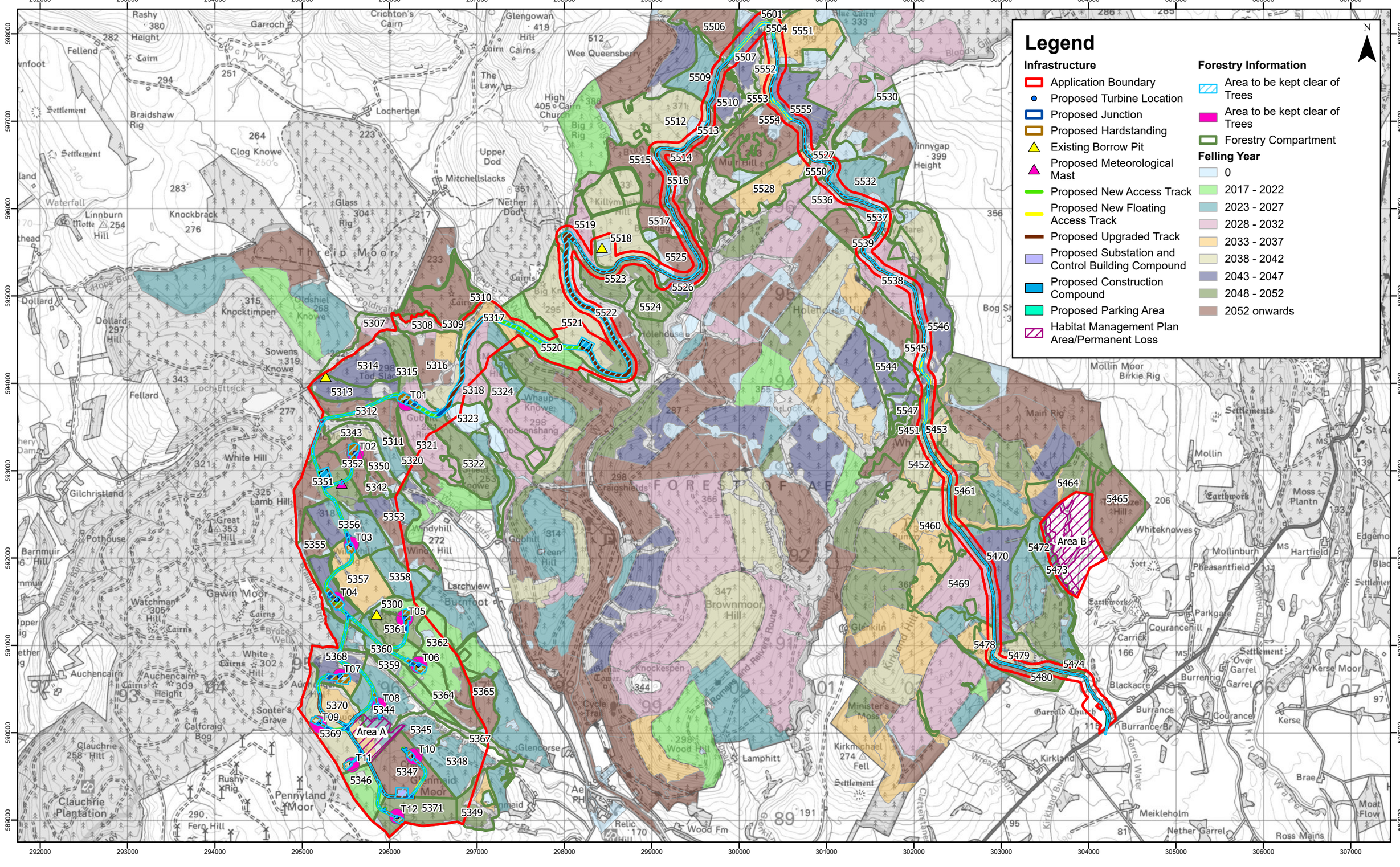
1:40,000 Scale @ A3

0 1 2 Km

Harestanes West Windfarm

Figure 14.1.10a: Construction Phase – Areas to be Kept Clear of Trees

Drg No	HSTW-RSK-I-072	
Rev	F	Datum: OSGB36
Date	04/12/24	Projection: TM
Figure	14.1.10a	



Rev	Date	By	Comment
E	04/12/24	DL	Revised Felling Year Coverage
D	26/11/24	DL	Revised Legend
C	30/10/24	DL	Revised Application Boundary

1:40,000 Scale @ A3

0 1 2 Km

Harestanes West Windfarm

Figure 14.1.10b: Operational Phase – Areas to be Kept Clear of Trees

Drg No	HSTW-RSK-I-073	
Rev	E	Datum: OSGB36
Date	04/12/24	Projection: TM
Figure	14.1.10b	

Legend

Infrastructure

- Application Boundary
- Proposed Turbine Location
- Proposed Junction
- Proposed Hardstanding
- Existing Borrow Pit
- Proposed Meteorological Mast
- Proposed New Access Track
- Proposed New Floating Access Track
- Proposed Upgraded Track
- Proposed Substation and Control Building Compound
- Proposed Construction Compound
- Proposed Parking Area
- Habitat Management Plan Area

Planting Year

- 2019/20
- 2020/21
- 2021/22
- 2022/23
- 2023/24
- 2024/25
- 2025/26
- 2026/27
- 2027/28

N

T01 T02 T03 T04 T05 T06 T07 T08 T09 T10 T11 T12

Area A

Area B

ScottishPower Renewables

Rev	Date	By	Comment
E	04/12/24	DL	Revised Coverage
D	26/11/24	DL	Revised Legend
B	17/10/24	DL	Revised Legend

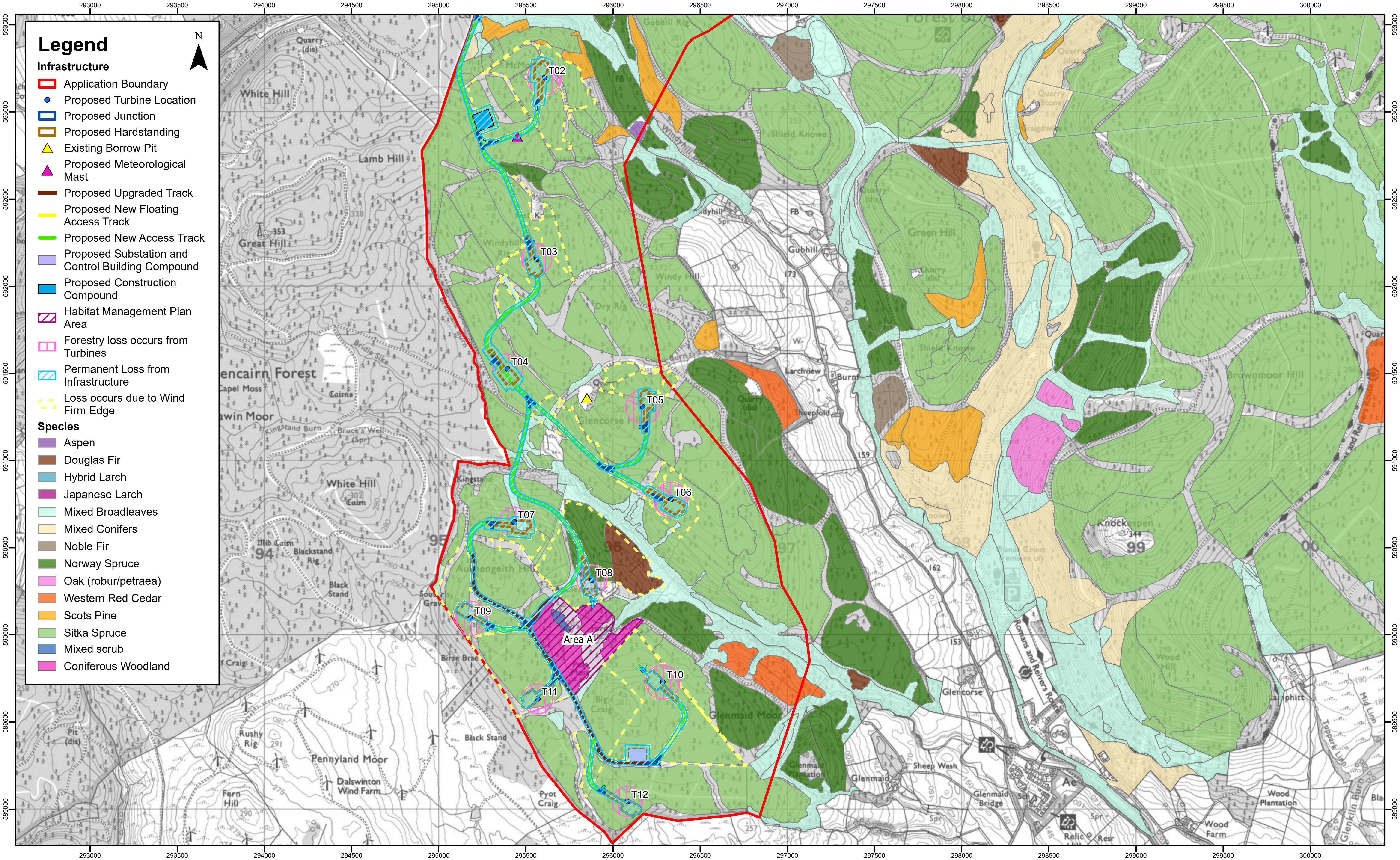
1:40,000 Scale @ A3

0 1 2 Km

Harestanes West Windfarm

Figure 14.1.11:
Restocking year

Drg No	HSTW-RSK-I-074	
Rev	E	Datum: OSGB36
Date	04/12/24	Projection: TM
Figure	14.1.11	



Legend
Infrastructure
Application Boundary
Proposed Turbine Location
Proposed Junction
Proposed Hardstanding
Existing Borrow Pit
Proposed Meteorological Mast
Proposed Upgraded Track
Proposed New Floating Access Track
Proposed New Access Track
Proposed Substation and Control Building Compound
Proposed Construction Compound
Habitat Management Plan Area
Forestry loss occurs from Turbines
Permanent Loss from Infrastructure
Loss occurs due to Wind Firm Edge
Species
Aspen
Douglas Fir
Hybrid Larch
Japanese Larch
Mixed Broadleaves
Mixed Conifers
Noble Fir
Norway Spruce
Oak (robur/petraea)
Western Red Cedar
Scots Pine
Sitka Spruce
Mixed scrub
Coniferous Woodland
T02
T03
T04
T05
T06
T07
T08
T09
T10
T11
T12
Area A

B	05/12/24	DL	Revised habitat detail
A	04/12/24	DL	First Issue.
Rev	Date	By	Comment

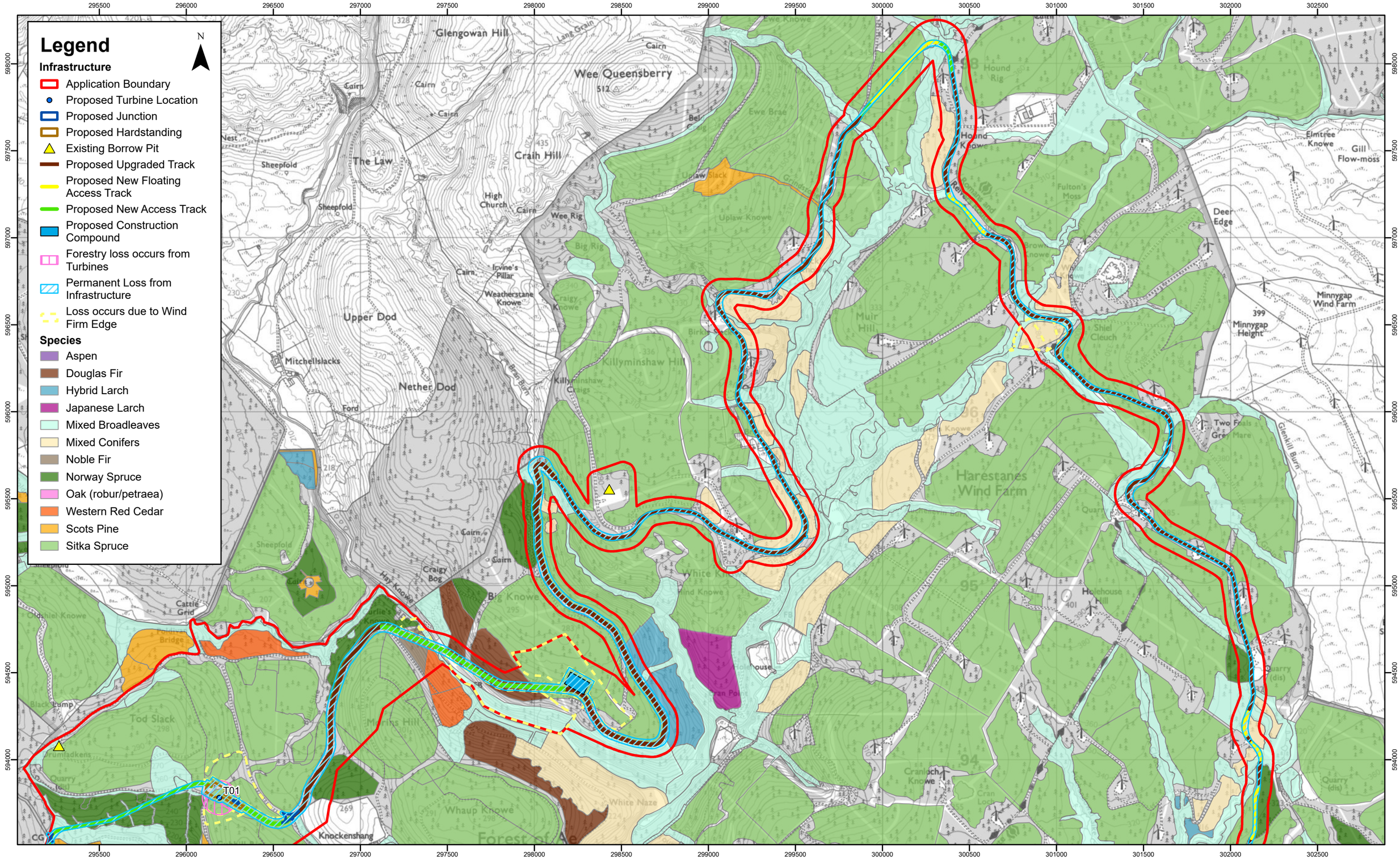
1:20,000
Scale @ A3

0 0.5 1 Km

Harestanes West Windfarm

Figure 14.1.16a: Future Species

Drg No	HSTW-RSK-I-107	
Rev	B	Datum: OSGB36 Projection: TM
Date	05/12/24	
Figure	14.1.16a	



Rev	Date	By	Comment
B	05/12/24	DL	Revised habitat detail
A	04/12/24	DL	First Issue.

1:20,000 Scale @ A3

0 0.5 1 Km

Harestanes West Windfarm

Figure 14.1.16b: Future Species

Drg No	HSTW-RSK-I-107
Rev	B
Date	05/12/24
Figure	14.1.16b

Datum: OSGB36
Projection: TM

Legend

N

Infrastructure

- Application Boundary
- Proposed Upgraded Track
- Proposed New Floating Access Track
- Proposed Parking Area
- Habitat Management Plan Area
- Permanent Loss from Infrastructure

Species

- Aspen
- Douglas Fir
- Hybrid Larch
- Japanese Larch
- Mixed Broadleaves
- Mixed Conifers
- Noble Fir
- Norway Spruce
- Oak (robur/petraea)
- Western Red Cedar
- Scots Pine
- Sitka Spruce

Area B

Rev	Date	By	Comment
B	05/12/24	DL	Revised habitat detail
A	04/12/24	DL	First Issue.

1:20,000 Scale @ A3

0 0.5 1 Km

Harestanes West Windfarm

Figure 14.1.16c:
Future Species

Drg No	HSTW-RSK-I-107
Rev	B
Date	05/12/24
Figure	14.1.16c

Datum: OSGB36
Projection: TM

12 ANNEXES

Annex 1: Sub-Compartment Schedule

Comp No.	Area (Ha)	Species	Planting Year	Yield Class	Age	Volume per Ha (m^3)
5300	8.67	Unplanted	0	0	0	0
5311	17.82	SS/NS	1935	16	89	583
5312	24.846	SS/NS	2015	14	9	n/a
5313	20.52	SS	2001	24	23	351
5315	23.71	SS	1989	22	35	630
5316	24.68	SS	1994	18	30	390
5317	18.46	SS	1994	18	30	390
5318	28.01	SS	1986	22	38	713
5321	30.52	SS	1989	22	35	630
5322	31.99	SS	2018	16	6	n/a
5323	51.43	SS	1991	22	33	586
5344	40.78	To be felled before construction	0	0		n/a
5346	17.45	Unplanted	0	0		n/a
5347	40.74	SS	2015	18	9	n/a

Comp No.	Area (Ha)	Species	Planting Year	Yield Class	Age	Volume per Ha (m^3)
5350	18.87	SS	2019	8	5	n/a
5351	54.26	SS	2015	18	9	n/a
5352	14.09	SS	2015	16	9	n/a
5355	18.35	SS	2015	18	9	n/a
5356	35.17	SS	2000	24	21	303
5357	34.08	SS	1994	14	30	257
5359	26.78	SS, windblown	1983	20	41	704
5360	15.99	SS/NS	1981	20	43	750
5361	19.94	SS	2007	16	17	75
5364	28.84	Unplanted/Open	0	0		n/a
5368	24.49	SS	2008	16	16	59
5369	30.08	SS	2000	18	24	233
5370	28.25	SS	1994	16	30	337
5371	29.81	SS	2007	16	17	75
5520		*No schedule information - Used average data*		*18*	*24*	*251*
5522		*No schedule information - Used average data*		*18*	*24*	*251*

Annex 2: Woodland lost to Habitat Management Plan

Photographs of timber at selected sites

Turbine 9

Figure 14.1.4 Compartment 5369 – Sitka spruce (Planting year 2000)

Turbine 7

Figure 14.1.5 Compartment 5368 Sitka spruce (Planting year 2008)

Turbine 5

Figure 14.1.6 Compartment 5361 Sitka spruce (planting year 2007)

Turbine 1

Figure 14.1.7 Compartment 5315 Sitka spruce (planting year 1989).