

TA9.6: Strathy South Forestry Management Plan

TECHNICAL APPENDIX 9.6

Strathy South Forestry Management Plan



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REPORT

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Appendix 2 Forestry Compartment Details for Strathy South

Appendix 3 Forestry Compartment Condition for the Strathy South Plantation

1 INTRODUCTION

1.1 Background

In April 2018 the proposed Strathy South Wind Farm was granted Section 36 consent under the Electricity Act 1989 and deemed planning permission under the Town and Country Planning (Scotland) Act 1997 (referred to as “the Consented Scheme”). A suite of documents were provided for the 2007 Environmental Statement (ES), the 2013 ES Addendum, and the 2014 Further Information Report (FIR) for the Consented Scheme. The 2013 ES Addendum: Volume 4: Technical Appendix A11.2: Management at Strathy South: Forest Removal, Habitat Management and an Assessment of the Effect on Birds Connected with the Caithness and Sutherlands Peatlands Special Protection Area (SPA) provided the proposed methods of forest removal. This Technical Appendix from the 2013 ES Addendum is appended as Appendix 1 to this report and provides a summary of the proposed habitat restoration activities to be completed onsite, and the potential effects of these operations to qualifying species of the surrounding designated site.

Through the consenting process for the Consented Scheme, further documents have been submitted which supersede some of the information provided in Volume 4: Technical Appendix A11.2 of the 2013 ES Addendum submission. These comprise a number of reports that were provided at Public Local Inquiry (PLI) held in 2015 for the Consented Scheme, which confirmed no Likely Significant Effect to the qualifying species for the Caithness and Sutherland SPA would result from removal of the forestry. This conclusion from the RPS report that was reproduced as TA11.2 of the 2013 Addendum at the PLI was accepted by the Reporter who conducted the PLI. In his Report to the Scottish Ministers he set out his conclusion in paragraph 12.3¹ that: “*The removal of commercial forestry and restoration (primarily to blanket bog) would support peatland revival and areas of important plant life.*” He further concluded that an appropriate assessment for the SAC was not required. The Scottish Ministers accepted this conclusion that there would be no likely significant effects on the Caithness and Sutherland Peatlands SAC and that an appropriate assessment was not required (paragraphs 145 & 146 of the Ministers’ decision letter dated 27 April 2018).

Since the PLI the following documents have been produced which to some extent supersede parts of Technical Appendix A11.2 of the 2013 Addendum. These are:

- Technical Appendix 9.5 - Strathy South Outline Habitat Management (EIAR Volume 4: Technical Appendices). This document details the proposed restoration activities to be completed through the lifespan of the Consented Scheme and same approach would be adopted for the Proposed Varied Development. Therefore, Technical Appendix 9.5 should be read in conjunction with this document;
- A number of reports were provided at Public Local Inquiry (PLI) for the Consented Scheme which confirmed no Likely Significant Effect to the qualifying species for the Caithness and Sutherland SPA, a view which the Reporter shared in his recommendation to the Scottish Government (paragraph 12.13 of the Reporter’s document²); and
- Scottish Natural Heritage’s (SNH) 2016 Guidance for wind farm developments³ on afforested sites and reducing their suitability for hen harrier, merlin and short-eared owl, which has been taken into account for the Proposed Varied Development.

Readers of this report are therefore referred to the above documents which may be referred to hereafter, but their subject matter is not covered in detail.

¹ Scottish Government: Planning and Environmental Appeals Division (2016) Summary of Report of Inquiry into application under section 36 of the Electricity Act 1989 and deemed application for planning permission under section 57 of the Town and Country Planning (Scotland) Act 1997 (as amended): The construction and operation of Strathy South Wind Farm south of Strathy, Caithness.

² Scottish Government: Planning and Environmental Appeals Division (2016) Summary of Report of Inquiry into application under section 36 of the Electricity Act 1989 and deemed application for planning permission under section 57 of the Town and Country Planning (Scotland) Act 1997 (as amended): The construction and operation of Strathy South Wind Farm south of Strathy, Caithness.

³ Scottish Natural Heritage (2016) Wind farm proposals on afforested sites – advice on reducing the suitability for hen harrier, merlin and short-eared owl.

1.2 Purpose of this Technical Appendix 9.6

This Technical Appendix has been prepared to provide the following information to inform the assessment of the effects from the removal of the Strathy South conifer plantation that is associated with the construction of the Proposed Varied Development:

- Details on the size and condition of timber stocks within the Strathy South conifer plantation;
- The rationale behind forest clearance methods and those selected as most appropriate for the Strathy South conifer plantation;
- The potential ecological constraints which have been considered during the planning of a Phased Forest Felling Plan; and
- A draft Phased Forest Felling Plan which ties into both the requirements of the construction of the Proposed Varied Development whilst delivering meaningful benefits for the restoration of peatland habitats in compliance with the Consented Scheme’s Outline Habitat Management Plan (OHMP) (EIAR Volume 4: Technical Appendix 9.5).

1.3 Considerations in Relation to Policy and Guidance

The following documents have been taken into consideration when designing the draft Phased Forestry Felling Plan:

- SNH (2016) Planning for Development: What to Consider and Include in Habitat Management Plans (Version 2);
- SEPA (2017) Guidance on the Management of Forest Waste;
- SEPA (2014) Land Use Planning System Guidance Note GU27: Use of Trees Cleared to facilitate Development on Afforested Land;
- SEPA (2012) Principles for Use of Forest Residue for Peatland Restoration;
- SNH/SEPA/FCS Joint Agency Agreement on Forest Removal and Peatland Restoration;
- FCS (2009) The Scottish Government’s Policy on Control of Woodland Removal;
- FCS (2006) Managing Brash on Conifer Clearfell Sites. Practice Note;
- FCS (2005) Protecting the Environment During Mechanised Harvesting Operations. Technical Note;
- Scottish Government (2019) Scotland’s Forestry Strategy 2019 – 2029;
- Forestry Commission (2017) The UK Forestry Standard: The governments’ approach to sustainable forestry.

The main Implication of this evolving policy and guidance background in relation to the site is that there is now a greater emphasis on removal off-site of harvestable timber, with mulching restricted to areas where trees are below a particular size, when compared to the guidance available for the Consented Scheme. Further details are provided in Section 4 of this document.

2 PHYSICAL CHARACTERISTICS OF STRATHY SOUTH

2.1 Landform

The topography and physical features of the site are presented in EIAR Volume 4: Technical Appendix 10.1: PLHRA. In summary, the site is relatively low lying and ground elevations range from 130 m Above Ordnance Datum (AOD) at Turbine 72 to 200 m AOD in the vicinity of Turbine 36 and is gently undulating. The site's western and eastern 'arms' consist of two north/south spurs of land that converge at the site's southern end, to form the upper catchment of the River Strathy. The area surrounding the Strathy South conifer plantation consists of open, undulating moorland dominated by blanket bog, lochans and pools.

2.2 Geology

The site's solid geological setting is described in Section 3.1 of EIAR Volume 4: Technical Appendix 10.1: PLHRA, so for information reference should be made to that document.

2.3 Soils

Soil distribution is a factor of topography, geology and drainage in the local area. Soils on-site consist predominantly of modified blanket peat, with three main soil types:

- Blanket peat: organic material with a consistently high water table;
- Peat gleys: slowly permeable, seasonally waterlogged clay-like soils with a peaty surface horizon; and
- Peaty podzols: leached soils with a peaty surface layer. The drainage of these soils is dependent on the level of leaching. Peaty podzols are normally free draining, however where strong leaching has occurred sufficient deposition of iron and aluminium in the lower soil horizons may cement the material into a hard impermeable layer, or ironpan, resulting in waterlogging of the profile above. The product of this is a soil intermediate between podzol and gley.

The site mainly comprises peat soils, which are of varying depths. Comprehensive peat survey work has been carried out for the site (refer to EIAR Volume 4: Technical Appendix 10.2: Draft Peat Management Plan for the peat probing survey results).

2.4 Peat Characteristics

Strathy South conifer plantation is surrounded by the Caithness and Sutherland Peatlands Special Area of Conservation (SAC) which is internationally important for the peatland landscapes and habitats present. The site lies within an area of previously open blanket bog and heathland which has subsequently been afforested. The results of extensive peat probing and analysis of underlying peat depth are included in the Peat Landslide Hazard Risk Assessment (EIAR Volume 4: Technical Appendix 10.1). These surveys indicated that the peat deposits are variable in thickness across the site, ranging from approximately 0.1 to 4.7 m. An interpolated peat depth map for the Strathy South conifer plantation is provided in Figure 10.1.4: Peat Depths (EIAR Volume 4: Technical Appendix 10.1: PLHRA).

2.5 Hydrogeology and Hydrology

Details of the hydrogeology and hydrology are summarised in EIAR Volume 2: Chapter 10: Soil and Water and a summary is provided in this Section. The site lies entirely within the catchment of the River Strathy, which runs south to north through the centre of the site, fed by several small tributaries. These watercourses are flashy with high peak flows and rapid response rates during storm events, and low flows during prolonged dry spells. There are also a number of small pool systems, un-named and named lochs/lochans within the main site, the largest of which is in the north-west, Loch nam Clach.

The Scottish Environment Protection Agency (SEPA) carried out water quality monitoring on the River Strathy in 2018, which is classified A2 (good).

Anticipated climate change suggests slightly increased temperatures, an increased capacity for the atmosphere to hold water vapour and resultant increases in fluxes of precipitation and evaporation. It is thought this may result in a reduction of summer precipitation and an increase during winter. If this occurs it can be expected that the current hydrological regime of the rivers in the study area will be magnified, with lower flows in summer and higher and more frequent peak flows in winter.

3 THE NATURE OF STRATHY SOUTH HABITATS AND CONIFER PLANTATION

Whereas Section 2 highlighted the main underlying physical characteristics of the Strathy South conifer plantation, the following two Sections provide an understanding of the forest itself by also presenting information on current and previous land cover. This forms the basis for considering the options for forest felling, also taking account of environmental, economic and legislative considerations for a Phased Forest Felling Plan.

3.1 Historic Land Management of Strathy South and its Surrounding Area

In the decades before afforestation, the land within the main site was used mainly for deer stalking. The only considerable modification over this period was digging of drainage grips and construction of the Strathy Lodge access track. Grips are visible in aerial imagery⁴ of the Strathy South conifer plantation and are also widespread on the adjacent part of the RSPB's Forsinard Flows Reserve, Yellow Bog, Skelpick and Rhifail Estate and Strathy Wood.

The introduction of large-scale conifer plantations to the Flow Country occurred primarily in the post-war period. This applies to the forests found around the main site, which have been planted at differing times and by different landowners. The initial forest plantations were created by the Forestry Commission Scotland (FCS), now Forestry and Land Scotland (FLS). The block immediately north of the main site, called Strathy Wood, was mostly planted between 1954 and 1959 with additional planting around 1966 (Source— Dornoch Forest District). A large area of forest (Achrugan Forest) was later created by FCS north of Strathy North Forest (now occupied by the constructed Strathy North Wind Farm), with planting taking place between 1968 and 1971.

The Strathy South conifer plantation was mostly planted between 1983 and 1987. Additional planting then took place in the early part of the 1990s with the final 109 ha being planted in 1994. Planting was undertaken by Fountain Forestry and the forest has been under their management since this time. These plantations were established in line with national forest policy during this period that encouraged the expansion of commercial forests to reduce the UK's reliance on imported timber. Tax concessions in place at the time provided woodland owners with additional incentives to plant commercial plantations.

3.2 Current Land Management of the Surrounding Area

The large forest blocks in Strathy Wood, directly to the north-east of Strathy South conifer plantation have mainly been felled as part of grant-aided forest-to-bog restoration management. This felling has been undertaken relatively recently, for the purpose of establishing peatland habitat and some native woodland. Natural regeneration from the seed banks created by lodgepole pine (*Pinus contorta*) and Sitka spruce (*Picea sitchensis*), along with areas of planted birch (*Betula spp.*), are now found over some of this area. The lodgepole pine and occasional Sitka spruce are now common throughout and have exploited the disturbed ground.

Substantial areas of Strathy Wood have been felled and the trees left *in situ*. These dead trees were being left to decay naturally, however the felled timber has recently been removed.

The open moorland of the Caithness and Sutherland Peatlands SAC and SPA surrounds the main site on all remaining sides, which are designated for their peatland and bird interests. The land is not agriculturally grazed, although deer stalking may take place on occasion. Adjacent to the main site's southern and eastern boundaries, the land under RSPB ownership is managed for nature conservation. SNH has a number of management agreements in place with SPA landowners, covering the open ground surrounding the Strathy South conifer plantation.

⁴ <https://www.bing.com/maps> (accessed 20.08.20).

The River Strathy and a number of lochans around the application site have fishing interests.

3.3 Non-Forested Habitats within Strathy South

The extent and structure of non-forested habitats within the Strathy South conifer plantation were surveyed in detail for the 2013 ES Addendum for the Consented Scheme, and ground-truthed for their continued accuracy in 2019 for the Proposed Varied Development (EIAR Volume 4: Technical Appendix 9.1: Habitats and Protected Species Survey Update 2019). In summary, of the 1,616 ha (approximately) that comprises the main site, 483 ha (30%) is non-forested, with the remainder comprising plantation, of which all but 6.7 ha is conifer.

Open habitats within the Strathy South conifer plantation, along rides and un-planted areas, are predominantly wet dwarf shrub heath (M15), blanket bog (M17, M19) and modified bog (M20) habitats (NVC communities) (refer to EIAR Volume 3a: Figure 9.3). The habitat survey results show the forest to be primarily surrounded by blanket bog and to a lesser extent by wet heath.

In recognition of the remaining habitat value of parts of the non-afforested land within the Strathy South conifer plantation, two areas in the southwest section of the plantation have been subject to conservation management agreements between the landowners and SNH.

3.4 Preparation and Planting of the Strathy South Conifer Plantation

A process of ploughing was used to provide raised planting positions in order to improve the establishment of trees. The species planted are mainly a self-thinning mix of lodgepole pine and Sitka spruce, planted in various combinations within rectangular blocks, depending on soil quality. Lodgepole pine is generally planted in monoculture on the poorest soils and used as a fast-growing 'nurse crop' for spruce on deep peat; whereas spruce is planted alone on areas of better soil.

The mixed plantations have all been planted on ridges, the result of deep ploughing by single and double mouldboard ploughs. The trees have been mostly planted in lines of three Sitka spruce then three lodgepole pine. This pattern of planting was seen as providing a self-thinning mix with the faster growing Sitka spruce shading out the lodgepole pine, thus providing the final timber tree as Sitka spruce.

There are a small number of compartments where Japanese larch was also planted, and 6.7 ha of broadleaved species in Coille Am Sealbach. The progression of planting from thirty to nineteen years ago is shown in Plate 9.6.1 below, with Figure 9.6.1: Plantation Planting Year showing the planting years for each compartment in relation to their location within the plantation. Forestry compartment numbering is provided in Figure 9.6.2: Plantation Sub-Compartment Plan, with details of the species provided in Table 9.6.6 within Appendix 2 of this document.

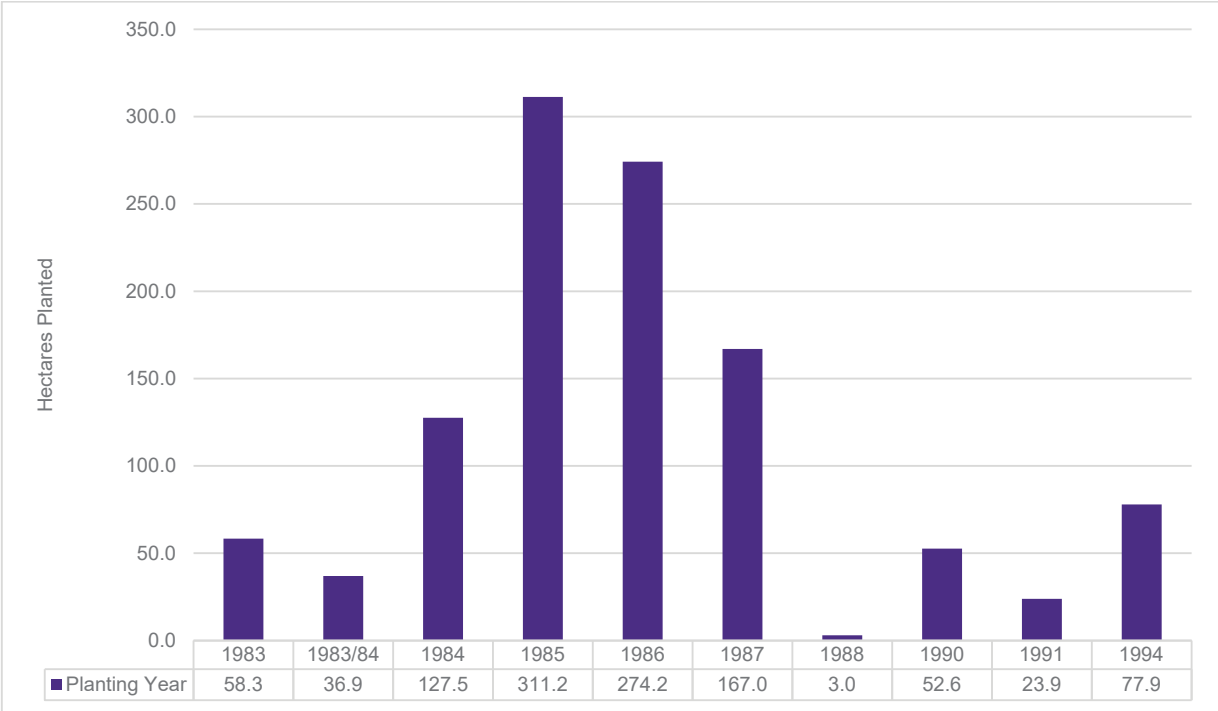


Plate 9.6.1: Strathy South planting progression

3.5 Aftercare of Forested Habitats

Aftercare work at the Strathy South conifer plantation is currently the responsibility of Fountain Forestry. The main works that have taken place since planting are drainage, deer fencing, and road maintenance. No further planting has taken place since the initial programme finished in 1994. No manual thinning work has been required and there is no agreed felling plan in place. Deer management takes place within the forest, where there is an annual cull in line with consultations and advice from SNH (refer to EIAR Volume 4: Technical Appendix 9.3 for further details of deer populations and their current management).

3.6 Composition of the Plantation

The forest areas of the Strathy South conifer plantation consist of eight forest units: Bad Collie, Coille Saobhaidhe, Coille Buidhe, Coille Am Sealbach, Coille Fada, Coille Meadhonach, Coille Nan Clach and Coille An Reidhe (Figure 9.6.2: Plantation Sub-Compartment Plan). Each forest unit is broken up into compartments and sub-compartments of varying size and species composition. The compartments are separated by rides and wider fire breaks. Full details are provided in Appendix 2 of this document (by Forest Unit, sub-compartment, planted area per sub-compartment, planting year, species mix and yield class). Table 9.6.1 below provides a breakdown of the quantity of forest planting in each forest unit between 1983 and 1994.

Table 9.6.1: Summary Information on Planting Years of Strathy South Conifer Plantation (areas in hectares)

Forest Unit	Planting Year									
	1983	1983 / 1984	1984	1985	1986	1987	1988	1990	1991	1994
Bad Coille				133						
Coille Am Sealbach			8	21	44	45				78
Coille An Reidhe	14	7	23	23	28					
Coille Fada			45	27	21	23				
Coille Meadhonach			15	15	17	15	3			
Coille Nan Clach	2	23	4	19	11	17				
Coille Saobhaidhe	56		44	67	80					
South Strathy			5	6	78	40		53	24	
Totals	58	37	128	311	274	167	3	53	24	78

Table 9.6.2 provides a summary of the species composition (by area) of each forestry unit within the Strathy South conifer plantation.

Table 9.6.2: Summary Information on Composition of Strathy South Conifer Plantation (area in hectares)

Forest Unit	Composition					
	Mixed Broadleaves	Sitka Spruce	Sitka Spruce / Lodgepole Pine Mix	Sitka Spruce / Petersburg Lodgepole Pine / Japanese Larch Mix	Sitka Spruce / Petersburg Lodgepole Pine / Scots Pine / Japanese Larch Mix	Sitka Spruce / Petersburg Lodgepole Pine Mix
Bad Coille			133			
Coille Am Sealbach	3		109		9	75
Coille An Reidhe			71			23
Coille Fada		4	112			
Coille Meadhonach			65			
Coille Nan Clach		2	68	6		
Coille Saobhaidhe			247			
South Strathy			172			33
Total	3	6	977	6	9	131

As illustrated in Plate 9.6.1 and detailed in Table 9.6.1, this information shows the majority of the forest was planted between 1983 and 1987, with a second phase of planting taking place in 1990 to 1994. These consisted in the most part, of a mixed plantation of lodgepole pine and Sitka spruce.

As highlighted above, the mixed plantations have all been planted on ridges, mostly planted in lines of three Sitka spruce then three of lodgepole pine. Currently this planting approach has had mixed results and, in many compartments, both Sitka spruce and lodgepole pine have been equally competitive. Local conditions have been influential in the success of each species with lodgepole pine being more successful on poorer sites. Each compartment’s growth potential can vary within as little as 20 m, as local wet areas will inhibit growth and create stunted trees.

Broadleaved trees have been planted in some compartments but have generally failed to establish. At the time of planting, the landowners tried to establish individual broadleaved trees in groups, the tree shelters used (height 1.2 m) are too small to stop browsing by red deer, and the few that have grown, are now being browsed off at the top of the shelter.

3.7 Strathy South Forest Condition Assessment

3.7.1 Predicted Yield Classes

Details of the Yield Classes of the 1,133 ha of forest to be potentially felled were gathered on a compartment and sub-compartment basis, during a site visit by RDS’ chartered forester in 2019. Survey results are provided in Appendix 2 of this document.

The forest condition varies throughout and is influenced by local conditions, particularly the local water table that provides differing soil moisture levels. This has had a direct influence on tree growth. Areas where drainage is impaired or those with higher water tables have produced poor growth and as a result this has produced checked and stunted trees. A few compartments have achieved reasonable growth rates in excess of yield class 10 to 12, dependant on species and local conditions. Sitka spruce can normally obtain considerably higher yield classes in more suitable conditions, and the values obtained on this site are a direct reflection of the poor site growing conditions. Low yield class values indicate slow growth, and in the case of commercial plantations, will indicate poor economic return on investment.

To obtain the yield class for individual compartments, Forestry Commission’s Forestry Yield Handbook⁵ has been used. Yield class is a direct correlation between species/variety, top height and age. The figures obtained give a mean average increase in stand volume (m³) per hectare per annum.

Access to many compartments throughout the Strathy South conifer plantation is difficult due to tree density and branching. Therefore, an assessment of trees by a chartered forester was used to gain average tree information that can then be extrapolated into compartment yield classes. Tree heights were obtained mainly using edge trees with regard to the requirements expected when measuring the Top Height of plantation trees; these are average values of best judgement and not accurate top height values that would be obtained in a detailed forest tariff. The tree heights are listed in Appendix 2 of this report.

A tree grading system (Forest Condition Assessment) based on yield classes provided through field survey has been produced for the forestry compartments. This relates forest condition to yield class information as below (Plate 9.6.2 and Table 9.6.4). Areas of bare ground were included in the mapping analysis. Figure 9.6.3: Yield Class Assessment Results (2019) provides an illustration of the yield classes across the Strathy South conifer plantation. The information gathered provides the basis of yield volume assessments using FC Production Forecast Tables (Normal Yield Tables for Species/Variety, Yield Class and Age – Forest Management Tables FC Booklet 34⁶). A full breakdown of each forestry compartment’s condition is provided in Appendix 3, Table 9.6.6, with a summary provided in Table 9.6.3.

⁵ Matthews, R.W., Jenkins, T.A.R., Mackie, E.D. and Dick, E.C. (2016). *Forest Yield: A handbook on forest growth and yield tables for British forestry*. Forestry Commission, Edinburgh.

⁶ Forestry Commission (1971) *Forestry Commission Booklet 34: Forestry Management Tables (Metric)*.

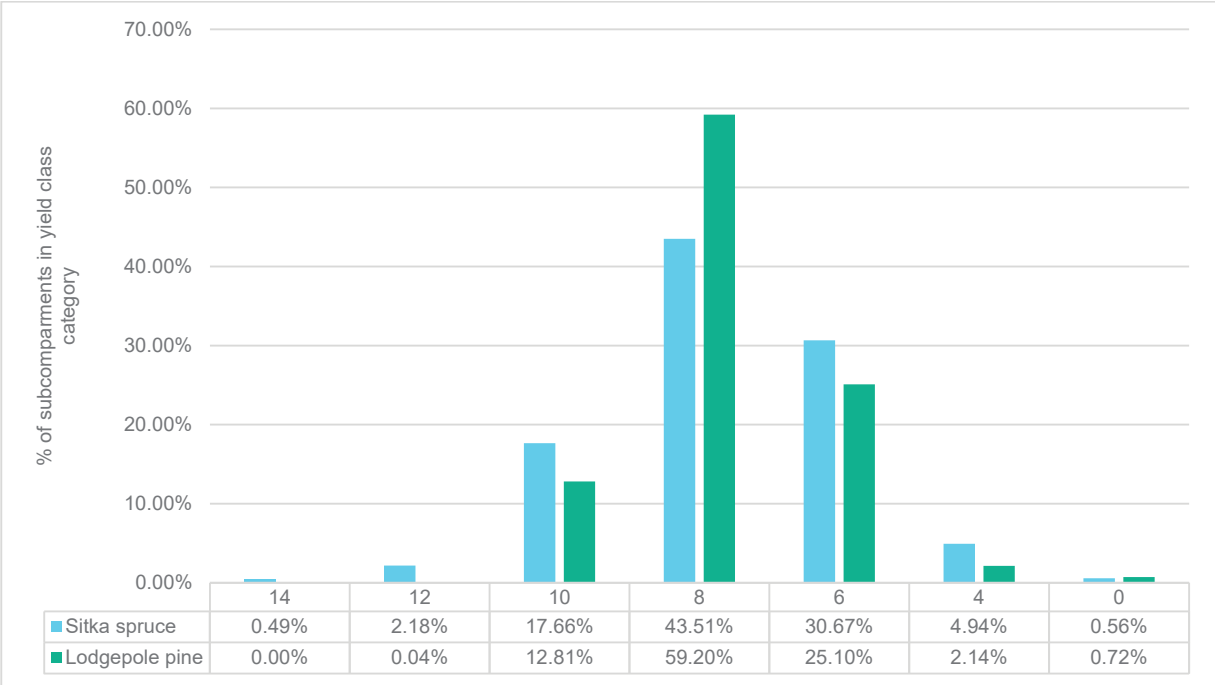


Plate 9.6.2. Percent Composition of Strathy Forest by Yield Class (figures rounded to nearest whole percent)

Table 9.6.3: Forest Condition Assessment of Sitka Spruce for Strathy South Forest

Yield Class	Condition Category	Sitka Spruce (Ha)	Lodgepole Pine (ha)
14	Good	5.52	0
12	Moderate (average)	24.67	0.4
10	Moderate (average)	200.07	145.19
8	Poor	492.97	670.74
6	Poor	347.50	284.35
4	Very Poor (stunted)	55.96	24.22
0	Very Poor (stunted)	6.34	8.13
Total		1,133.03	1,133.03

Table Note

Compartments are a mixture of Sitka spruce and lodgepole pine, as such the total quantity of timber present is 1,133.03 ha. The above figures provide an assessment of the likely distinction in yield classes between species.

4 FOREST REMOVAL

4.1 Forest Removal Rationale

Removal of 1,133 ha of plantation within the Strathy South conifer plantation is required firstly to aid in preparation for the construction of the Proposed Varied Development, and secondly to enable landscape scale peatland restoration activities to commence. The permanent footprint of the Proposed Varied Development within the main site would occupy 28.38 ha of habitat as provided in Technical Appendix 9.7: Loss Calculation Methodology, Table 9.7.5 (EIAR Volume 4) (beyond which is already occupied by existing forest tracks). In addition, in common with many other plantations in the Flow Country, it is evident that the area would now be regarded as unsuitable for planting, due to the widespread presence of important habitats, and consequently such an area would not meet current planting guidelines. The removal of the plantation for the Proposed Varied Development, therefore, enables the implementation of a 50-year programme of peatland restoration, whilst ensuring this avoids increasing the risk to qualifying species of the adjacent SPA.

4.2 Constraints and Considerations Influencing Tree Removal Approach

The Strathy South conifer plantation has a variety of constraints that have been considered as part of the Phased Forest Felling Plan. The tree condition was discussed above, whilst policy, physical and economic constraints are detailed below.

4.2.1 Policy Considerations

Guiding Principles

The Scottish Government has, through their Policy on Control of Woodland Removal⁷ made “a strong presumption in favour of protecting Scotland’s woodland resources” (Guiding Principles) and has placed constraints with regard to woodland removal.

‘Woodland Removal’ is defined in the Policy as “the permanent removal of woodland for the purposes of conversion to another type of land use” (in this case the wind farm development accompanied by restoration of the peatland habitats which were previously dominant on the site). This will only be allowed where it would achieve significant and clearly defined additional public benefits. In appropriate cases, a proposal for compensatory planting may form part of this balance. Approval will usually be conditional on the undertaking of actions to ensure full delivery of the defined additional public benefits.

Criteria for Determining the Acceptability of Woodland Removal

- The woodland removal policy states that, 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 SSSIs;
 - Improving conservation of water or soil resources; or
 - Public safety.

⁷ Forestry Commission Scotland (2009). The Scottish Government’s Policy on Control of Woodland Removal. [http://www.forestry.gov.uk/pdf/fcfc125.pdf/\\$FILE/fcfc125.pdf](http://www.forestry.gov.uk/pdf/fcfc125.pdf/$FILE/fcfc125.pdf).

There is broad guidance on meeting the acceptability criteria for woodland removal. These criteria are listed below with text in bold where the wind farm development at the Strathy South conifer plantation will meet the acceptable criteria.

Enhancing Priority Habitats and their Connectivity

- Within the boundaries of priority habitats.
- **Contributes to the functional connectivity of priority and associated habitats without adverse impact on priority woodland habitats or connectivity.**
- Availability of ‘seed banks’ from previous land use and adjacent land use.

Enhancing Populations of Priority Species

- **Woodland is detrimental to nationally significant concentrations of Biodiversity Action Plan species.**

Enhancing Nationally Important Landscapes and Historic Environments

- Current landscape character in National Parks and National Scenic Areas compromised significantly by the woodland.
- Condition or context of Scheduled Monuments, Listed Buildings, Conservation Areas and Gardens & Designed Landscapes compromised significantly by woodland.

Improving Conservation of Soil and Water Resources

- Agreed as a measure to address Significant Water Management Issues identified in River Basin Management Plans more effectively than woodland.
- Significantly reduces water loss from woodland in an area of high water demand and low water supply but without impacting on flooding.
- **Restoration of peat bogs where the removal of woodland would prevent the significant net release of greenhouse gases.**

It can be seen that the case for forest removal of the Strathy South conifer plantation is strong and in line with the aspirations of the Scottish Government. It is also in line with the wider initiatives in the Flow Country of seeking to secure peatland habitat restoration through removal of exotic conifer plantations.

The removal of the Strathy South conifer plantation is in line with the Scottish Government’s Scottish Forest Strategy 2019 – 2029⁸. The Strategy lists the objective and priorities for Scotland’s forests over the next 10 years to increase sustainable management and increased integration with other land uses, key priorities relevant to the Proposed Varied Development include:

- Ensuring woodlands are sustainably managed;
- Enhancing environmental benefits provided by forests and woodlands.

The above priorities include safeguarding priority habitats and species, such as those of the Caithness and Sutherland Peatlands SAC and supporting activities to improve the ecological condition and quality of habitats. Whilst the policy does not deal specifically with woodland removal (which continues to be covered by the 2009 guidance⁷) it provides the overarching principals for restoration of areas of priority habitat where appropriate.

⁸ Scottish Government (2019) Scotland’s Forestry Strategy 2019 – 2029.

Similarly, the removal of the Strathy South conifer plantation meets the requirements of the UK Forestry Standard (UKFS, 2017)⁹, in particular UKFS Guidelines on Forestry and Biodiversity: Habitat creation and restoration, where it is identified that “Significant gains for biodiversity arise from restoring degraded habitats”.

Requirements of the Scottish Environment Protection Agency

In addition to these policy considerations, attention has also been paid to ensuring the approach to forest removal has fully taken into account the requirements of the Scottish Environment Protection Agency (SEPA). This has been achieved through consultations during 2012 and 2013 for the Consented Scheme to enable finalisation of the Strathy North Outline Habitat Management Plan (EIAR Volume 4: Technical Appendix 9.5). Over this same period, SEPA evolved and published its February 2013 (updated in 2017) Guidance on the Management of Forestry Waste¹⁰. In cognisance of this Guidance and its objectives, particular consideration has been given to identifying forest felling options and potential off-site uses of marketable timber.

4.2.2 Physical Considerations

Ground Conditions

The forest is planted within a large area of blanket bog and as such the ground conditions are extremely variable throughout the site. Peat depths have been extensively surveyed revealing depths of between 0.1 and 4.7 metres. These conditions have created extremely wet areas with high moisture levels, but the degree of wetness is variable throughout, creating access and travel issues across considerable parts of the forest.

To establish the plantation, the site was ploughed prior to planting to create the raised planting positions. It is clear from the areas of natural regeneration along the edges of tracks that, without the ground disturbance and creation of raised areas of peat, tree establishment would have failed.

Harvesting machinery will need to take account of these issues and be adapted for working in peatland environments. Low ground pressure tracks will be the preferred option. Some areas may be difficult even for this type of machinery. The options for machinery to be used for tree removal has been a key consideration in determining how best to enable forest removal, but at the same time, minimise damage to any residual peatland vegetation or the peat itself. This is because the minimisation of ground disturbance is an important factor in peatland restoration, as well as minimising run-off issues and reducing the extent of disturbed ground conditions that encourages natural regeneration of conifers.

Slope

With the exception of a few areas within the forest, the ground slopes gradually and it is not seen as being a particular issue for modern harvesting machinery. The few areas of steep ground can be worked around and are also mostly devoid of trees.

Windthrow

Windthrow can be predicted using various methods developed by the Forestry Commission Scotland (FCS). The prediction of Terminal Height of the crop provides the height and thus age that the stand will become liable to windthrow and thus the approximate rotation of the crop. Forestry Commission Scotland has produced various systems to predict the Terminal Height, and for the assessment of Strathy South conifer plantation, their ForestGALES programme was used, which calculates the risk of damage over a typical rotation from stand characteristics contained in yield models. Providing the information required to predict failure allows an estimate to be produced of the likely life expectancy of the forest crop.

Whilst occasional pockets of windthrow can be located within the conifer plantation, these tend to be the direct result of localised soil conditions on the edge of the plantation and not the result of the crop reaching a

⁹ Forestry Commission (2017) The UK Forestry Standard: The governments’ approach to sustainable forestry.

¹⁰ https://www.sepa.org.uk/media/28957/forestry_waste_guidance_note.pdf (accessed 06.04.2020).

terminal height due to the low yield class. However, many of the forest compartments have reached a stage at which they are commercially viable to harvest despite the low yield class and associated slow growth rate.

The conclusion reached therefore, is that due to the age and the slow growth rates, were the wind farm not to proceed, windthrow within Strathy South conifer plantation would be highly unlikely to occur over the lifespan of the Proposed Varied Development.

4.3 Phased Forest Felling Plan Objectives

The forest blocks at the Strathy South conifer plantation were planted as commercial timber crops. It was planned that blocks would be felled just before terminal height was reached, and then replanted. From the forest condition survey, it is evident that tree growth has been poorer than expected, and as such, the removal of the forest is in line with the UK Forestry Standard (UKFS, 2017) where afforested sites “have potential for restoration where this offers significant and demonstrable benefits for biodiversity”¹¹.

The combination of poorer than anticipated growth, wet/soft ground conditions, and distance to processing facilities, therefore, conspire to make commercial harvesting for timber uneconomic for the great majority of the plantation.

The proposed development of the wind farm provides an opportunity to harvest, take off-site or mulch the plantation and to allow for the restoration of peatland habitats in the long term.

Therefore, the objectives of the Phased Forest Felling Plan for the Strathy South conifer plantation are:

- To describe and plan for the forest removal of the entire site;
- To manage the forest removal in an environmentally sensitive way to ensure the effective restoration of the original landscape whilst not damaging intact blanket bog within or adjacent to the site;
- To comply with all relevant guidance produced by the FCS / FLS with regards the harvesting operations;
- To comply with all relevant guidance produced by SEPA with regards the harvesting operations and management of forestry waste;
- To consider within the Plan the utilisation of timber as biomass, to local markets and supply chains, where possible;
- To complete the harvesting component of forest removal within a five-year period to avoid flooding the market but enable wind farm construction and commencement of restoration activities; and
- To complete the removal in such a way as to allow managed restoration and re-colonisation of the former forest area for habitats whilst avoiding increased risk to qualifying birds from the adjacent SPA.

4.4 Phased Forest Felling Plan

The decision to harvest a forest is normally based on its economic return. In the case of the Strathy South conifer plantation, as elsewhere in the Flow Country, the planting of trees in such soils as blanket bog has proved problematic, inappropriate and limited the economic volumes of quality timber.

As evident from the extent of poor or very poor yield classes in Figure 9.6.3, the great majority of the plantation is unlikely to reach a utilisable size that could be considered for economic harvesting without the construction of the Proposed Varied Development. The remote location of the conifer plantation, the lower growth rates of the crop from the poor quality of the soils, and the poor quality of the access which would require substantial upgrade works to enable harvesting activities to take place, limit the economic

¹¹ UKFS (2017) Section 6.1 Biodiversity UKFS Requirements for Forestry and Biodiversity, Habitat Creation and Restoration.

attractiveness of the plantation in a stand-alone commercial forestry context. These facts, combined with the difficult ground conditions for tree removal, have also dictated the options for harvesting.

4.4.1 Mulching

This method of forest removal is considered in areas where uneconomic or small trees are located, particularly on soft and wet ground. It involves a base unit with a high powered flail that chips the tree to fragments. This forms a mulch on the ground that can decompose and/or be subsumed by growing peatland vegetation (notably Sphagnum in wetter areas). The flail head can also reduce the stump to ground level. Mulching will have an expected ‘out-turn’ (work rate) of half a hectare per day per machine. This method has been used successfully on other site restoration projects, including Strathy North and Gordonbush Wind Farms.

Strengths – fewer machine movements on the site reduces the impact on the soils and minimises carbon emissions. Most economic method of reducing uneconomic and inappropriate trees from a site. Residue consists of decomposable material. Woodchips tend to infill drainage ditches, leaving a more even surface that is more amenable to the future management of vegetation that subsequently develops. No timber traffic on local road network.

Weaknesses – mulch is not utilised for any economic product, and hence is purely a cost to the landowner.

4.4.2 Basal Shearing

This method for forest removal has been considered by FCS and used by the RSPB and others. Using a specially designed hydraulic shear cutting head, lower yield class trees (generally Yield Class 4 and 6) can be severed at ground level and the whole tree (providing it is of sufficiently small size) can then be used by pushing or laying into drains created by ploughing, to start the process of impeding drainage and restoring the bog’s water table. The brash is kept to a height that should not exceed 0.5 m in height, but ideally would be below the current maximum ground level. This can be followed by peatland restoration activities such as drain blocking to further control nutrient release and run-off issues.

Strengths – leaves minimal ground disturbance and requires fewer vehicle movements. Stumps are removed to ground level, avoiding the need to re-visit with stump grinder or mulching head.

Weaknesses – no economic use of timber. Whole tree left on site. Needle drop could potentially be concentrated and contribute to nutrient enrichment, depending on conditions and the timing of restoration.

4.4.3 Conventional Harvesting – Shortwood Systems

This harvesting method involves the trees being harvested by forestry mechanical harvesters or by chainsaw operators. The timber is then extracted by forwarders to roadside for removal from the forest by HGV units.

Strengths – machinery readily available. Machine movements on brash mats reduce damage to soil structure. Provides a utilisable product that may have a market value.

Weaknesses – large amount of vehicle movements on site, leading to potential ground damage, peat compaction and siltation, particularly where trees are small and brash-mats are limited. Expensive on low yield tree volume sites. Large size/amount of residue left on site and the site would need to be revisited to reduce stump height and make the ground surface topography suitable for peatland restoration.



Plate 9.6.3 – Example of harvested trees in Yield Class 10 Forest at the Strathy North Wind Farm to illustrate the approach

4.4.4 Whole Tree Harvesting

This method involves felling the entire tree (branches, main stem and top) and extracting this to ride/road side for processing. The processing method usually consists of chipping the complete tree into a container then removing the containers from site to be utilised by board manufacturers or as biomass wood fuel.

Strengths – little residue left on site. Utilises the whole tree and maximises biomass volumes.

Weaknesses – large number of machine movements, and traffic movements. Limited machinery available - currently very specialised machinery required. Few markets for the product, including the current local biomass market which is not established to accept this whole tree product. The site would need to be revisited to reduce stump height and make the ground surface topography suitable for peatland restoration, thus increasing vehicle movements and their associated impacts.

4.4.5 Preferred Tree Removal Options

Using the information obtained in Sections 2 and 3 on the condition and size of the trees within the Strathy South conifer plantation, and the felling options available as outlined in Sections 4.4.1 – 4.4.4, it was concluded in Technical Appendix A11.2, Volume 4 of the 2013 ES Addendum (Appendix 1 of this document) that mulching was the most suitable option for the sub-compartments where tree growth has been limited, and Yield Class is 8 or less. This was deemed to restrict the extent of mulching ensuring the volume of woody material would be sufficiently small, and thinly spread, to (a) avoid suppressing regeneration of peatland vegetation, and (b) avoid a harmful short-term increase in nitrate and phosphate leachate into natural watercourses. Where trees are generally of greater yield class (Yield Class 10 or above), it was concluded that conventional harvesting would generally be the most appropriate tree removal option, extracting stemwood off-site and removing as much brash as practically possible to facilitate peatland restoration.

Reassessment of the condition of the Strathy South conifer plantation in 2019, the improvement in harvesting techniques and efficiencies since the EIA work was carried out for the Consented Scheme, and a desire to provide the best possible surface for peatland restoration following felling, it has been determined that a greater area of the plantation would be able to be felled using conventional methods, thereby reducing the waste material left post-felling. It is now proposed that where possible Yield Classes 6 and above would be removed from site using conventional harvesting methods. This in turn will improve the rate and success of the recolonisation of the ground by peatland vegetation species. Table 9.6.4 below provides the predicted updated values for felling and mulching, with some areas still to be determined dependent on the ground conditions encountered whilst on site.

Table 9.6.4: Updated Harvesting Methods and the Potential Plantation Area Covered

Yield Class	Predicted Harvesting Method		
	Conventional Harvest	Mulching	Unknown Method
14	0.73	4.78	0.00
12	24.41	0.23	0.03
10	144.96	2.78	52.34
8	372.69	37.28	82.99
6	170.65	44.51	132.34
4	26.11	12.68	17.18
0	2.11	1.27	2.95
Total	741.67	103.54	287.82

As can be seen from Table 9.6.4, it is now proposed to use conventional harvesting methods across all yield classes, increasing the quantity of timber removed from site. At this time, this has increased from 230 ha to 740 ha as a minimum, with mulching decreased (at this time) from 903 ha to 104 ha. Mulching would still be required where ground conditions do not allow access for standard harvesting machinery. It is also proposed to remove all brash, where practical, associated with conventional harvesting and where practical mulch the remaining stumps to as close to ground level as possible. Brash mats created and used by harvesting machinery may be left in situ where it is considered the removal of these would be more damaging than beneficial to peatland restoration. The above measures will see a considerable improvement in the ground conditions left for peatland restoration.

The Phased Forest Felling Plan for the Strathy South conifer plantation has therefore been designed to favour suitable management of resultant habitats whilst accommodating the wind farm’s construction. This approach to removal of the forest is in line with the Scottish Government’s current policy (Scottish Forestry Strategy 2019-2029)¹².

4.4.6 Harvesting/Forest Removal Operations

Harvesting operations at the Strathy South Plantation will be in accordance with the UK Forestry Standard - The Governments Approach to Sustainable Forestry 2017¹³ and underlying FC/FCS guidance on best practice methods to be implemented, including:

- UK Forest Standard – Forests and soil requirements and guidelines;
- UK Forest Standard – Forests and water requirements and guidelines;

¹² Scottish Government (2019). Scotland’s Forestry Strategy:2019- 2029. <https://www.gov.scot/binaries/content/documents/govscot/publications/strategy-plan/2019/02/scotlands-forestry-strategy-20192029/documents/scotlands-forestry-strategy-2019-2029/scotlands-forestry-strategy-2019-2029/govscot%3Adocument/scotlands-forestry-strategy-2019-2029.pdf> (Accessed 06.04.2020).

¹³ Forestry Commission (2017). The UK Forestry Standard. Forestry Commission, Edinburgh.

- UK Forest Standard – Forests and biodiversity requirements and guidelines; Managing brash on conifer clearfell sites (FC, 2006)¹⁴;
- Guidance on site selection for brash removal (Forest Research, 2009)¹⁵;
- Forestry practice: Handbook 6 (Hibberd, 1991)¹⁶;
- Whole-tree harvesting: a guide to good practice (Nisbet et al, 1997)¹⁷;
- Soft ground harvesting: review of methods to minimise site damage (Spencer, 1991)¹⁸;
- Extraction route evaluation on deep peat (Saunders, 2001)¹⁹; and
- Protecting the environment during mechanised harvesting operations (Murgatroyd, 2005)²⁰.

Any additional published new guidance that emerges prior to, or during, forest works will similarly be adhered to.

4.4.7 Proposed Phasing of Forest Removal

It is proposed that the five-year timescale for removal of the Strathy South conifer plantation would be phased as follows:

Phase 1

Key-holing of priority construction areas including access tracks, turbine hard-standings and borrow pit locations, and the top priority area of forest removal for habitat restoration.

Phase 2

Key-holing of the wind turbine envelopes, coupled with felling and mulching of the conifer plantation in the northwest section of the site where construction is no longer planned for the Proposed Varied Development.

Phase 3

Felling or mulching of all further conifer plantation with lower yield compartments in the order of priority to aid in habitat restoration. Mulching will be applied in forest sub-compartments where ground conditions and / or Yield Classes do not allow for standard harvesting methods to be used.

Figure 9.6.4: Phased Forest Removal Plan provides an illustration of the proposed phased forest removal.

¹⁴ Moffat, A., Jones, B. and Mason B. (2006). Managing Brash on Conifer Clearfell Sites. Forestry Commission Practice Note, Forestry Commission, Edinburgh.

¹⁵ Forest Research (2009). Guidance on Site Selection for Brash Removal. Forest Research Agency of the Forestry Commission.

¹⁶ Hibberd B.G. (1991). Forest Practice. Forestry Commission Handbook No. 6. Forestry Commission.

¹⁷ Nisbet T., Dutch J. and Moffat A. (1997). Whole-Tree Harvesting: A Guide to Good Practice. Forestry Practice Guide, Forestry Commission.

¹⁸ Spencer, J.B. (1991). Soft ground harvesting review of methods to minimise site damage. Technical Development Report 35/91. Forestry Commission, Ae.

¹⁹ Saunders, C.J. (2001). Extraction route evaluation on deep peat. Technical Development Internal Project Information Note 03/01. Forestry Commission, Ae.

²⁰ Murgatroyd, I., Saunders, C. (2005), FCTN011 Protecting the Environment during Mechanised Harvesting Operations. Forestry Commission, Edinburgh.

4.4.8 Conclusions in Relation to Felling

The following conclusions have been drawn from analysis of the forest clearing options.

- Forest felling at the Strathy South conifer plantation would be in line with current Scottish Government Policy regarding woodland removal and the Scottish Forestry Strategy;
- The assessment of the conifer plantation’s condition has confirmed that only a small proportion of the forest is of an economically viable size whereby harvesting would be considered as an option if the Proposed Varied Development was not constructed;
- When harvesting is carried out, all available harvesting options would be considered along with any further practical and cost-effective techniques/equipment that leave a ground surface conducive to peatland restoration;
- Conventional harvesting would be the most widespread forest removal method on site as this method would reduce the waste material left behind and therefore would improve the rate and success of peat restoration in these areas;
- Forest felling would be phased, with priority given to removal of those sub-compartments where there is significant remaining peatland vegetation. This early removal is in response to consultation with SNH and aims to halt any further damage to peatland habitats from tree growth/canopy closure in these areas, and initiate restoration as early in the process as possible. This would primarily be in the northwest of the forest where construction activities are not proposed and the area can be linked back into the surrounding Caithness and Sutherland Peatlands SAC; and

The Applicant will continue to explore alternative options for off-site use of timber, where these are economically viable and would generate additional environmental benefits.

Figures

Figure 9.6.1: Plantation Planting Year

Figure 9.6.2: Plantation Sub-Compartment Plan

Figure 9.6.3: Yield Class Assessment Results (2019)

Figure 9.6.4: Phased Forest Removal Plan

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