

3 THE NATURE OF STRATHY SOUTH HABITATS AND CONIFER PLANTATION

Whereas Section 2 highlighted the main underlying physical characteristics of the Strathy South site, the following two sections deal with the understanding of the forest itself by also presenting information on current and previous land cover. This forms the basis for considering the options for forestry removal, also taking account of environmental, economic and legislative considerations for a Forestry Removal and Harvesting Plan.

3.1 Historic Land Management of Strathy South and Its Surrounding Area

In the decades before afforestation, the land within the application area was used mainly for deer stalking. The only significant modification over this period was digging of drainage grips and construction of the Strathy Lodge access track (please see Figures A11.1.7 – A11.1.12). Grips are visible in the aerial photos on Strathy South and are also widespread on the adjacent part of RSPB's Forsinard Flows Reserve, Yellow Bog, Skelpick and Rhifail Estate and Strathy Wood.

The introduction of large scale plantation forestry to the Flow Country occurred primarily in the post-war period. This applies to the forests found around Strathy South, which have been planted at differing times and by different landowners. The initial forest plantations were created by the Forestry Commission Scotland (FCS). The block immediately above Strathy South (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 the FCS north of Strathy North Forest, with planting taking place between 1968 and 1971.

Strathy South was mostly planted between 1983 and 1987. Additional planting then took place in the early part of the 1990's 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. Further details are provided below (Sections 3.4 to 3.7).

In recognition of the remaining habitat value of parts of the non-afforested land at Strathy South, two areas in the south-west section of Strathy South have been subject to conservation management agreements between the land owners and SNH (see Section 3.3 for further details).

3.2 Current Land Management of the Surrounding Area

Before describing the Strathy South site itself, information is presented on the adjacent land at Strathy Wood because the land management here, and the resulting bird activity, overlaps with Strathy South.

The large forest blocks in Strathy Wood, directly to the north-west of Strathy South Forest (which can be seen in Figure A11.1.4), have mainly been felled as part of grant-aided forest-to-bog restoration management (Plate A11.2.1). This has been 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 (Plate A11.2.2). The lodgepole pine and occasional Sitka spruce are now common throughout and have exploited the disturbed ground.

Significant areas of Strathy Wood have been felled and the trees left *in situ* (Plate A11.2.3). These dead trees are being left, at present, to decay naturally, although there is a desire to have the material removed. Currently, the felled trees are providing highly suitable nesting habitat for hen harriers, but are also likely to be preventing regeneration of the ground flora (Plate A11.2.4).



Plate A.11.2.1. Strathy Wood planted and regenerated birch, with some regeneration of lodgepole pine, looking east



Plate A11.2.2 Strathy Wood lodgepole regeneration



Plate A11.1.3. Strathy Wood felled area looking west



Plate A11.2.4. Area of felled forestry in Strathy Wood which is potentially suitable for nesting raptors

Open moorland surrounds the site on all remaining sides, all of which is designated for peatland and bird interests. The land is not agriculturally grazed, although deer stalking may take place

on occasion. Along the southern and eastern boundary, the land under RSPB ownership is managed for nature conservation. SNH have a number of management agreements in place with SPA land owners, covering the open ground surrounding Strathy South.

The River Strathy and a number of lochans around about the application site have fishing interests. Further information regarding fish interests is provided in Technical Appendix A10.4: Assessment of Fish Habitats and Populations.

3.3 Non-Forested Habitats Within Strathy South

The extent and structure of non-forested habitats within the Strathy South application area have been surveyed for the 2007 ES and more recently to ground-truth and up-date these data. The resulting information is presented in Chapter 10 of the 2007 ES and Chapter 10 of the ES Addendum. In summary, of the approximately 1,620 ha application area, 487 ha (30%) is non-forested, with the remainder comprising plantation, of which all but 6.7 ha is conifer.

An example of open vegetation along the existing forest track is shown in Plate A11.2.5 below. Open habitats within Strathy South, along rides and un-planted areas, are predominantly wet dwarf shrub heath, blanket bog and modified bog (see Figures A10.4, A10.5, A10.8 and A10.9 in Chapter 10: Ecology of the ES Addendum). The habitat survey results show the forest to be primarily surrounded by blanket bog with a lesser extent of wet heath.



Plate A11.2.5 Typical ride vegetation adjacent to forest track within Strathy South

In recognition of the residual habitat value of remaining non-forested areas in the south-west of the site (within Plot 3 of the land ownership, as shown in Figure A11.1.4), these areas are covered by management agreements between SNH and the land owners.

3.4 Preparation and Planting of the Strathy South Plantation

A process of ploughing was used to provide raised planting positions in order to improve the establishment of trees (visible in Figure A11.1.8 – A11.1.12). The species planted are mainly a self-thinning mix of lodgepole pine and Sitka spruce (Plate A11.2.6), 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.



Plate A11.1.6. Typical self-thinning mix of spruce and lodgepole pine

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 broadleaves in Coille Am Sealbach. The progression of planting from thirty to nineteen years ago is shown in Diagram A11.2.1.

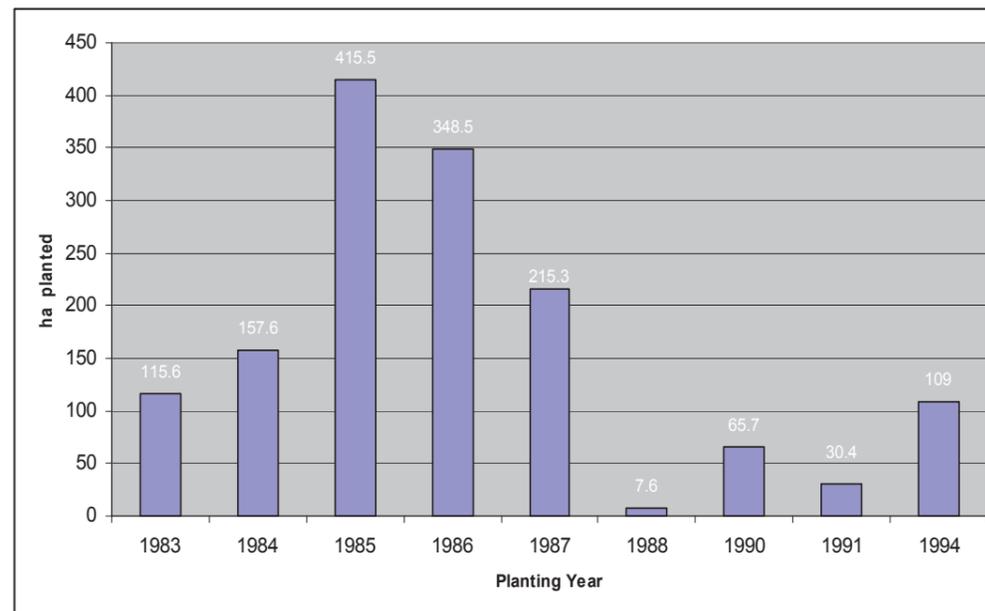


Diagram A11.2.1. Strathy South planting progression

3.5 Aftercare of Forested Habitats

Aftercare work at Strathy South 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.

Of note is the fact that, in order to produce a commercially viable crop at Strathy South, it would be necessary to carry out additional drainage and the application of fertiliser.

3.6 Composition of the Plantation

The forest areas of Strathy South consist of eight forest units: Bad Coille, Coille Saobhaidhe, Coille Buidhe, Coille Am Sealbach, Coille Fada, Coille Meadhonach, Coille Nan Clach and Coille An Reidhe (Figure A11.2.1). 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 1 (by Forest Unit, sub-compartment, planted area per sub-compartment, planting year, species mix and yield class). Data for each forest unit and sub-compartment has been given by planting year and species composition in Appendix 2 – Forest Planting Years and Composition. Summary details of planting year are found in Table A11.2.1 and overall composition in Table A11.2.2.

Forest Unit	Planting Year								
	1983	1984	1985	1986	1987	1988	1990	1991	1994
Bad Coille			183.7						
Coille Saobhaidhe	65.8	55.6	88.5	100.2					
Coille Buidhe		6.2	8.4	98.2	49.8		65.7	30.4	
Coille Am Sealbach		11.1	26.1	57.6	58.6				109.0
Coille Fada		52.8	37.9	26.8	27.6				
Coille Nan Clach	32.4	5.2	22	14.5	42.3	7.6			
Coille Meadhonach		18.6	20.6	19.5					
Coille An Reidhe	17.4	8.1	28.3	31.7	37				
Totals	115.6	157.6	415.5	348.5	215.3	7.6	65.7	30.4	109.0

Forest Unit	Composition							Broad-leaves (ha)	Un-planted (ha)
	Sitka Spruce (ha)	Sitka Spruce/ Lodge-pole Pine (ha)	Sitka Spruce / Peters-burg Lodge pole Pine Mix	Sitka Spruce / Lodge-pole Pine / Scots Pine/ Japanese Larch	Sitka Spruce / Lodge-pole Pine Mix/ Japanese Larch	Sitka Spruce / Peters-burg Lodge-pole Pine / Scots Pine/ Japanese Larch Mix			
Bad Coille		183.7						3.8	
Coille Saobhaidhe		310.1						5.6	
Coille Buidhe		218.9	39.8					45.1	
Coille Am Sealbach		139.5	101.8	7.9		5.4	6.7	77.9	
Coille Fada	6.3	138.8							
Coille Nan Clach	2.8	113.7		.0	7.5			14.1	
Coille Meadhonach		58.7						0.6	
Coille An Reidhe		91.8	30.7					7.8	
Totals	9.1	1225.2	172.3	7.9	7.5	5.4	6.7	154.9	

Note: There is also 1.1 ha of Dunkeld Larch planted in Coille Am Sealbach

As illustrated in Diagram A11.2.1, this information shows the majority of the forest was planted between 1983 and 1987 (the aerial photos shown in A11.1.8 – A11.1.12 were taken in 1988), 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 (Figures A11.2.2 and A11.2.3, Tables A11.2.1 and A11.2.2).

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 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 and with one exception have failed to establish. Compartment 1d of Coille Buidhe (described on the planting plan as a deer lawn) has established broadleaved trees present, but growth is slow and mostly stunted. Where 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

Predicted Yield Classes

Details of the 1,133 ha of forestry to be potentially felled were gathered on a compartment and sub-compartment basis, during a site visit by RPS's chartered forester in August 2010. Survey results are provided in Appendix A11.2.1 and Appendix A11.2.2.

The forest condition varies throughout and is influenced by local conditions, particularly 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 of 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 Yield Models for Forest Management Handbook Booklet 48 have been used. Yield class is a direct correlation between species/variety, top height and age. The figure obtained gives a mean average increase in stand volume (m³) per hectare per annum.

Access to many compartments throughout Strathy South 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. Obviously, these are average values of best judgement and not accurate top height values that would be obtained in a detailed forest tariff.

During August 2010 the forest was visited by a Chartered Forester and a large number of data points (173) collected to allow a yield class analysis to take place. The survey took in a large part of the forest but further desktop analysis was undertaken using aerial photograph to establish approximate growth rates and thus yield classes for all the forest unit compartments. This produced a range of values that could be used to analyse the condition and productivity of the forest compartments.

A tree grading system based on yield classes was then produced. This related forest condition to yield class information as below (Diagram A11.2.2 and Table A11.2.3). Areas of bare ground were included in the mapping analysis to complete the forest plan.

Once the grading had been completed, a Forest Condition Plan (Figure A11.2.3) was produced. The information gathered provided 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 34).

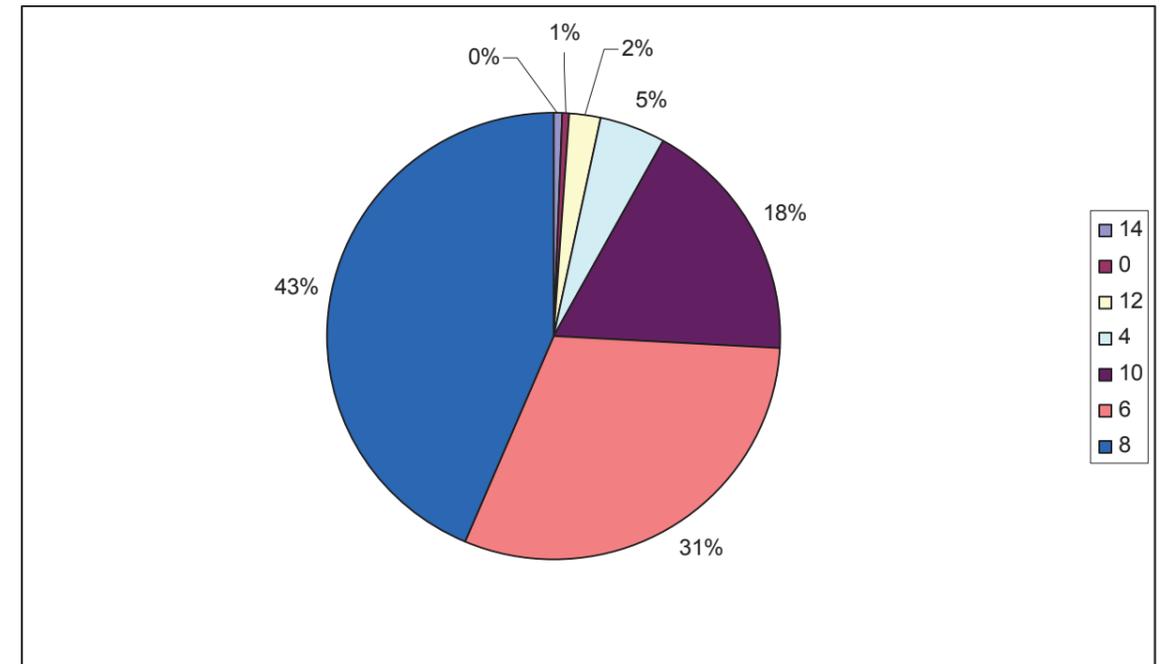


Diagram A11.2.2. Percent Composition of Strathy Forest by Yield Class (figures rounded to nearest whole percent)

Yield Class	Condition Category	Ha	% of the Total Planted Area
14	Good	5.52	0.49
12	Moderate	24.67	2.18
10	Moderate	200.07	17.66
8	Poor	492.97	43.51
6	Poor	347.50	30.67
4	Very Poor	55.96	4.94
0	Very Poor	6.34	0.56
Total		1,133.03	

4 FOREST REMOVAL

4.1 Forest Removal Rationale

Removal of 1,133ha of plantation within Strathy South is required in preparation for the construction of the wind farm and associated infrastructure. This wind farm footprint will occupy 24ha of habitat (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 habitat, and consequently such an area would not meet current planting guidelines. The removal of the plantation for the wind farm, therefore, enables the implementation of a 25 year programme of peatland restoration, whilst ensuring this avoids increasing the risk to qualifying species of the adjacent SPA.

Using the information obtained in Sections 2 and 3, the options considered for tree removal were (a) whole tree harvesting and extraction which involves the cutting and removal of the whole tree for processing; (b) conventional harvesting (shortwood systems) which involves trees being harvested and timber extracted; with residual brash and stumps being mulched, and (c) mulching of trees and brash. In general, the most appropriate approach will be applied to the whole sub-compartment but as variable tree growth within sub-compartments is typical for the area, a combination of approaches may be used.

Based on the constraints described in this Technical Appendix, it was concluded that mulching was the most suitable option for the sub-compartments where tree growth has been limited, and Yield Class is 8 or less. Restricting the extent of mulching to these sub-compartments ensures the volume of woody material is 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 or groundwater. In addition, mulching enables tree removal with minimum ground disturbance and damage to existing peatland vegetation.

Where trees are generally of greater yield class (Yield Class 10 or above), it has been concluded that conventional harvesting is generally the most appropriate tree removal option, extracting stemwood off-site (potentially for the local biomass market) and mulching brash residues *in situ*.

Whilst a Yield Class of 10 or greater would generally be used to identify the most appropriate forest compartments for harvesting, flexibility is required in this approach to allow for pockets of poorer forming trees which occur in a mosaic within such compartments. Conversely, this flexibility would also allow for harvesting of trees with better growth within compartments of Yield Class 8 or less.

The aim of this combined approach is to enable restoration of peatland habitats, informed by recent experience of SNH and RSPB Scotland in particular. This approach is, however, dependent on SNH agreeing that this does not result in an increased mortality risk to qualifying species of the adjacent SPA being attracted into the wind farm area.

The Harvesting Plan for Strathy South Forest has therefore been designed to favour suitable management of resultant habitat whilst accommodating the wind farm's construction.

This approach to removal of the forest is in line with the Scottish Government's desire to address 'negative environmental legacies from the previous century. Examples include poorly designed forests that have yet to be 'restructured', plantations on inappropriate sites such as raised bogs or important blanket bogs' (Scottish Forestry Strategy 2006)¹.

The Plan makes certain assumptions as to the composition and current individual compartment growth rates as they have not been fully surveyed. However, the forest was planted within a short time period and has similar species composition (see Table A11.2.1). This has led to a

forest structure that is fairly typical of a commercial forest in this area and found on this soil structure.

As part of the development of the harvesting plan, comments have been taken into account from SNH's, SEPA's and FCS's responses to the 2007 ES, as well as more recent consultations. The Harvesting Plan (Section 4.4) provides greater information regarding the method and approach that will be adopted in the forest removal.

4.2 Constraints and Considerations Influencing Tree Removal Approach

Strathy South has a variety of constraints that have been considered as part of the harvesting 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 Removal² 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 heath and blanket bog 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.

Planning conditions and agreements are used to mitigate the environmental impacts arising from wind farm development and FCS will also encourage their application to development-related woodland removal.

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.

There is broad guidance on meeting the acceptability criteria for woodland removal. These criteria are listed below with sections in bold where the wind farm development at Strathy South 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.**

¹ Scottish Executive (2006). The Scottish Forestry Strategy. Report SE/2006/155. <http://www.forestry.gov.uk/forestry/INFD-6AGGZW>

² 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)

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.**

Also, as mentioned above, the removal of Strathy South Forest is in line with the Scottish Government's Scottish Forest Strategy 2006 that identifies the desire to address 'negative environmental legacies from the previous century. Examples include poorly designed forests that have yet to be 'restructured', plantations on inappropriate sites such as raised bogs or important blanket bogs'.

It can be seen that the case for forest removal at Strathy South 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.

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 on Strathy South but also liaison during 2012 and 2013 to enable finalisation of the Strathy North Habitat Management Plan. Over this same period, SEPA evolved and published its February 2013 Guidance on the Management of Forestry Waste. In cognisance of this Guidance and its objectives, particular consideration has been given to identifying forest removal 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 (see Technical Appendix A14.1: Peat Landslide Hazard Assessment), 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 forest trees, 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. The prediction of Terminal Height of the crop provides the height and thus age that the stand will become liable to wind throw and thus the approximate rotation of the crop. The Forestry Commission has produced various systems to predict the Terminal Height, and for the assessment of Strathy South Forest, 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 wind-throw can be located within the woodland, these tend to be the direct result of localised soil conditions on the edge of the plantation.

The ForestGALES Prediction Model shows that for the average Sitka spruce with a top height of 8 m and an average stem diameter of 12 cm (as obtained from the survey) has a return period of 200 years. A similar return period is predicted for lodgepole pine of top height 6 m and stem diameter of 12 cm. This reflects the poor yield class being obtained on the site and the estimated time it will take for these trees to obtain their terminal height.

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 Forest would be highly unlikely to occur over the lifespan of the proposed development.

4.3 Forest Removal and Harvesting Plan Objectives

The forest plantations at Strathy South 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 Scottish Forestry Strategy 2006 to address the legacy of 'inappropriate' planting from the previous century on important habitats including blanket bog sites.

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 heath and peatland habitats in the long term.

Therefore the objectives of the Harvesting Plan for Strathy South 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 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 harvesting plan the utilisation of timber as biomass, to local markets and supply chains, where possible;
- To complete the harvesting component of forest removal within the 24 month construction period.; 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 Forest Removal and Harvesting Plan

The decision to harvest a forest is normally based on its economic return. In the case of Strathy South, as elsewhere in the Flow Country, the planting of trees in such soils as blanket bog has proved problematic, inappropriate and unlikely to provide economic volumes of quality timber. As evident from the extent of poor or very poor yield classes in Figure A11.2.3, the great majority of the plantation is unlikely to reach a utilisable size that could be considered for harvesting. This fact, combined with the difficult ground conditions for tree removal, has largely 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 mosses 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.

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 the Forestry Commission 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 brush 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.

4.4.3 Conventional Harvesting – Shortwood Systems

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

Strengths – machinery readily available. Machine movements on brush 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 and siltation, particularly where trees are small and brush-mats are limited. Expensive on low yield tree volume sites. Large size/amount of residue left on site.



Plate A11.2.7 – Example of harvested trees in Yield Class 10 Forest at Strathy North 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. No brush mats to reduce impact on site from machinery travel. 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.

4.4.5 Preferred Tree Removal Options

The matrix underpinning this assignment of felling approaches to each sub-compartment is provided in Appendix A11.2.1.

Based on a combination of compartment condition, underlying ground conditions and habitat management objectives, the appropriate method applicable to harvesting the majority of the site is considered to be mulching. This would generally be applied to sub-compartments with a Yield Class of 8 or less. This equates to 80% of the 1,133 ha to be removed (i.e. approximately 903 ha).

In areas of higher yield (10 or above), which comprises the remaining 20% of the 1,133 ha (i.e. approximately 230 ha), the applicant is committed to exploring the most recent evolution of harvesting machinery and approaches to maximise environmental benefit. Provided this machinery proves economic and is available, and providing peat depth/wetness does not prevent machine access, one example of this may be harvesting equipment that has a cutting tool for basal shearing, combined with an otherwise standard harvesting head. This would reduce any need for mulching stumps and therefore running machinery across the peatland for a second time.

It enables whole tree harvesting, after which various options would be considered, such as processing the tree *in situ* in which case the brush mat would subsequently be mulched, or to process the trees in windrows, so that brush is concentrated in these areas, keeping the intervening ground free of brush to potentially aid peatland restoration. One further possible option could be removing the whole tree for processing at the roadside. All these options have potential pros and cons, and the final decision will be made depending on the balance of these, and whether or not other options have emerged by the time felling would be required.

4.4.6 Harvesting/Forest Removal Operations

Harvesting operations at Strathy South will be in accordance with the UK Forestry Standard 2011³ 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;
- UK Forest Standard – Forests and biodiversity requirements and guidelines;
- Managing brush on conifer clearfell sites (FC, 2006)⁴;
- Guidance on site selection for brush removal (Forest Research, 2009)⁵;
- Forestry practice : Handbook 6 (Hibberd, 1991)⁶;
- Whole-tree harvesting: a guide to good practice (Nisbet *et al*, 1997)⁷;
- Soft ground harvesting: review of methods to minimise site damage (Spencer, 1991)⁸;
- Extraction route evaluation on deep peat (Saunders, 2001)⁹; and
- Protecting the environment during mechanised harvesting operations (Murgatroyd, 2005)¹⁰.

SSER will also adhere to any additional published new guidance that emerges prior to, or during, forest works.

Given the on-going development of machinery and approaches to forest removal, including for peatland habitat restoration, SSER will continue to investigate any new options for forest clearance.

³ Forestry Commission (2011). The UK Forestry Standard. Forestry Commission, Edinburgh.

⁴ Moffat, A., Jones, B. and Mason B. (2006). Managing Brush on Conifer Clearfell Sites. Forestry Commission Practice Note, Forestry Commission, Edinburgh.

⁵ Forest Research (2009). Guidance on Site Selection for Brush Removal. Forest Research Agency of the Forestry Commission.

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

⁷ Nisbet T., Dutch J. and Moffat A. (1997). Whole-Tree Harvesting: A Guide to Good Practice. Forestry Practice Guide, Forestry Commission.

⁸ Spencer, J.B. (1991). Soft ground harvesting review of methods to minimise site damage. Technical Development Report 35/91. Forestry Commission, Ae.

⁹ Saunders, C.J. (2001). Extraction route evaluation on deep peat. Technical Development Internal Project Information Note 03/01. Forestry Commission, Ae.

¹⁰ Murgatroyd, I., Saunders, C. (2005), FCTN011 Protecting the Environment during Mechanised Harvesting Operations. Forestry Commission, Edinburgh.

As part of the preparatory works for future felling, if the wind farm is consented, SSER propose to commission a LIDAR survey in order to up-date the Yield Class mapping, and provide finalised tree heights, mulch volumes and harvest areas for consultees. The LIDAR data will also be used to assist with detailed planning of drain blocking on open habitats.

4.4.7 Proposed Phasing of Forest Removal

It is proposed that the two-year timescale for removal of the Strathy South Forest is phased as follows:-

Phase One would cover clearance to accommodate the initial wind farm infrastructure (tracks, borrow pits, switching station, laydown areas and turbine bases), as has been done at Strathy North. To ensure peatland restoration is started as early as possible, Phase One also includes removal of plantation forest that has significant underlying peatland vegetation remaining. This is in accordance with the expressed feedback from SNH, and will focus on areas of lowest yield class.

Phase Two will be the clearance of the remainder of the site for the turbine envelope.

Phase Three will involve the removal of all remaining conifer plantation.

The subsequent control of any conifer regeneration on site would take place as part of the implementation of HMP proposals.

4.5 Conclusions in Relation to Felling

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

- Forest removal at Strathy South is in line with current Scottish Government Policy regarding woodland removal and the Scottish Forestry Strategy.
- The assessment of the forest's condition has confirmed that only a small proportion of the forest is of a size whereby harvesting can be considered as an option.
- Where harvesting is carried out, options such as basal shearing will be considered along with any further practical and cost-effective techniques/equipment that leave a ground surface conducive to peatland restoration.
- Mulching will be the most widespread forest removal method on site given the small size of the trees, underlying ground conditions, and the lack of any economically viable or environmentally beneficial alternative use.
- Forest removal will be phased, with equal 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.
- SSER will continue to explore alternative options for off-site use of timber, where these are economically viable and would generate additional environmental benefits.

5 POST-CLEARANCE LAND MANAGEMENT AND THE ASSESSMENT OF ITS EFFECTS ON SPA QUALIFYING SPECIES

5.1 Assessing the Timescale and Nature of Vegetation Recolonisation and Succession on Mulched and Harvested Forestry at Strathy South

Recolonisation of vegetation is influenced by a range of factors, notably the nature, age and volume of the previous forest, the thickness of needle cover, the nature of the underlying vegetation, the age of the seed bank present, the degree of soil disturbance during forest operations, the soil type, slope, and wetness.

Published results on the influence of these and re-colonisation rates are limited, however, largely because mulching at this scale is a relatively recent land management technique. There has also been relatively limited compilation of monitoring data from mulched sites, or it is held privately by developers.

To access the information that does exist, SNH staff are directed to E.ON (for Rosehall) and Scottish Power (specifically Peter Robson, Ecologist), as they are funding post-mulching vegetation studies at Black Law (Central Scotland), Whitelee (Central Scotland), and Beinn an Tuirc (Argyll). This data is held in commercial confidence and was not therefore directly accessible for the purposes of this Report.

Information from three North Scotland sites (Rothes, Gordonbush and preliminary data from Strathy North) is available, together with data from RSPB forest clearance on their Forsinard Flows Reserve. Results are discussed in more detail below, to inform the likely recolonisation influences and outcomes at Strathy South.

5.1.1 Mulch Thickness

The thickness and degree of continuous cover provided by mulch has an influence on the speed and evenness of regeneration. The compartments with the highest yield class forestry (Figure A11.2.3) will generate the largest thickness of mulch chips, which will subsequently suppress vegetation for a longer period of time compared to equivalent sites with shallower depths of chips. Vegetation will then develop dependant a range of local variables such as soils, slope and wetness.

During the mulching process, experience from other sites shows that mulch tends to infill existing depressions, leading to a smoothing of micro-topography. This is compounded by the movement of machinery back and forward over planting ridges and furrows, whilst mulching trees, resulting in a degree of evening out of the ground surface.

Photos of mulched areas from Strathy North are shown below, to illustrate the different mulch volumes resulting from different Yield Classes (Plates A11.2.8 – A11.2.11).



Plate A11.2.8 – Small tree size (Yield Class 0 – 4) showing incomplete canopy closure



Plate A11.2.9 – Small tree size (Yield Class 0 – 4) – no harvestable produce and minimal mulch produced.



Plate A11.2.10 - Tree height <10 m (Yield Class 6) – no harvestable produce and minimal mulch produced.



Plate A11.2.11 - Tree height approximately 10 m (Yield Class 8) – no harvestable produce.

The predicted mulch depths for Strathy South, derived from measurements of mulch depth from different yield classes at Strathy North (sub-compartment 2A and other sub-compartments) are shown below in Table A11.2.4.

Table A11.2.4 Strathy South Forest Yield Data								
Yield Class	Clearance Method	Planting Year	Age at 2013	Tree height 2013	Area (ha)	Material from mulching mean depth (avg) cm		
0	Small tree - mulch	1990	23	<3	1.6	negligible		
		1994	19	<3	2.9	negligible		
		Unknown		<3	0.5	negligible		
4	Small tree - mulch	1983	30	7	2.2	negligible		
		1984	29	7	4.3	negligible		
		1985	28	6	23.3	negligible		
		1987	26	6	9.8	negligible		
		1994	19	6	16.3	negligible		
6	Small tree - mulch	1984	29	8	79.9	9.5		
		1985	28	8	169.2	9.0		
		1986	27	8	25.3	8.6		
		1987	26	8	26.0	8.0		
		1988	25	9	1.0	7.5		
		1990	23	9	2.2	negligible		
		1994	19	9	43.9	negligible		
		8	Small tree - mulch	1983	30	10	33.9	11.7
				1984	29	10	66.6	11.1
				1985	28	9	97.3	10.6
1986	27			9	173.9	10.0		
1987	26			9	37.6	9.5		
1988	25			9	2.0	9.0		
1990	23			9	39.3	7.9		
1991	22			8	23.9	7.3		
8	Potential harvest	1987	26	10	3.7	Not applicable		
		1994	19	7	14.7	5.8		
10	Potential harvest	1983	30	14	22.3	Not applicable		
		1984	29	13	13.6	Not applicable		
		1985	28	13	14.5	Not applicable		
		1986	27	13	55.2	Not applicable		
		1987	26	14	85.0	Not applicable		
		1990	23	14	9.5	Not applicable		
		12	Potential harvest	1985	28	14	4.9	Not applicable
				1986	27	14	19.8	Not applicable
14	Potential harvest	1985	28	15	2.0	Not applicable		
		1987	26	15	4.8	Not applicable		
Total					1133.0			

5.1.2 Underlying Vegetation

Previous studies indicate a strong correlation between vegetation development and existing plant species within the forest, providing mulch depth is insufficient to suppress these species. Areas where the mulch layer is thinner, or where more existing vegetation remains, will enable more rapid restoration of peatland vegetation, whereas this process will take significantly longer where peatland vegetation has been shaded out, and a thick needle layer and mulch are present.

5.1.3 Wetness

Experience from mulched areas to date shows that, depending on slope, certain types of vegetation generally develops significantly more quickly (generally within one to two growing seasons) where ground conditions are wet. Rushes and grasses dominate this early growth, producing a mosaic of wet peat, peat pools, and small patches of rushes and grasses.

To halt and reverse the drying out effect of forest drains (and remaining suitable hill drains) a key element of peatland restoration will also be drain blocking, to increase water table levels.

In relation to habitats and birds, evidence of nesting preference shows that both hen harrier and short-eared owl preferentially nest in rushy patches set in a wider matrix of heather-dominated moorland. Harriers have also been recorded nesting in bracken, and brash (as is evident from Strathy Wood, for example). Therefore, as part of overall vegetation monitoring, targeted surveys will check extent of such preferential nesting habitats and their height. This information will feed into decisions on whether any vegetation control would be needed to achieve the HMP objectives (specifically, and only if this remains a requirement of SNH, the prescription to minimise the development of suitable nesting locations that would lead to flight activity likely to cause an unacceptable collision risk to hen harriers or short-eared owls).

5.1.4 Slope

The importance of slope, in terms of vegetation succession, is its effect on drainage and soils. In light of emerging experience referred to above, it is important to note that the majority of the main wind farm area has a limited or gentle gradient (see Technical Appendix A11.1, Figure A11.1.7). Where slopes are steeper, depending on soil conditions, natural and artificial drainage will tend to have led to greater tree growth (with resulting increased needle depth, less residual moorland vegetation and greater mulch depth).

5.1.5 Soil Disturbance

It has been shown that the presence of an unbroken layer of pine needles suppresses vegetation development after forest felling. The disturbance created by forest harvesting operations helps break up this needle layer, exposing bare soil and creating better conditions for the seed bank or windborne seed to germinate.

Machinery used for mulching does not create the same level of ground disturbance as normal forwarders and harvesters under similar conditions. Nonetheless, some ground disturbance would be inevitable, particularly where a shallower depth of needles has accumulated and trees are a low yield class.

5.1.6 Conifer Regeneration

Regeneration of conifers is dependant on a number of factors including tree species, tree age, soil type, soil wetness, soil disturbance, and proximity of seed trees. Sitka spruce produce relatively small amounts of seed under the age of 20 years (Brown and Neustein, 1974¹¹, Ruth, 1965¹²) becoming more active from this age onwards. Large volumes of seed are not produced by Sitka spruce until after 35 years (Harris, 1991¹³). Lodgepole pine can produce seed as early as five to ten years of age (Lotan and Critchfield, 1990¹⁴). Trees within Strathy South have an average age of approximately 28 years, but vary between 19 and 30 years. Hence, both species are likely to produce enough seed prior to harvesting to result in the presence of a viable seed bank. Sitka spruce is known to have 'mast' seeding years whereby trees synchronize seeding and produce heavier crops in those years. For Sitka spruce this is generally on a four to five year return period (Pfeifer, 1991¹⁵). Heavy seed years in lodgepole pine may be more often than this (Lotan and Critchfield, 1990). The timing of mast years will contribute to determining the level of seed bank present.

Dry or intermediate soil wetness will improve the chance of seedling germination and establishment as Sitka spruce is relatively intolerant of wet soils. However, lodgepole pine does regenerate in wetter conditions. Both species prefer mineral or shallow peat soils (Harris, 1991) but on deeper peat soils, where elevated nutrient levels have been created by the presence of a previous crop, or where peat is disturbed causing drying or mineral mixing, this will increase regeneration. Soil disturbance aids germination by creating micro-climates, although, indications

¹¹ Brown, J.M.B. and Neustain, S.A. 1974. *Natural regeneration on conifers in the British Isles*. Proc. Roy. Hort. Soc. 3rd Conf.:29-30.

¹² Ruth, Robert H. 1965. *Sitka spruce (Picea sitchensis (Bong.) Carr.)*. In *Silvics of forest trees of the United States*. p. 311-317. H. A. Fowells, comp. U.S. Department of Agriculture, Agriculture Handbook 271. Washington, DC.

¹³ Harris, A.S. 1991. *Conifers: Picea sitchensis*. In: *Silvics of North America, Vol.1*. USDA Forest Service Handbook no. 654:260-267.

¹⁴ Lotan, J.,E., Critchfield, W., B., 1990. "*Pinus contorta*". In. *Silvics of North America*. Edited by R.M. Burns and B.H. Honkala. USDA Forest Service Agricultural Handbook 654. Volume 1.

¹⁵ Pfeifer, A. 1991. *Relationship between some climatic factors and seed production*. Unpublished study. Research and Development, Coillte Teo., Sidmonton Place, Bray, Co.Wicklow.

from some sites show germination can occur on non-disturbed peat soils providing they are relatively dry.

Sitka spruce and lodgepole pine seed generally last less than two years in the seed bank (Von Ow *et al*, 1996¹⁶). This creates an initial pulse of seedlings in the years following forest removal. Beyond three years, any subsequent regeneration will only occur where parent trees remain in close proximity to the site. Both Sitka spruce and lodgepole pine seed are relatively large and heavy and therefore windborne seed dispersal is mainly limited to within 100 m of source trees (Nixon and Worrell, 1999¹⁷). However, smaller amounts of seed may disperse further in high winds or through mammal/bird dispersal.

Given the nature of the site and current crop within Strathy South, it is likely some level of regeneration will occur. This will be greater in more sloping, better drained areas where an older more mature crop currently exists.

5.2 **Predicted Sequence and Duration of Recolonisation of the Wind Farm, and the Resulting Evolution of Bird Activity**

In light of the above range of influences and observations of mulching elsewhere (such as Gordonbush and Black Law Wind Farms), the evidence indicates that where wet conditions prevail, even under a moderate initial thickness of mulch (up to approximately 10-20 cm), rapid vegetation recolonisation dominated by rushes may occur within one to two seasons, dependant on other local variables. Re-growth will be relatively slow in higher yield class areas, particularly on slopes with a deep needle layer, taking in the region of three to five years before a near-continuous ground cover develops.

In low yield class areas where conditions are flatter (therefore more poorly drained), there will be more residual vegetation cover remaining and the layer of mulch will be less. Dependant upon the type of species and soils present, vegetation in these areas could develop relatively quickly. On the basis of this evidence, areas of the turbine envelope could support vegetation suitable for mammalian and avian prey, and raptor nesting within three to four years after felling, particularly if large rush patches or other relatively tall vegetation develops and are not suppressed/cut.

The vegetation that will develop over the majority of the site in the longer term is likely to reflect that on adjacent moorland surrounding the site, and to a degree, the vegetation on site in forest rides and open areas. The match will be influenced by the differences in drainage and soil nutrients that have respectively resulted from creation of forest drains and enrichment due to historical application of forest fertiliser.

5.2.1 **RSPB Forsinard Flows Reserve Peatland Regeneration**

Insights into the evolution of bird populations following different forms of tree removal can be gained from the peatland restoration and subsequent monitoring at RSPB's Forsinard Flows Reserve. Moorland bird surveys were carried out by RSPB in eight areas of clear-fell across the RSPB Forsinard reserve in 2008, as part of an ongoing monitoring programme in relation to the Caithness and Sutherland Peatlands LIFE project¹⁸. Drain blocking, forest removal restoration work and other ongoing management including grazing effects on the condition of the peatland habitats have been monitored by RSPB since felling began.

The effects of felling work were studied at two sites in particular - Talaheel, a conifer plantation felled in 1998 during the first LIFE-funded project in the Flow Country, and Lonielist, a plantation felled in 2003-04 during the second LIFE-funded project in the area. The effects of hill drain blocking were studied at Cross Lochs Hill site.

¹⁶ Von Ow, F., Joyce, P. and Keane, M. (1996). *Factors affecting the establishment of natural regeneration Sitka spruce. (Picea sitchensis (Bong.) Carr.) in Ireland*. Ir. For. 53, 2 – 18.

¹⁷ Nixon, C.J. and Worrell, R. (1999). *The Potential for the Natural Regeneration of Conifers in Britain*. Bulletin 120. Forestry Commission, Edinburgh.

¹⁸ Robinson, K. (2008). *Restoring Active Blanket Bog of European Importance in North Scotland: Monitor effectiveness of habitat restoration works completed on RSPB land*. LIFE Project Ref: LIFE00NAT/UK/7075

Talaheel

Talaheel plantation was purchased by the RSPB in 1997 after 15 years of tree growth. The trees were felled soon after the purchase as part of a wider LIFE Nature funded project, in order to restore the area to open blanket bog. Trees were felled to waste into the forestry furrows where the brash helps to impede the drainage of water from the site. Prior to tree removal in spring 1998, a long-term monitoring scheme was set up for the site. Overall the vegetation on the site appears to be recovering well with bog species such as hare's tail cotton-grass (*Eriophorum vaginatum*), common cotton-grass (*Eriophorum angustifolium*) and *Sphagnum* species increasing throughout the site with *Sphagnum* cover overall equivalent to open bog cover scores. The decrease in heather (*Calluna vulgaris*) is also indicative of a move towards wetter conditions.

West Cross Lochs Hill Drain Monitoring

This area was not forest but an area of open blanket bog. Typically in the region, large areas of blanket bog were damaged by drainage schemes as part of an agricultural initiative to improve areas of moorland for grazing and game. This included drainage ditches cut in rows 50-90 cm deep in average. The RSPB has been attempting to reverse the impacts by installing dams in these drains. Dams were first installed on the reserve under the first LIFE Peatlands Project in March 1996. The two materials used for damming hill drains were peat and recycled plastic piles.

The results of the data collected show that six years after the instalment of dams, a few signs of recovery were seen in the hydrology and vegetation:

- The dams improved water table and its resilience to dry weather; and
- The decrease in bare ground, heather and lichens, together with the increase in *Sphagnum* mosses, common cotton-grass, bog asphodel (*Narthecium ossifragum*) and liverworts are signs that the ground is getting wetter across the dammed area and that bog vegetation may be recovering.

Lonielist

As part of the Peatlands LIFE-funded project, work at the RSPB's Lonielist Plantation was carried out to ascertain what methods would ultimately lead to faster habitat restoration process (Plates A11.2.12 and A11.2.13. For the location of Lonielist, see Technical Appendix A11.1, Figure A11.1.1). A study was set up to compare the restoration of sites felled by mulcher to those of the standard methods of felling to waste, namely, hand felling by chainsaw and the hydraulic shear machine. No monitoring results were available within the report, although 2009 bird surveys by RPS indicate that, at least one pair of breeding hen harrier and one pair of breeding short-eared owl, nested either on or beside clear-fell areas where the method of felling to waste was used. Although far too soon to draw any conclusions, by comparison, no such nesting took place on or adjacent to mulched areas.



Plate A11.2.12. Lonielist Plantation (Forsinard Flows Reserve) – forest removal and restoration works.

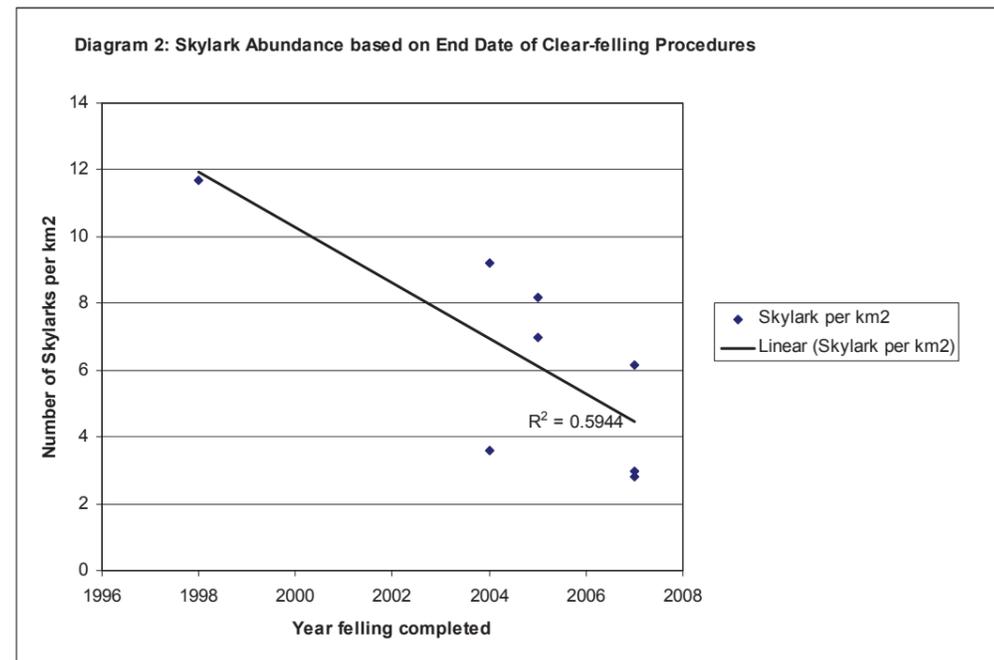


Plate A11.2.13. Lonielist Plantation - felled brash.

Results from RSPB's moorland bird surveys in felled areas across the Forsinard Flows Reserve show that, in general, there are a wide range of densities of breeding birds recorded during each survey, from 4-44 territories per km², or 15 to 73 birds recorded per km². Common prey species were also very variable in abundance, with 6.5-43.2 meadow pipits per km² and 3.6-11.7 skylarks per km² (peak counts of individuals, not territories).

Areas that were surveyed were clear-felled between 1998 and 2007, and analysis showed that, in general, there was no significant relationship between date of felling and bird density, territory density or species diversity. This was thought to be primarily due to differences in overall habitat types between plots, particularly tree/scrub cover. In some cases woodland species recorded on site and in adjacent land were included, which would increase overall numbers.

There was however, an indication that skylark density (peak counts of individuals) increased with time since felling (Diagram 2), suggesting that over time, clear-fell habitat becomes increasingly suitable for skylark (an open moorland breeder).



Vole Surveys

The nature, distribution and availability of prey items for raptors are predicted to undergo a significant change once the Strathy South plantation is removed. The abundance of avian prey, notably small passerines inhabiting the forest environment, would be replaced by more open moorland species (notably meadow pipit).

In addition to avian prey, the abundance and distribution of voles will also change as the forest is removed and peatland vegetation re-colonises the formerly planted area. Since prey abundance is potentially an important influence of raptor distribution and productivity¹⁹, vole sign surveys were therefore conducted in 2009 in relation to Strathy North. Sample plots were located at rides within the Strathy North Forest, adjacent grazed grassland, adjacent moorland and clear-felled forestry at Lonielist Plantation, Forsinard. A control was not considered necessary within closed canopy forest as it was assumed voles are absent from this habitat. Results from the 2009 comparative surveys showed that, as with passerines, vole signs were most common in forest rides. Forest rides contained over twice the density compared to the Lonielist clearfell area and three times the density on open moorland (Table A11.2.5 and Diagram A11.2.3). Vole signs within grassland were so low, density could not be estimated reliably.

¹⁹ Lambin, X., Petty, S.J. and MacKinnon, J.L. (2000) Cyclic dynamics in field vole populations and generalist predation. *Journal of Animal Ecology*, 69, 106–118.

	Sward Height (cm)	Droppings	Old Clippings	Fresh Clippings	Tunnels	Total	Density
Strathy North Rides	55	17	10	7	3	37	19.7 per m ²
Open Moorland Plot 1(b)	34	5	4	1	0	10	5.3 per m ²
Lonielist Plantation	24	8	2	5	0	15	8.0 per m ²

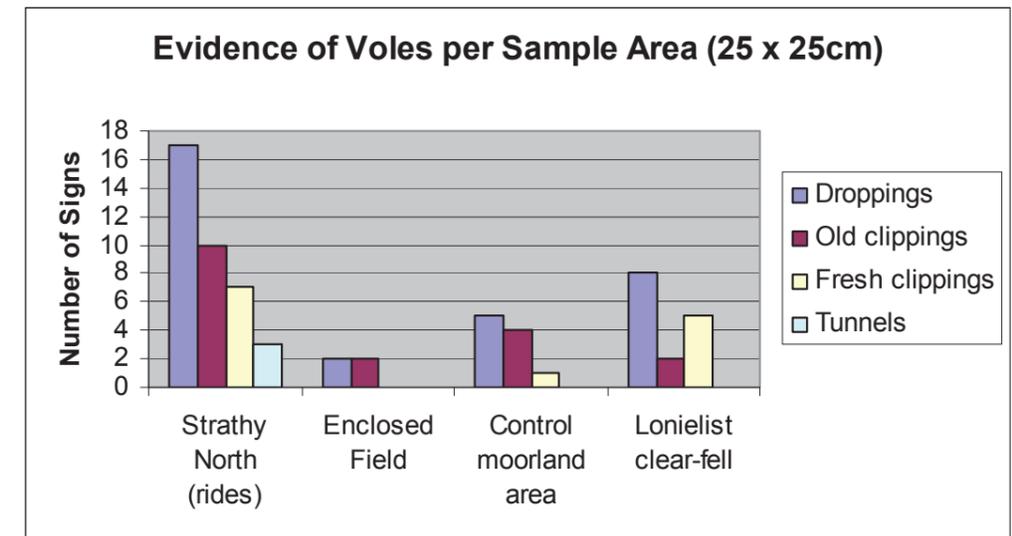


Diagram A11.2.3. Vole Signs at Strathy North and Forsinard

Further data were collected at Strathy North in 2011 and 2012. This data included a newly mulched area (mulched in 2011) within Strathy North Forest while sample plots within Lonielist Forest were not repeated. Preliminary analysis of this data indicates a similar distribution to 2009 data with forest rides containing the highest level of vole sign and the mulched area having the lowest. Vole sign in grassland and moorland areas increased markedly between 2009 – 2012 which may reflect changes over the vole abundance cycle or changing management regimes e.g. less intense grazing. In addition, vole densities within forest rides more than doubled between 2011 and 2012. This is likely to reflect the highly dynamic nature of vole densities within and across seasons in response to environmental variables such as conifer tree mast seeding years and weather conditions.

It is clear that vegetation structure and height within forest rides provide greater opportunities for voles, with significantly higher levels of abundance within rides at Strathy North, as well as possible lower predation rates compared to other habitats surveyed. At Lonielist, although vole density was higher than in open moorland, there was very little recovery of vegetation between plough lines in clear-fell areas. All signs of vole were therefore recorded on rides, although again sward height was comparatively low either due to shading before trees were felled or possible suppression due to grazing, and hence density was lower than at Strathy North Forest. This shows that, post-felling at Strathy South, raptor foraging is likely to be more focussed on existing rides than it would be prior to forest removal. Foraging within mulched or harvested areas is likely to be considerably lower until appropriate vegetation recolonises.

5.2.2 Evidence of Succession Following Mulching at Rothes Wind farm

There is a growing body of information from other sites on vegetation succession and, to a lesser extent, bird usage in the years after mulching (due to post-treatment monitoring of bird activity being less frequently undertaken). The SNH staff who are considering the Strathy South submission are therefore referred to their various colleagues who have access to this data (as SSE do not, for reasons of commercial confidentiality).

Information from the Rothes Wind Farm has been included below, on the success of the mulching regime, in terms of its effects on raptor prey availability. It is important to note that the objective of the associated Rothes Wind Farm Habitat Management Plan was to create suitable habitat for harriers, rather than prevent them breeding. Hence, there were no measures to check vegetation growth or to make the area unsuitable for nesting or foraging.

Vegetation regeneration at the wind farm has been monitored annually²⁰. Results have shown that hare's tale cotton-grass and rushes (*Juncus spp.*) were quick to grow back in wetter areas. Heather has also recovered well but its rate of growth has been inhibited by deer and hare grazing. On average the heather measured 15 cm in height after 4 years of regeneration.

A vole sign survey was carried out in an area of mulched coniferous plantation forestry (Sitka spruce and lodgepole pine; four years after mulching) and an adjacent area of blanket bog (NVC habitat M19a). Of 120 sample points in each habitat, field signs were recorded at 26 points in the bog habitat, and at only two points in the mulched area (both runways in tall grass patches). The developing habitat is therefore still largely unsuitable for voles four years after mulching.

Moorland breeding bird surveys, using the Brown and Shepherd (1993)²¹ technique, were carried out in the mulched area to provide details of meadow pipit and red grouse numbers. Meadow pipit numbers were low in the first year after mulching, compared to an adjacent area, but were similar to this area in the subsequent three years, when vegetation began to regenerate. Red grouse numbers were also low in the first year after mulching, compared to the adjacent area, with some recovery in subsequent years, but numbers were still lower than in the adjacent area.

The implications of these early trends in prey abundance are that the rates of increase in avian and mammalian prey abundance evidently vary on areas of mulched forest. Not surprisingly, they also show that initially avian and mammalian prey abundance is higher on adjacent moorland, than on mulched plantation, but that this variance diminishes relatively rapidly for meadow pipit (a key prey item for hen harriers).

5.3 Management of Vegetation Following Forest Removal

In contrast to Strathy North, SNH have indicated (via their email of 7th June 2013) that blanket bog restoration would be the preference, wherever possible, instead of restricting the attractiveness of the turbine envelope to breeding SPA qualifying birds. The focus of vegetation management after tree removal will not therefore be the uniform restriction of sward height through grazing and/or mechanical cutting. As highlighted in the HMP section below, the emphasis will be on peatland restoration, accompanied by the targeted control of any particular areas of vegetation that SNH consider would attract nesting by key species, and therefore lead to flight activity levels that would put birds at unacceptable risk of collision.

The management of Strathy South following forest removal would therefore be a combination of measures to (i) restore peatland habitats (notably drain blocking and removal of conifer regeneration, with consideration also given to mulching of brash mats and stumps in harvested areas, depending on the harvesting approach that was ultimately used), combined with (ii) targeted management of any taller vegetation in proximity to turbines (such as rush and/or bracken control) where it was considered necessary by SNH to minimise the risk of nesting, and consequently of collision. The timing of any vegetation management would be subject to approval from SNH.

5.4 Vegetation Management Conclusions

Ground cover will be monitored and any potential management intervention will be identified. This may initially comprise mulching of brash mats and conifer stumps in any harvested areas (although the need for this will depend on the tree removal approach finally selected). This would be followed by removal of any conifer regeneration over the lifetime of the wind farm, and

²⁰ Sharp, C. (2007). Field vole survey on Rothes wind farm Report for SSE.

²¹ Brown, A.F. and Shepherd, K.B. 1993. A method of censusing upland breeding waders. *Bird Study* 40: 189-195.

potentially the targeted control of rushes, where this is considered necessary for the restoration of peatland habitat and/or reduction in collision risk for key species.

5.5 The Strathy South Outline Habitat Management Plan

The Strathy South Outline Habitat Management Plan (HMP) has been produced to set out the habitat management measures to be implemented if consent was granted. The measures would be targeted in management compartments, which are shown in Appendix 4 (Figure A11.2.5).

In light of consultation responses from SNH, and the findings of RPS' work for the 2013 ES Addendum, and given the proximity of designated sites, the overriding goal of this HMP is to restore and enhance peatland habitats typical of the adjacent SAC and the SSSI's features of scientific interest. The HMP's second goal is to avoid any unacceptable effects arising on the SPA's qualifying species.

The Outline HMP therefore has the following aims. These are:

1. To encourage at appropriate locations active peat-forming vegetation, to contribute to the restoration of blanket bog and wet heath habitats.
2. To maintain and improve peatland habitats within non-forested land units adjacent to the wind farm.
3. Within the wind farm envelope, reduce collision risk to breeding and foraging divers, raptors and waders associated with the Caithness and Sutherland Peatlands SPA (specifically red-throated divers, hen harrier, short-eared owl and greenshank).
4. To mitigate collision risk for breeding divers by provision of diver rafts at suitable locations off site, in consultation with SNH...

Figure A11.2.5 shows the layout of the habitat management areas. In particular, of note are:

- Peatland Restoration – identification of comparatively wetter areas (generally corresponding to, but not limited to, deep peat areas) outwith the turbine envelope. The map identifies areas where peatland restoration is considered to have a earlier likelihood of success. Areas are also identified which are adjacent to pool systems on the neighbouring open moorland with the aim of placing particular emphasis on assisting to re-establish the hydrological links and integrity of these wetlands.
- Peat Restoration, with Option for Targeted Vegetation Control to Reduce Suitability for Nesting by Key Species – peat restoration will remain the priority within the turbine envelope. However, where required, and in response to site vegetation monitoring, targeted control of vegetation will be undertaken, where deemed necessary, to reduce the suitability for nesting within the turbine envelope by key bird species.

Finalisation of the extent of these areas and methods used to maintain them in an optimal condition will be achieved through consultation with SNH, RSPB and other relevant parties. Consultation will be informed by targeted site surveys both prior to and following forest removal. The aim is to evolve the Outline HMP into a detailed prescriptive document that will be implemented through an appropriate and binding mechanism. Initial prescriptions for each of the HMP's aims are given in Appendix 4.

The Strathy South HMP is intended to be fully integrated with the HMP for Strathy North, and has complimentary aims, thereby mitigating the risk of cumulative impacts and helping to achieve integrated landscape-scale restoration of peatland habitats.

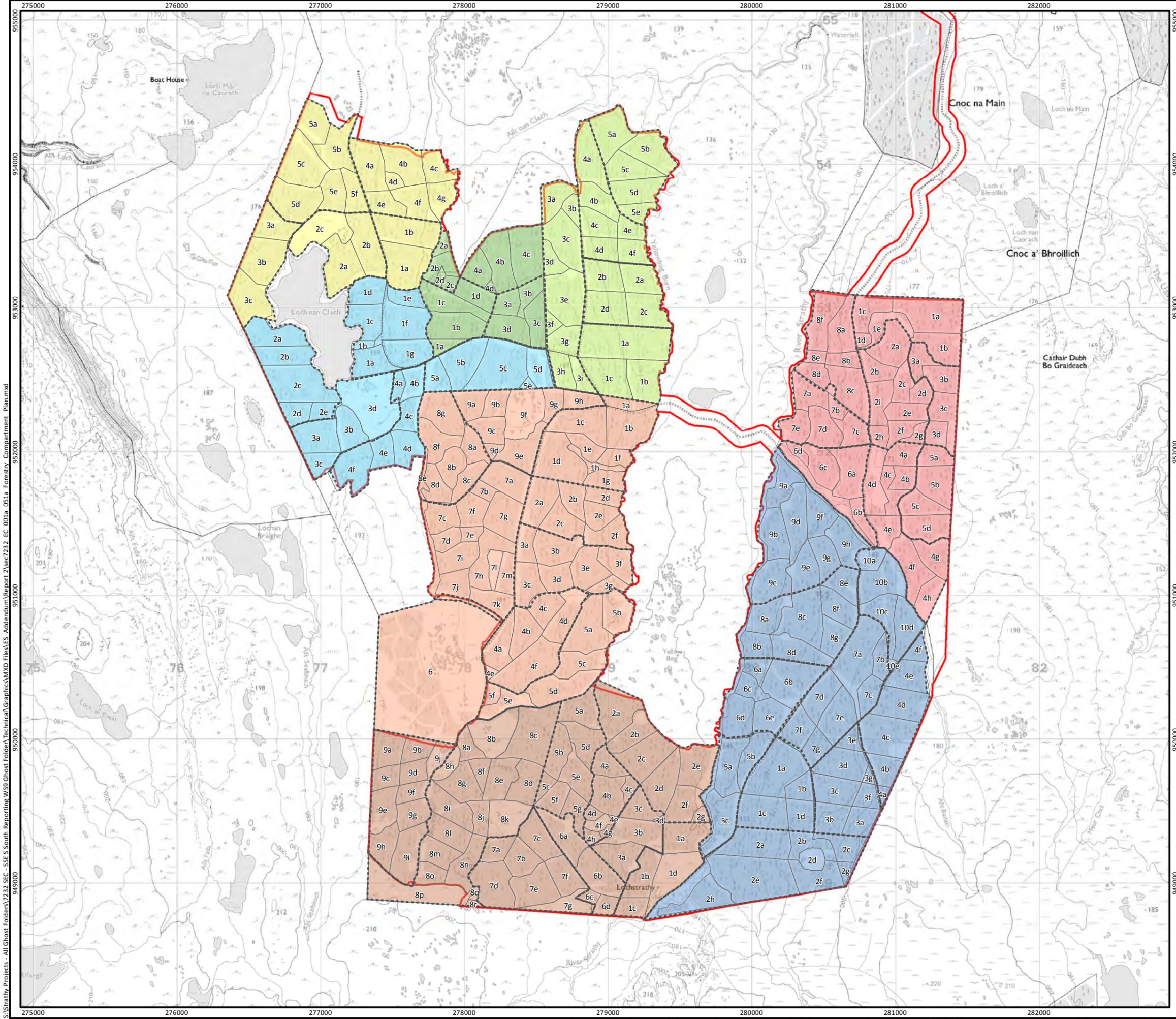
6 CONFIDENTIAL: SPECIES ACCOUNTS: AN ASSESSMENT OF PREDICTED EFFECTS ON SPA QUALIFYING SPECIES

This section is confidential. Please contact Jamie Watt at SSER (Email: jamie.watt@sserenewables.com)

FIGURES

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3. Figure A11.2.3 – Strathy South Forest Yield Classes with Sub-Compartments
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- Key**
- Site Boundary
 - Forest Sub-compartment
 - Forest Compartment

- Forest Unit**
- Bad Coille
 - Coille Am Sealbach
 - Coille An Reidhe
 - Coille Fada
 - Coille Meadhonach
 - Coille Nan Clach
 - Coille Saobhaidhe
 - South Strathy

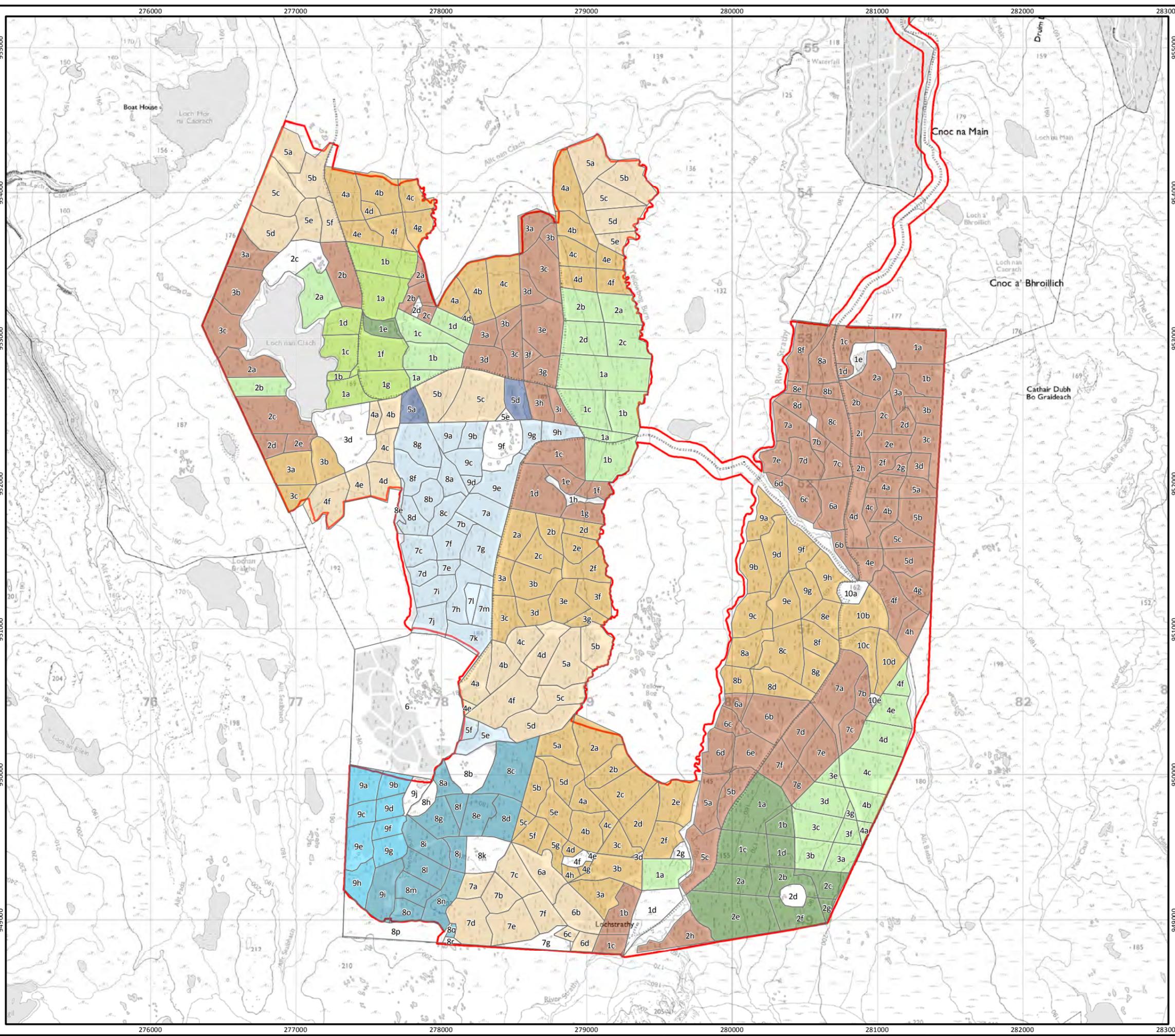
The labels refer to the forestry subcompartments



**Figure A11.2.1
Forestry Compartment Plan**

**Strathy South Wind Farm
Environmental Statement Addendum**

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Key

- Site Boundary
- Forest Sub-compartment

Planting Year

- Unplanted
- 1983
- 1983/84
- 1984
- 1985
- 1986
- 1987
- 1988
- 1990
- 1991
- 1994

The labels refer to the forestry subcompartments



Figure A11.2.2
Forestry Planting Year

Strathy South Wind Farm
Environmental Statement Addendum



Key

Site Boundary

Yield Class

 0
 4
 6
 8
 10
 12
 14

The labels refer to the forestry subcompartments

Scale 1:25,000 @ A3



Figure A11.2.3
Forestry Yield Classes

Strathy South Wind Farm
Environmental Statement Addendum

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Aerial photography May 2009



Key

Site Boundary

Yield Class

- 0
- 4
- 6
- 8
- 10
- 12
- 14

The labels refer to the woodland area of each subcompartment in hectares

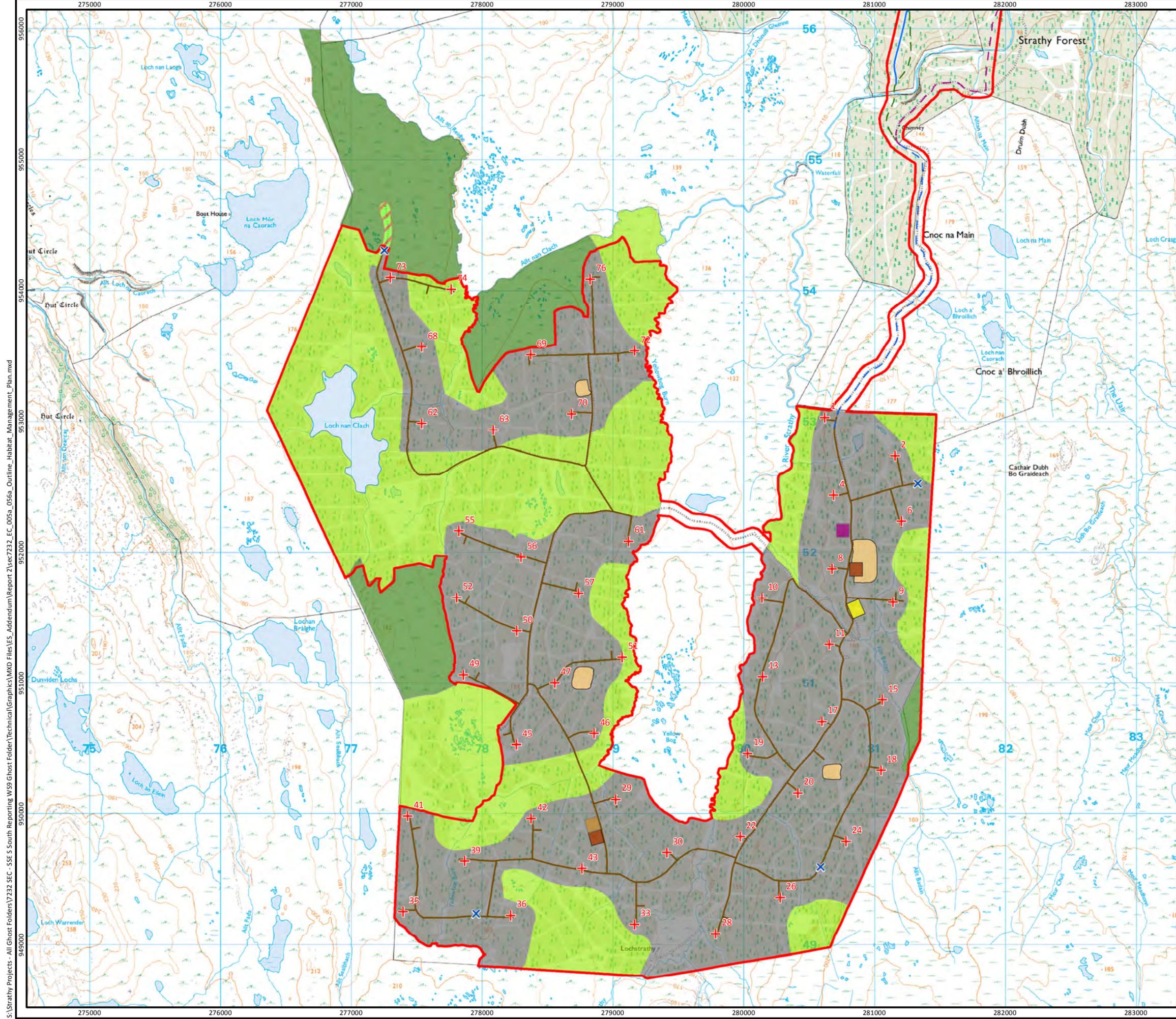


Figure A11.2.4
Forestry Yield Classes With Woodland Area (ha)

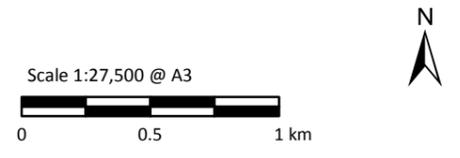
Strathy South Wind Farm
Environmental Statement Addendum

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Aerial photography May 2009



- Key**
- + Turbine
 - x Permanent Met Mast
 - Site Boundary
 - Indicative Cable Route
 - Tracks
 - Preferred Access Route
 - Alternative Access Route
 - Common Access Route
 - Borrow Pit
 - Concrete Batching Plant
 - Construction Compound
 - Lay Down Area
 - Switching Station
- Habitat Management Plan**
- Peatland Management
 - Peatland Restoration (Indicative)
 - Peatland Restoration Of Existing Track
 - Peat Restoration, with Option for Targeted Vegetation Control to Reduce Suitability for Nesting by Key Species



**Figure A11.2.5
Outline Habitat Management Plan**

**Strathy South Wind Farm
Environmental Statement Addendum**

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APPENDIX 1 – FORESTRY COMPARTMENT DETAILS FOR STRATHY SOUTH

Forest Unit	Sub-compartment	Species	Planting Year	Yield Class	Planted Area (ha)	Proposed Forest Removal
Bad Coille	1a	Sitka Spruce / Lodgepole Pine Mix	1985	8	8.23	Small tree - mulch
Bad Coille	1b	Sitka Spruce / Lodgepole Pine Mix	1985	6	4.62	Small tree - mulch
Bad Coille	1c	Sitka Spruce / Lodgepole Pine Mix	1985	6	3.37	Small tree - mulch
Bad Coille	1d	Sitka Spruce / Lodgepole Pine Mix	1985	6	0.71	Small tree - mulch
Bad Coille	2a	Sitka Spruce / Lodgepole Pine Mix	1985	8	5.19	Small tree - mulch
Bad Coille	2b	Sitka Spruce / Lodgepole Pine Mix	1985	4	2.62	Small tree - mulch
Bad Coille	2c	Sitka Spruce / Lodgepole Pine Mix	1985	8	2.10	Small tree - mulch
Bad Coille	2d	Sitka Spruce / Lodgepole Pine Mix	1985	6	1.76	Small tree - mulch
Bad Coille	2e	Sitka Spruce / Lodgepole Pine Mix	1985	6	2.89	Small tree - mulch
Bad Coille	2f	Sitka Spruce / Lodgepole Pine Mix	1985	6	2.26	Small tree - mulch
Bad Coille	2g	Sitka Spruce / Lodgepole Pine Mix	1985	6	1.12	Small tree - mulch
Bad Coille	2h	Sitka Spruce / Lodgepole Pine Mix	1985	6	1.31	Small tree - mulch
Bad Coille	2i	Sitka Spruce / Lodgepole Pine Mix	1985	6	3.53	Small tree - mulch
Bad Coille	3a	Sitka Spruce / Lodgepole Pine Mix	1985	6	2.85	Small tree - mulch
Bad Coille	3b	Sitka Spruce / Lodgepole Pine Mix	1985	6	3.05	Small tree - mulch
Bad Coille	3c	Sitka Spruce / Lodgepole Pine Mix	1985	4	3.05	Small tree - mulch
Bad Coille	3d	Sitka Spruce / Lodgepole Pine Mix	1985	8	1.75	Small tree - mulch
Bad Coille	4a	Sitka Spruce / Lodgepole Pine Mix	1985	6	2.85	Small tree - mulch
Bad Coille	4b	Sitka Spruce / Lodgepole Pine Mix	1985	6	2.17	Small tree - mulch
Bad Coille	4c	Sitka Spruce / Lodgepole Pine Mix	1985	6	2.19	Small tree - mulch
Bad Coille	4d	Sitka Spruce / Lodgepole Pine Mix	1985	6	1.58	Small tree - mulch
Bad Coille	4f	Sitka Spruce / Lodgepole Pine Mix	1985	6	5.03	Small tree - mulch
Bad Coille	4g	Sitka Spruce / Lodgepole Pine Mix	1985	6	3.42	Small tree - mulch
Bad Coille	4h	Sitka Spruce / Lodgepole Pine Mix	1985	6	1.06	Small tree - mulch
Bad Coille	5a	Sitka Spruce / Lodgepole Pine Mix	1985	6	2.44	Small tree - mulch
Bad Coille	5b	Sitka Spruce / Lodgepole Pine Mix	1985	6	5.18	Small tree - mulch
Bad Coille	5c	Sitka Spruce / Lodgepole Pine Mix	1985	6	3.08	Small tree - mulch
Bad Coille	5d	Sitka Spruce / Lodgepole Pine Mix	1985	6	4.57	Small tree - mulch
Bad Coille	6a	Sitka Spruce / Lodgepole Pine Mix	1985	10	5.51	Potential harvest
Bad Coille	6b	Sitka Spruce / Lodgepole Pine Mix	1985	14	1.27	Potential harvest
Bad Coille	6c	Sitka Spruce / Lodgepole Pine Mix	1985	8	4.19	Small tree - mulch
Bad Coille	6d	Sitka Spruce / Lodgepole Pine Mix	1985	6	0.89	Small tree - mulch
Bad Coille	7a	Sitka Spruce / Lodgepole Pine Mix	1985	4	3.28	Small tree - mulch
Bad Coille	7b	Sitka Spruce / Lodgepole Pine Mix	1985	4	0.82	Small tree - mulch
Bad Coille	7c	Sitka Spruce / Lodgepole Pine Mix	1985	6	3.23	Small tree - mulch
Bad Coille	7d	Sitka Spruce / Lodgepole Pine Mix	1985	6	4.80	Small tree - mulch
Bad Coille	7e	Sitka Spruce / Lodgepole Pine Mix	1985	4	2.68	Small tree - mulch
Bad Coille	8a	Sitka Spruce / Lodgepole Pine Mix	1985	6	4.36	Small tree - mulch
Bad Coille	8b	Sitka Spruce / Lodgepole Pine Mix	1985	6	1.83	Small tree - mulch
Bad Coille	8c	Sitka Spruce / Lodgepole Pine Mix	1985	8	6.26	Small tree - mulch
Bad Coille	8d	Sitka Spruce / Lodgepole Pine Mix	1985	6	1.93	Small tree - mulch
Bad Coille	8e	Sitka Spruce / Lodgepole Pine Mix	1985	14	0.73	Potential harvest
Bad Coille	8f	Sitka Spruce / Lodgepole Pine Mix	1985	12	4.88	Potential harvest
Coille Saobhaidhe	1a	Sitka Spruce / Lodgepole Pine Mix	1983	10	9.64	Potential harvest
Coille Saobhaidhe	1b	Sitka Spruce / Lodgepole Pine Mix	1983	10	2.28	Potential harvest
Coille Saobhaidhe	1c	Sitka Spruce / Lodgepole Pine Mix	1983	10	6.97	Potential harvest
Coille Saobhaidhe	1d	Sitka Spruce / Lodgepole Pine Mix	1983	10	3.38	Potential harvest
Coille Saobhaidhe	2a	Sitka Spruce / Lodgepole Pine Mix	1983	8	7.77	Small tree - mulch
Coille Saobhaidhe	2c	Sitka Spruce / Lodgepole Pine Mix	1983	8	3.54	Small tree - mulch
Coille Saobhaidhe	2e	Sitka Spruce / Lodgepole Pine Mix	1983	8	13.93	Small tree - mulch
Coille Saobhaidhe	2f	Sitka Spruce / Lodgepole Pine Mix	1983	8	4.87	Small tree - mulch
Coille Saobhaidhe	2g	Sitka Spruce / Lodgepole Pine Mix	1983	8	0.90	Small tree - mulch
Coille Saobhaidhe	2h	Sitka Spruce / Lodgepole Pine Mix	1985	6	6.59	Small tree - mulch
Coille Saobhaidhe	3a	Sitka Spruce / Lodgepole Pine Mix	1984	8	3.33	Small tree - mulch
Coille Saobhaidhe	3b	Sitka Spruce / Lodgepole Pine Mix	1984	6	4.04	Small tree - mulch
Coille Saobhaidhe	3c	Sitka Spruce / Lodgepole Pine Mix	1984	8	5.07	Small tree - mulch
Coille Saobhaidhe	3d	Sitka Spruce / Lodgepole Pine Mix	1984	8	5.86	Small tree - mulch
Coille Saobhaidhe	3e	Sitka Spruce / Lodgepole Pine Mix	1984	8	1.45	Small tree - mulch
Coille Saobhaidhe	3f	Sitka Spruce / Lodgepole Pine Mix	1984	8	2.10	Small tree - mulch
Coille Saobhaidhe	3g	Sitka Spruce / Lodgepole Pine Mix	1984	8	0.46	Small tree - mulch
Coille Saobhaidhe	2b	Sitka Spruce / Lodgepole Pine Mix	1983	8	2.87	Small tree - mulch
Coille Saobhaidhe	4a	Sitka Spruce / Lodgepole Pine Mix	1984	8	0.33	Small tree - mulch
Coille Saobhaidhe	4b	Sitka Spruce / Lodgepole Pine Mix	1984	8	2.49	Small tree - mulch
Coille Saobhaidhe	4c	Sitka Spruce / Lodgepole Pine Mix	1984	8	7.05	Small tree - mulch
Coille Saobhaidhe	4d	Sitka Spruce / Lodgepole Pine Mix	1984	8	6.04	Small tree - mulch
Coille Saobhaidhe	4e	Sitka Spruce / Lodgepole Pine Mix	1984	6	4.12	Small tree - mulch
Coille Saobhaidhe	4f	Sitka Spruce / Lodgepole Pine Mix	1984	6	1.74	Small tree - mulch
Coille Saobhaidhe	5a	Sitka Spruce / Lodgepole Pine Mix	1985	6	5.03	Small tree - mulch
Coille Saobhaidhe	5b	Sitka Spruce / Lodgepole Pine Mix	1985	6	3.16	Small tree - mulch

Forest Unit	Sub-compartment	Species	Planting Year	Yield Class	Planted Area (ha)	Proposed Forest Removal
Coille Saobhaidhe	5c	Sitka Spruce / Lodgepole Pine Mix	1985	6	4.50	Small tree - mulch
Coille Saobhaidhe	6a	Sitka Spruce / Lodgepole Pine Mix	1985	6	1.67	Small tree - mulch
Coille Saobhaidhe	6b	Sitka Spruce / Lodgepole Pine Mix	1985	6	7.50	Small tree - mulch
Coille Saobhaidhe	6c	Sitka Spruce / Lodgepole Pine Mix	1985	8	2.22	Small tree - mulch
Coille Saobhaidhe	6d	Sitka Spruce / Lodgepole Pine Mix	1985	8	4.92	Small tree - mulch
Coille Saobhaidhe	6e	Sitka Spruce / Lodgepole Pine Mix	1985	8	3.75	Small tree - mulch
Coille Saobhaidhe	7a	Sitka Spruce / Lodgepole Pine Mix	1985	8	8.64	Small tree - mulch
Coille Saobhaidhe	7b	Sitka Spruce / Lodgepole Pine Mix	1985	8	2.07	Small tree - mulch
Coille Saobhaidhe	7c	Sitka Spruce / Lodgepole Pine Mix	1985	8	2.85	Small tree - mulch
Coille Saobhaidhe	7d	Sitka Spruce / Lodgepole Pine Mix	1985	10	4.23	Potential harvest
Coille Saobhaidhe	7e	Sitka Spruce / Lodgepole Pine Mix	1985	8	5.83	Small tree - mulch
Coille Saobhaidhe	7f	Sitka Spruce / Lodgepole Pine Mix	1985	8	3.44	Small tree - mulch
Coille Saobhaidhe	7g	Sitka Spruce / Lodgepole Pine Mix	1985	8	2.76	Small tree - mulch
Coille Saobhaidhe	8a	Sitka Spruce / Lodgepole Pine Mix	1986	10	3.95	Potential harvest
Coille Saobhaidhe	8b	Sitka Spruce / Lodgepole Pine Mix	1986	8	3.15	Small tree - mulch
Coille Saobhaidhe	8c	Sitka Spruce / Lodgepole Pine Mix	1986	12	8.44	Potential harvest
Coille Saobhaidhe	8d	Sitka Spruce / Lodgepole Pine Mix	1986	8	4.58	Small tree - mulch
Coille Saobhaidhe	8e	Sitka Spruce / Lodgepole Pine Mix	1986	8	3.04	Small tree - mulch
Coille Saobhaidhe	8f	Sitka Spruce / Lodgepole Pine Mix	1986	8	4.10	Small tree - mulch
Coille Saobhaidhe	8g	Sitka Spruce / Lodgepole Pine Mix	1986	8	3.27	Small tree - mulch
Coille Saobhaidhe	9a	Sitka Spruce / Lodgepole Pine Mix	1986	12	3.89	Potential harvest
Coille Saobhaidhe	9b	Sitka Spruce / Lodgepole Pine Mix	1986	10	4.93	Potential harvest
Coille Saobhaidhe	9c	Sitka Spruce / Lodgepole Pine Mix	1986	8	5.56	Small tree - mulch
Coille Saobhaidhe	9d	Sitka Spruce / Lodgepole Pine Mix	1986	10	5.31	Potential harvest
Coille Saobhaidhe	9e	Sitka Spruce / Lodgepole Pine Mix	1986	8	4.34	Small tree - mulch
Coille Saobhaidhe	9f	Sitka Spruce / Lodgepole Pine Mix	1986	8	4.11	Small tree - mulch
Coille Saobhaidhe	9g	Sitka Spruce / Lodgepole Pine Mix	1986	8	3.80	Small tree - mulch
Coille Saobhaidhe	9h	Sitka Spruce / Lodgepole Pine Mix	1986	8	3.94	Small tree - mulch
Coille Saobhaidhe	10a	Unplanted	Unknown	0	0.30	Small tree - mulch
Coille Saobhaidhe	10b	Sitka Spruce / Lodgepole Pine Mix	1986	10	4.65	Potential harvest
Coille Saobhaidhe	10c	Sitka Spruce / Lodgepole Pine Mix	1986	6	4.28	Small tree - mulch
Coille Saobhaidhe	10d	Sitka Spruce / Lodgepole Pine Mix	1986	10	4.61	Potential harvest
South Strathy	1a	Sitka Spruce / Lodgepole Pine Mix	1984	10	4.92	Potential harvest
South Strathy	1b	Sitka Spruce / Lodgepole Pine Mix	1985	6	4.72	Small tree - mulch
South Strathy	1c	Sitka Spruce / Lodgepole Pine Mix	1985	8	1.77	Small tree - mulch
South Strathy	2a	Sitka Spruce / Lodgepole Pine Mix	1986	8	6.05	Small tree - mulch
South Strathy	2b	Sitka Spruce / Lodgepole Pine Mix	1986	8	3.44	Small tree - mulch
South Strathy	2c	Sitka Spruce / Lodgepole Pine Mix	1986	8	7.05	Small tree - mulch
South Strathy	2d	Sitka Spruce / Lodgepole Pine Mix	1986	8	6.11	Small tree - mulch
South Strathy	2e	Sitka Spruce / Lodgepole Pine Mix	1986	8	4.72	Small tree - mulch
South Strathy	2f	Sitka Spruce / Lodgepole Pine Mix	1986	8	3.95	Small tree - mulch
South Strathy	3a	Sitka Spruce / Lodgepole Pine Mix	1986	10	4.79	Potential harvest
South Strathy	3b	Sitka Spruce / Lodgepole Pine Mix	1986	10	4.11	Potential harvest
South Strathy	3c	Sitka Spruce / Lodgepole Pine Mix	1986	10	3.24	Potential harvest
South Strathy	3d	Unknown	Unknown	0	0.18	Small tree - mulch
South Strathy	4a	Sitka Spruce / Lodgepole Pine Mix	1986	8	2.98	Small tree - mulch
South Strathy	4b	Sitka Spruce / Lodgepole Pine Mix	1986	8	5.04	Small tree - mulch
South Strathy	4c	Sitka Spruce / Lodgepole Pine Mix	1986	8	1.00	Small tree - mulch
South Strathy	4d	Sitka Spruce / Lodgepole Pine Mix	1986	8	0.74	Small tree - mulch
South Strathy	4g	Sitka Spruce / Lodgepole Pine Mix	1986	8	0.31	Small tree - mulch
South Strathy	4h	Sitka Spruce / Lodgepole Pine Mix	1986	8	0.76	Small tree - mulch
South Strathy	5a	Sitka Spruce / Lodgepole Pine Mix	1986	8	3.60	Small tree - mulch
South Strathy	5b	Sitka Spruce / Lodgepole Pine Mix	1986	8	4.05	Small tree - mulch
South Strathy	5c	Sitka Spruce / Lodgepole Pine Mix	1986	8	1.25	Small tree - mulch
South Strathy	5d	Sitka Spruce / Lodgepole Pine Mix	1986	8	4.98	Small tree - mulch
South Strathy	5e	Sitka Spruce / Lodgepole Pine Mix	1986	8	3.84	Small tree - mulch
South Strathy	5f	Sitka Spruce / Lodgepole Pine Mix	1986	8	2.74	Small tree - mulch
South Strathy	5g	Sitka Spruce / Lodgepole Pine Mix	1986	8	2.81	Small tree - mulch
South Strathy	6a	Sitka Spruce / Petersburg Lodgepole Pine Mix	1987	8	3.90	Small tree - mulch
South Strathy	6b	Sitka Spruce / Lodgepole Pine Mix	1987	8	5.19	Small tree - mulch
South Strathy	6c	Sitka Spruce / Lodgepole Pine Mix	1987	8	0.49	Small tree - mulch
South Strathy	6d	Sitka Spruce / Lodgepole Pine Mix	1987	8	1.20	Small tree - mulch
South Strathy	7a	Sitka Spruce / Petersburg Lodgepole Pine Mix	1987	10	2.70	Potential harvest
South Strathy	7b	Sitka Spruce / Petersburg Lodgepole Pine Mix	1987	6	3.84	Small tree - mulch
South Strathy	7c	Sitka Spruce / Petersburg Lodgepole Pine Mix	1987	10	4.81	Potential harvest
South Strathy	7d	Sitka Spruce / Petersburg Lodgepole Pine Mix	1987	8	7.13	Small tree - mulch

Forest Unit	Sub-compartment	Species	Planting Year	Yield Class	Planted Area (ha)	Proposed Forest Removal
		Pine Mix				
South Strathy	7e	Sitka Spruce / Petersburg Lodgepole Pine Mix	1987	8	6.39	Small tree - mulch
South Strathy	8a	Sitka Spruce / Lodgepole Pine Mix	1990	0	1.64	Small tree - mulch
South Strathy	8c	Sitka Spruce / Lodgepole Pine Mix	1990	8	8.35	Small tree - mulch
South Strathy	8d	Sitka Spruce / Lodgepole Pine Mix	1990	10	5.03	Potential harvest
South Strathy	8e	Sitka Spruce / Lodgepole Pine Mix	1990	8	4.42	Small tree - mulch
South Strathy	8f	Sitka Spruce / Lodgepole Pine Mix	1990	8	2.18	Small tree - mulch
South Strathy	8g	Sitka Spruce / Lodgepole Pine Mix	1990	8	4.95	Small tree - mulch
South Strathy	8i	Sitka Spruce / Lodgepole Pine Mix	1990	8	4.77	Small tree - mulch
South Strathy	8j	Sitka Spruce / Lodgepole Pine Mix	1990	6	2.16	Small tree - mulch
South Strathy	8l	Sitka Spruce / Lodgepole Pine Mix	1990	10	4.50	Potential harvest
South Strathy	8m	Sitka Spruce / Lodgepole Pine Mix	1990	8	3.52	Small tree - mulch
South Strathy	8n	Sitka Spruce / Lodgepole Pine Mix	1990	8	3.98	Small tree - mulch
South Strathy	8o	Sitka Spruce / Lodgepole Pine Mix	1990	8	2.22	Small tree - mulch
South Strathy	9a	Sitka Spruce / Lodgepole Pine Mix	1991	8	4.07	Small tree - mulch
South Strathy	9b	Sitka Spruce / Lodgepole Pine Mix	1991	8	2.40	Small tree - mulch
South Strathy	9c	Sitka Spruce / Lodgepole Pine Mix	1991	8	2.52	Small tree - mulch
South Strathy	9d	Sitka Spruce / Lodgepole Pine Mix	1991	8	2.60	Small tree - mulch
South Strathy	9e	Sitka Spruce / Lodgepole Pine Mix	1991	8	3.18	Small tree - mulch
South Strathy	9f	Sitka Spruce / Lodgepole Pine Mix	1991	8	2.20	Small tree - mulch
South Strathy	9g	Sitka Spruce / Lodgepole Pine Mix	1991	8	3.20	Small tree - mulch
South Strathy	9h	Sitka Spruce / Lodgepole Pine Mix	1991	8	3.74	Small tree - mulch
South Strathy	9i	Sitka Spruce / Lodgepole Pine Mix	1990	8	4.88	Small tree - mulch
South Strathy	7f	Sitka Spruce / Petersburg Lodgepole Pine Mix	1987	10	3.88	Potential harvest
Coille Am Sealbach	1a	Sitka Spruce / Lodgepole Pine Mix	1984	8	1.40	Small tree - mulch
Coille Am Sealbach	1b	Sitka Spruce / Lodgepole Pine Mix	1984	8	6.98	Small tree - mulch
Coille Am Sealbach	1c	Sitka Spruce / Lodgepole Pine Mix	1985	6	6.11	Small tree - mulch
Coille Am Sealbach	1d	Sitka Spruce / Lodgepole Pine Mix	1985	4	7.93	Small tree - mulch
Coille Am Sealbach	1e	Sitka Spruce / Lodgepole Pine Mix	1985	6	2.65	Small tree - mulch
Coille Am Sealbach	1f	Sitka Spruce / Lodgepole Pine Mix	1985	6	2.21	Small tree - mulch
Coille Am Sealbach	1g	Sitka Spruce / Lodgepole Pine Mix	1985	6	2.45	Small tree - mulch
Coille Am Sealbach	2a	Sitka Spruce / Lodgepole Pine Mix	1986	8	4.04	Small tree - mulch
Coille Am Sealbach	2b	Sitka Spruce / Lodgepole Pine Mix	1986	6	2.76	Small tree - mulch
Coille Am Sealbach	2c	Sitka Spruce / Lodgepole Pine Mix	1986	8	4.38	Small tree - mulch
Coille Am Sealbach	2d	Sitka Spruce / Lodgepole Pine Mix	1986	8	1.99	Small tree - mulch
Coille Am Sealbach	2e	Sitka Spruce / Lodgepole Pine Mix	1986	8	2.86	Small tree - mulch
Coille Am Sealbach	2f	Sitka Spruce / Lodgepole Pine Mix	1986	8	3.69	Small tree - mulch
Coille Am Sealbach	3a	Sitka Spruce / Lodgepole Pine Mix	1986	8	2.02	Small tree - mulch
Coille Am Sealbach	3b	Sitka Spruce / Lodgepole Pine Mix	1986	8	5.29	Small tree - mulch
Coille Am Sealbach	3c	Sitka Spruce / Lodgepole Pine Mix	1986	6	3.96	Small tree - mulch
Coille Am Sealbach	3d	Sitka Spruce / Lodgepole Pine Mix	1986	8	3.45	Small tree - mulch
Coille Am Sealbach	3e	Sitka Spruce / Lodgepole Pine Mix	1986	12	5.21	Potential harvest
Coille Am Sealbach	3f	Sitka Spruce / Lodgepole Pine Mix	1986	8	2.71	Small tree - mulch
Coille Am Sealbach	3g	Sitka Spruce / Lodgepole Pine Mix	1986	8	1.34	Small tree - mulch
Coille Am Sealbach	4a	Sitka Spruce / Petersburg Lodgepole Pine / Scots Pine / Japanese Larch Mix	1987	8	3.21	Small tree - mulch
Coille Am Sealbach	4b	Sitka Spruce / Lodgepole Pine Mix	1987	10	4.62	Potential harvest
Coille Am Sealbach	4c	Sitka Spruce / Lodgepole Pine Mix	1987	8	3.75	Potential harvest
Coille Am Sealbach	4d	Sitka Spruce / Lodgepole Pine Mix	1987	10	3.92	Potential harvest
Coille Am Sealbach	4e	Sitka Spruce / Petersburg Lodgepole Pine Mix	1987	4	0.50	Small tree - mulch
Coille Am Sealbach	4f	Sitka Spruce / Lodgepole Pine Mix	1987	4	9.33	Small tree - mulch
Coille Am Sealbach	5b	Sitka Spruce / Lodgepole Pine Mix	1987	10	2.85	Potential harvest
Coille Am Sealbach	5c	Sitka Spruce / Lodgepole Pine Mix	1987	8	3.52	Small tree - mulch
Coille Am Sealbach	5d	Sitka Spruce / Petersburg Lodgepole Pine / Scots Pine / Japanese Larch Mix	1987	6	5.55	Small tree - mulch
Coille Am Sealbach	5e	Sitka Spruce / Petersburg Lodgepole Pine Mix	1994	4	1.41	Small tree - mulch
Coille Am Sealbach	5f	Sitka Spruce / Petersburg Lodgepole Pine Mix	1994	4	0.96	Small tree - mulch
Coille Am Sealbach	7a	Sitka Spruce / Petersburg Lodgepole Pine Mix	1994	8	4.94	Small tree - mulch
Coille Am Sealbach	7b	Sitka Spruce / Petersburg Lodgepole Pine Mix	1994	6	1.18	Small tree - mulch
Coille Am Sealbach	7c	Sitka Spruce / Petersburg Lodgepole Pine Mix	1994	6	3.37	Small tree - mulch

Forest Unit	Sub-compartment	Species	Planting Year	Yield Class	Planted Area (ha)	Proposed Forest Removal
Coille Am Sealbach	7d	Sitka Spruce / Petersburg Lodgepole Pine Mix	1994	6	2.13	Small tree - mulch
Coille Am Sealbach	7e	Sitka Spruce / Petersburg Lodgepole Pine Mix	1994	6	1.13	Small tree - mulch
Coille Am Sealbach	7f	Sitka Spruce / Petersburg Lodgepole Pine Mix	1994	6	3.52	Small tree - mulch
Coille Am Sealbach	7g	Sitka Spruce / Petersburg Lodgepole Pine Mix	1994	8	5.12	Small tree - mulch
Coille Am Sealbach	7h	Sitka Spruce / Petersburg Lodgepole Pine Mix	1994	8	4.69	Small tree - mulch
Coille Am Sealbach	7i	Sitka Spruce / Petersburg Lodgepole Pine Mix	1994	6	4.32	Small tree - mulch
Coille Am Sealbach	7j	Sitka Spruce / Petersburg Lodgepole Pine Mix	1994	6	3.32	Small tree - mulch
Coille Am Sealbach	7k	Sitka Spruce / Petersburg Lodgepole Pine Mix	1994	6	3.12	Small tree - mulch
Coille Am Sealbach	8a	Sitka Spruce / Petersburg Lodgepole Pine Mix	1994	6	2.77	Small tree - mulch
Coille Am Sealbach	8b	Sitka Spruce / Petersburg Lodgepole Pine Mix	1994	6	3.41	Small tree - mulch
Coille Am Sealbach	8c	Sitka Spruce / Petersburg Lodgepole Pine Mix	1994	6	2.81	Small tree - mulch
Coille Am Sealbach	8d	Sitka Spruce / Petersburg Lodgepole Pine Mix	1994	6	3.22	Small tree - mulch
Coille Am Sealbach	8f	Sitka Spruce / Petersburg Lodgepole Pine Mix	1994	4	3.94	Small tree - mulch
Coille Am Sealbach	8g	Sitka Spruce / Petersburg Lodgepole Pine Mix	1994	4	5.43	Small tree - mulch
Coille Am Sealbach	9a	Sitka Spruce / Petersburg Lodgepole Pine Mix	1994	6	2.55	Small tree - mulch
Coille Am Sealbach	9b	Sitka Spruce / Petersburg Lodgepole Pine Mix	1994	6	2.24	Small tree - mulch
Coille Am Sealbach	9c	Sitka Spruce / Petersburg Lodgepole Pine Mix	1994	6	3.26	Small tree - mulch
Coille Am Sealbach	9d	Mixed Broadleaves	1994	0	0.82	Small tree - mulch
Coille Am Sealbach	9e	Sitka Spruce / Petersburg Lodgepole Pine Mix	1994	4	4.58	Small tree - mulch
Coille Am Sealbach	9g	Mixed Broadleaves	1994	0	1.74	Small tree - mulch
Coille Am Sealbach	9h	Mixed Broadleaves	1994	0	0.38	Small tree - mulch
Coille Am Sealbach	5a	Sitka Spruce / Lodgepole Pine Mix	1987	10	7.57	Potential harvest
Coille Am Sealbach	7m	Sitka Spruce / Petersburg Lodgepole Pine Mix	1994	6	1.55	Small tree - mulch
Coille Fada	1a	Sitka Spruce / Lodgepole Pine Mix	1984	6	13.26	Small tree - mulch
Coille Fada	1b	Sitka Spruce / Lodgepole Pine Mix	1984	8	5.20	Small tree - mulch
Coille Fada	1c	Sitka Spruce / Lodgepole Pine Mix	1984	8	6.37	Small tree - mulch
Coille Fada	2a	Sitka Spruce / Lodgepole Pine Mix	1984	6	4.18	Small tree - mulch
Coille Fada	2b	Sitka Spruce / Lodgepole Pine Mix	1984	6	4.62	Small tree - mulch
Coille Fada	2c	Sitka Spruce / Lodgepole Pine Mix	1984	6	5.24	Small tree - mulch
Coille Fada	2d	Sitka Spruce / Lodgepole Pine Mix	1984	6	5.91	Small tree - mulch
Coille Fada	3a	Sitka Spruce / Lodgepole Pine Mix	1985	10	3.43	Potential harvest
Coille Fada	3b	Sitka Spruce / Lodgepole Pine Mix	1985	10	1.32	Potential harvest
Coille Fada	3c	Sitka Spruce / Lodgepole Pine Mix	1985	6	6.01	Small tree - mulch
Coille Fada	3d	Sitka Spruce / Lodgepole Pine Mix	1985	6	1.81	Small tree - mulch
Coille Fada	3e	Sitka Spruce / Lodgepole Pine Mix	1985	6	6.79	Small tree - mulch
Coille Fada	3f	Sitka Spruce / Lodgepole Pine Mix	1985	6	0.60	Small tree - mulch
Coille Fada	3g	Sitka Spruce / Lodgepole Pine Mix	1985	6	2.79	Small tree - mulch
Coille Fada	3h	Sitka Spruce	1985	4	2.90	Small tree - mulch
Coille Fada	3i	Sitka Spruce	1985	6	1.26	Small tree - mulch
Coille Fada	4a	Sitka Spruce / Lodgepole Pine Mix	1986	10	6.38	Potential harvest
Coille Fada	4b	Sitka Spruce / Lodgepole Pine Mix	1986	8	3.81	Small tree - mulch
Coille Fada	4c	Sitka Spruce / Lodgepole Pine Mix	1986	10	3.68	Potential harvest
Coille Fada	4e	Sitka Spruce / Lodgepole Pine Mix	1986	10	1.93	Potential harvest
Coille Fada	4f	Sitka Spruce / Lodgepole Pine Mix	1986	12	2.24	Potential harvest
Coille Fada	4d	Sitka Spruce / Lodgepole Pine Mix	1986	6	3.31	Small tree - mulch
Coille Fada	5a	Sitka Spruce / Lodgepole Pine Mix	1987	8	6.56	Small tree - mulch
Coille Fada	5b	Sitka Spruce / Lodgepole Pine Mix	1987	10	5.17	Potential harvest
Coille Fada	5c	Sitka Spruce / Lodgepole Pine Mix	1987	10	4.78	Potential harvest
Coille Fada	5d	Sitka Spruce / Lodgepole Pine Mix	1987	14	4.78	Potential harvest
Coille Fada	5e	Sitka Spruce / Lodgepole Pine Mix	1987	10	1.51	Potential harvest
Coille Nan Clach	1a	Sitka Spruce / Lodgepole Pine Mix	1984	6	3.99	Small tree - mulch

Forest Unit	Sub-compartment	Species	Planting Year	Yield Class	Planted Area (ha)	Proposed Forest Removal
Coille Nan Clach	1b	Sitka Spruce / Lodgepole Pine Mix	1984	6	0.53	Small tree - mulch
Coille Nan Clach	1c	Sitka Spruce / Lodgepole Pine Mix	1984	4	4.33	Small tree - mulch
Coille Nan Clach	1d	Sitka Spruce / Lodgepole Pine Mix	1984	6	3.23	Small tree - mulch
Coille Nan Clach	1e	Sitka Spruce	1983	4	2.19	Small tree - mulch
Coille Nan Clach	1f	Sitka Spruce / Lodgepole Pine Mix	1984	6	6.11	Small tree - mulch
Coille Nan Clach	1g	Sitka Spruce / Lodgepole Pine Mix	1984	6	4.78	Small tree - mulch
Coille Nan Clach	2a	Sitka Spruce / Lodgepole Pine Mix	1985	6	5.32	Small tree - mulch
Coille Nan Clach	2b	Sitka Spruce / Lodgepole Pine Mix	1984	6	4.23	Small tree - mulch
Coille Nan Clach	2c	Sitka Spruce / Lodgepole Pine Mix	1985	6	9.43	Small tree - mulch
Coille Nan Clach	2d	Sitka Spruce / Lodgepole Pine Mix	1985	6	2.47	Small tree - mulch
Coille Nan Clach	2e	Sitka Spruce / Lodgepole Pine Mix	1985	6	1.58	Small tree - mulch
Coille Nan Clach	3a	Sitka Spruce / Lodgepole Pine Mix	1986	6	5.05	Small tree - mulch
Coille Nan Clach	3b	Sitka Spruce / Lodgepole Pine Mix	1986	6	3.75	Small tree - mulch
Coille Nan Clach	3c	Sitka Spruce / Lodgepole Pine Mix	1986	6	2.17	Small tree - mulch
Coille Nan Clach	4a	Sitka Spruce / Lodgepole Pine Mix	1987	6	1.20	Small tree - mulch
Coille Nan Clach	4b	Sitka Spruce / Lodgepole Pine Mix	1987	6	1.24	Small tree - mulch
Coille Nan Clach	4c	Sitka Spruce / Lodgepole Pine Mix	1987	6	1.90	Small tree - mulch
Coille Nan Clach	4d	Sitka Spruce / Lodgepole Pine Mix	1987	6	3.54	Small tree - mulch
Coille Nan Clach	4e	Sitka Spruce / Lodgepole Pine Mix	1987	6	2.78	Small tree - mulch
Coille Nan Clach	4f	Sitka Spruce / Petersburg Lodgepole Pine / Japanese Larch Mix	1987	6	5.89	Small tree - mulch
Coille Nan Clach	5a	Sitka Spruce / Lodgepole Pine Mix	1988	8	1.95	Small tree - mulch
Coille Nan Clach	5b	Sitka Spruce / Lodgepole Pine Mix	1987	10	5.96	Potential harvest
Coille Nan Clach	5c	Sitka Spruce / Lodgepole Pine Mix	1987	10	9.42	Potential harvest
Coille Nan Clach	5d	Sitka Spruce / Lodgepole Pine Mix	1988	6	1.04	Small tree - mulch
Coille Meadhonach	1a	Sitka Spruce / Lodgepole Pine Mix	1984	10	0.71	Potential harvest
Coille Meadhonach	1b	Sitka Spruce / Lodgepole Pine Mix	1984	8	5.90	Small tree - mulch
Coille Meadhonach	1c	Sitka Spruce / Lodgepole Pine Mix	1984	10	4.47	Potential harvest
Coille Meadhonach	1d	Sitka Spruce / Lodgepole Pine Mix	1984	10	3.46	Potential harvest
Coille Meadhonach	2a	Sitka Spruce / Lodgepole Pine Mix	1985	8	0.51	Small tree - mulch
Coille Meadhonach	2c	Sitka Spruce / Lodgepole Pine Mix	1985	8	0.81	Small tree - mulch
Coille Meadhonach	3a	Sitka Spruce / Lodgepole Pine Mix	1985	8	2.45	Small tree - mulch
Coille Meadhonach	3b	Sitka Spruce / Lodgepole Pine Mix	1985	8	1.78	Small tree - mulch
Coille Meadhonach	3c	Sitka Spruce / Lodgepole Pine Mix	1985	8	3.60	Small tree - mulch
Coille Meadhonach	3d	Sitka Spruce / Lodgepole Pine Mix	1985	8	4.09	Small tree - mulch
Coille Meadhonach	4a	Sitka Spruce / Lodgepole Pine Mix	1986	8	3.13	Small tree - mulch
Coille Meadhonach	4b	Sitka Spruce / Lodgepole Pine Mix	1986	8	6.45	Small tree - mulch
Coille Meadhonach	4c	Sitka Spruce / Lodgepole Pine Mix	1986	10	7.62	Potential harvest
Coille Meadhonach	2b	Sitka Spruce / Lodgepole Pine Mix	1985	8	1.96	Small tree - mulch
Coille Meadhonach	4d	Sitka Spruce / Lodgepole Pine Mix	1986	8	0.10	Small tree - mulch
Coille An Reidhe	1a	Sitka Spruce / Lodgepole Pine Mix	1984	6	6.95	Small tree - mulch
Coille An Reidhe	1b	Sitka Spruce / Lodgepole Pine Mix	1984	6	6.99	Small tree - mulch
Coille An Reidhe	2a	Sitka Spruce / Lodgepole Pine Mix	1984	8	6.61	Small tree - mulch
Coille An Reidhe	2b	Sitka Spruce / Lodgepole Pine Mix	1985	6	6.47	Small tree - mulch
Coille An Reidhe	3a	Sitka Spruce / Lodgepole Pine Mix	1985	8	4.00	Small tree - mulch
Coille An Reidhe	3b	Sitka Spruce / Lodgepole Pine Mix	1985	8	6.53	Small tree - mulch
Coille An Reidhe	3c	Sitka Spruce / Lodgepole Pine Mix	1985	8	5.63	Small tree - mulch
Coille An Reidhe	4a	Sitka Spruce / Lodgepole Pine Mix	1986	8	5.39	Small tree - mulch
Coille An Reidhe	4b	Sitka Spruce / Lodgepole Pine Mix	1986	8	5.67	Small tree - mulch
Coille An Reidhe	4c	Sitka Spruce / Lodgepole Pine Mix	1986	8	2.18	Small tree - mulch
Coille An Reidhe	4d	Sitka Spruce / Lodgepole Pine Mix	1986	8	0.95	Small tree - mulch
Coille An Reidhe	4e	Sitka Spruce / Lodgepole Pine Mix	1986	8	2.86	Small tree - mulch
Coille An Reidhe	4f	Sitka Spruce / Lodgepole Pine Mix	1986	8	3.68	Small tree - mulch
Coille An Reidhe	4g	Sitka Spruce / Lodgepole Pine Mix	1986	8	2.61	Small tree - mulch
Coille An Reidhe	5a	Sitka Spruce / Petersburg Lodgepole Pine Mix	1987	10	3.18	Potential harvest
Coille An Reidhe	5b	Sitka Spruce / Lodgepole Pine Mix	1987	10	4.55	Potential harvest
Coille An Reidhe	5c	Sitka Spruce / Petersburg Lodgepole Pine Mix	1987	10	5.93	Potential harvest
Coille An Reidhe	5d	Sitka Spruce / Petersburg Lodgepole Pine Mix	1987	10	7.33	Potential harvest
Coille An Reidhe	5e	Sitka Spruce / Petersburg Lodgepole Pine Mix	1987	10	4.02	Potential harvest
Coille An Reidhe	5f	Sitka Spruce / Petersburg Lodgepole Pine Mix	1987	10	2.82	Potential harvest
Total Area Planted					1133.03	

APPENDIX 2 – FOREST SURVEY RESULTS

Forest Unit	Sub-compartment	Species	Planting Year	DBH (cm)	Top Height (M)	Condition
Bad Coille	1c	Lodgepole Pine	1985	10	6	Poor
Bad Coille	1c	Sitka Spruce	1985	15	8	Poor
Bad Coille	2a	Sitka Spruce	1985	10	7	Poor
Bad Coille	2b	Lodgepole Pine	1985	8	6	Stunted
Bad Coille	2c	Sitka Spruce	1985	14	7	Poor
Bad Coille	2c	Lodgepole Pine	1985	12	6	Poor
Bad Coille	2d	Lodgepole Pine	1985	11	6	Poor
Bad Coille	2d	Sitka Spruce	1985	13	7	Poor
Bad Coille	2i	Sitka Spruce	1985	10	7	Poor
Bad Coille	2i	Lodgepole Pine	1985	8	6	Stunted
Bad Coille	3b	Sitka Spruce	1985	14	7	Average
Bad Coille	3b	Lodgepole Pine	1985	10	6	Poor
Bad Coille	3c	Lodgepole Pine	1985	10	6	Poor
Bad Coille	3d	Sitka Spruce	1985	10	6	Poor
Bad Coille	3d	Sitka Spruce	1985	11	7	Poor
Bad Coille	3d	Lodgepole Pine	1985	10	6	Poor
Bad Coille	4c	Sitka Spruce	1985	15	10	Average
Bad Coille	4c	Lodgepole Pine	1985	12	6	Poor
Bad Coille	4d	Sitka Spruce	1985	15	10	Average
Bad Coille	4d	Lodgepole Pine	1985	12	6	Poor
Bad Coille	4e	Sitka Spruce	1985	14	9	Poor
Bad Coille	4e	Lodgepole Pine	1985	10	6	Poor
Bad Coille	6a	Sitka Spruce	1985	15	11	Average
Bad Coille	6a	Lodgepole Pine	1985	12	8	Average
Bad Coille	6b	Sitka Spruce	1985	12	6	Stunted
Bad Coille	6b	Lodgepole Pine	1985	10	6	Stunted
Bad Coille	6c	Sitka Spruce & Lodgepole Pine	1985	13	7	Poor
Bad Coille	8a	Lodgepole Pine	1985	10	8	Poor
Bad Coille	8b	Sitka Spruce	1985	12	8	Poor
Bad Coille	8b	Lodgepole Pine	1985	16	8	Poor
Bad Coille	8e	Sitka Spruce	1985	17	12	Average
Coille Am Seabach	3b	Sitka Spruce & Lodgepole Pine	1986	10	6	Poor
Coille Am Seabach	3c	Sitka Spruce	1986	6	5	Stunted
Coille Am Seabach	3d	Sitka Spruce & Lodgepole Pine	1986	15	10	Average
Coille Am Seabach	3d	Sitka Spruce & Lodgepole Pine	1986	10	6	Poor
Coille Am Seabach	3e	Sitka Spruce & Lodgepole Pine	1986	14	10	Average
Coille Am Seabach	3g	Sitka Spruce & Lodgepole Pine	1986	13	8	Good
Coille Am Seabach	4b	Sitka Spruce & Lodgepole Pine	1987	12	7	Poor
Coille Am Seabach	4c	Sitka Spruce & Lodgepole Pine	1987	10	6	Poor
Coille Am Seabach	4d	Sitka Spruce & Lodgepole Pine	1987	15	7	Average
Coille Am Seabach	4f	Lodgepole Pine	1987	14	7	Poor
Coille Am Seabach	5a	Sitka Spruce & Lodgepole Pine	1987	13	8	Average
Coille Am Seabach	5a	Sitka Spruce	1987	15	9	Average
Coille Am Seabach	7a	Sitka Spruce & Lodgepole Pine	1994	6	4	Stunted
Coille Am Seabach	7c	Sitka Spruce & Lodgepole Pine	1994	5	3	Stunted
Coille Am Seabach	7d	Sitka Spruce & Lodgepole Pine	1994	5	3	Stunted
Coille Am Seabach	7e	Sitka Spruce & Lodgepole Pine	1994	5	3	Stunted
Coille Am Seabach	7f	Sitka Spruce & Lodgepole Pine	1994	5	3	Stunted
Coille Am Seabach	7g	Sitka Spruce & Lodgepole Pine	1994	5	4	Stunted
Coille Am Seabach	7h	Sitka Spruce & Lodgepole Pine	1994	6	4	Stunted
Coille Am Seabach	8a	Sitka Spruce & Lodgepole Pine	1994	5	3	Stunted
Coille Am Seabach	8b	Sitka Spruce & Lodgepole Pine	1994	5	3	Stunted
Coille Am Seabach	8d	Sitka Spruce & Lodgepole Pine	1994	6	3	Stunted
Coille Am Seabach	9d	Broadleaved	1994	no data	no data	Dead
Coille Am Seabach	9e	Lodgepole Pine	1994	6	4	Stunted
Coille Am Seabach	9g	Sitka Spruce & Lodgepole Pine	1994	6	5	Poor
Coille Am Seabach	9h	Broadleaved	1994	no data	no data	no data
Coille An Reidhe	1a	Sitka Spruce & Lodgepole Pine	1983	10	6	Poor
Coille An Reidhe	2b	Sitka Spruce & Lodgepole Pine	1985	10	6	Poor
Coille An Reidhe	5b	Sitka Spruce	1987	14	10	Average
Coille An Reidhe	5f	Sitka Spruce	1987	14	10	Average
Coille Buidhe	1a	Sitka Spruce & Lodgepole Pine	1984	14	10	Average
Coille Buidhe	1b	Sitka Spruce & Lodgepole Pine	1985	10	5	Poor
Coille Buidhe	1c	Sitka Spruce	1985	12	7	Poor

Forest Unit	Sub-compartment	Species	Planting Year	DBH (cm)	Top Height (M)	Condition
Coille Buidhe	1c	Lodgepole Pine	1985	10	5	Poor
Coille Buidhe	3b	Sitka Spruce & Lodgepole Pine	1986	15	9	Average
Coille Buidhe	3b	Broadleaved	1986	no data	3	Poor
Coille Buidhe	3c	Sitka Spruce & Lodgepole Pine	1986	13	9	Average
Coille Buidhe	4b	Sitka Spruce & Lodgepole Pine	1986	12	8	Average
Coille Buidhe	5c	Sitka Spruce & Lodgepole Pine	1986	12	7	Average
Coille Buidhe	5f	Sitka Spruce & Lodgepole Pine	1986	12	7	Average
Coille Buidhe	5g	Sitka Spruce & Lodgepole Pine	1986	15	9	Average
Coille Buidhe	5g	Sitka Spruce & Lodgepole Pine	1986	12	8	Average
Coille Buidhe	6b	Sitka Spruce & Lodgepole Pine	1987	11	6	Poor
Coille Buidhe	6c	Sitka Spruce & Lodgepole Pine	1987	11	6	Poor
Coille Buidhe	6c	Sitka Spruce & Lodgepole Pine	1987	10	7	Average
Coille Buidhe	7a	Sitka Spruce & Lodgepole Pine	1987	12	7	Average
Coille Buidhe	7b	Sitka Spruce	1987	10	4	Stunted
Coille Buidhe	7c	Sitka Spruce & Lodgepole Pine	1987	13	7	Average
Coille Buidhe	7e	Sitka Spruce & Lodgepole Pine	1987	10	7	Poor
Coille Buidhe	7f	Sitka Spruce & Lodgepole Pine	1987	10	7	Poor
Coille Buidhe	8d	Sitka Spruce & Lodgepole Pine	1990	10	6	Poor
Coille Buidhe	8e	Sitka Spruce & Lodgepole Pine	1990	10	6	Poor
Coille Buidhe	8g	Sitka Spruce & Lodgepole Pine	1990	10	5	Poor
Coille Buidhe	8i	Sitka Spruce & Lodgepole Pine	1990	10	6	Poor
Coille Buidhe	8j	Sitka Spruce & Lodgepole Pine	1990	10	5	Poor
Coille Buidhe	8l	Sitka Spruce & Lodgepole Pine	1990	10	4	Poor
Coille Buidhe	8n	Sitka Spruce & Lodgepole Pine	1990	10	6	Poor
Coille Fada	2b	Sitka Spruce	1984	13	8	Average
Coille Fada	2b	Lodgepole Pine	1984	12	6	Average
Coille Fada	3a	Sitka Spruce & Lodgepole Pine	1985	14	9	Average
Coille Fada	3b	Sitka Spruce & Lodgepole Pine	1985	14	9	Average
Coille Fada	3c	Sitka Spruce	1985	12	7	Average
Coille Fada	3c	Lodgepole Pine	1985	12	6	Poor
Coille Fada	3e	Sitka Spruce	1985	13	8	Average
Coille Fada	3e	Lodgepole Pine	1985	13	6	Poor
Coille Fada	3g	Sitka Spruce & Lodgepole Pine	1985	8	5	Poor
Coille Fada	3h	Sitka Spruce	1985	6	3	Stunted
Coille Fada	3i	Sitka Spruce & Lodgepole Pine	1985	5	5	Stunted
Coille Fada	4a	Sitka Spruce & Lodgepole Pine	1986	14	9	Average
Coille Fada	4b	Sitka Spruce & Lodgepole Pine	1986	12	8	Average
Coille Fada	4b	Sitka Spruce & Lodgepole Pine	1986	14	8	Average
Coille Fada	4c	Sitka Spruce & Lodgepole Pine	1986	14	9	Average
Coille Fada	4d	Sitka Spruce	1986	10	6	Poor
Coille Fada	4d	Lodgepole Pine	1986	9	5	Poor
Coille Fada	4e	Sitka Spruce & Lodgepole Pine	1986	14	9	Average
Coille Fada	4f	Sitka Spruce & Lodgepole Pine	1986	14	10	Average
Coille Fada	5c	Sitka Spruce & Lodgepole Pine	1987	16	10	Average
Coille Fada	5e	Lodgepole Pine	1987	15	10	Average
Coille Meadhonach	1b	Sitka Spruce & Lodgepole Pine	1984	10	7	Poor
Coille Meadhonach	1b	Sitka Spruce & Lodgepole Pine	1984	16	10	Average
Coille Meadhonach	1c	Sitka Spruce & Lodgepole Pine	1984	15	10	Average
Coille Meadhonach	1d	Sitka Spruce & Lodgepole Pine	1984	16	10	Average
Coille Meadhonach	3a	Sitka Spruce & Lodgepole Pine	1985	12	7	Average
Coille Meadhonach	3b	Sitka Spruce & Lodgepole Pine	1985	12	8	Average
Coille Meadhonach	3c	Sitka Spruce	1985	10	7	Poor
Coille Meadhonach	3d	Sitka Spruce & Lodgepole Pine	1985	13	8	Average
Coille Meadhonach	4a	Sitka Spruce & Lodgepole Pine	1986	13	8	Average
Coille Meadhonach	4b	Sitka Spruce & Lodgepole Pine	1986	12	8	Average
Coille Meadhonach	4c	Sitka Spruce & Lodgepole Pine	1986	15	9	Average
Coille Nan Clach	1a	Sitka Spruce & Lodgepole Pine	1983	10	6	Poor
Coille Nan Clach	1b	Sitka Spruce & Lodgepole Pine	1983	10	6	Poor
Coille Nan Clach	1c	Sitka Spruce	1983	12	7	Poor
Coille Nan Clach	1c	Lodgepole Pine	1983	10	6	Poor
Coille Nan Clach	1d	Sitka Spruce & Lodgepole Pine	1983	10	6	Poor
Coille Nan Clach	1e	Sitka Spruce & Lodgepole Pine	1983	6	4	Stunted
Coille Nan Clach	1f	Sitka Spruce & Lodgepole Pine	1983	10	6	Poor
Coille Nan Clach	1g	Sitka Spruce & Lodgepole Pine	1983	7	6	Poor
Coille Nan Clach	4a	Sitka Spruce	1987	no data	no data	Stunted
Coille Nan Clach	4a	Sitka Spruce & Lodgepole Pine	1987	8	5	Poor
Coille Nan Clach	4a	Sitka Spruce & Lodgepole Pine	1987	8	6	Poor
Coille Nan Clach	5b	Sitka Spruce	1987	10	8	Poor

Forest Unit	Sub-compartment	Species	Planting Year	DBH (cm)	Top Height (M)	Condition
Coille Nan Clach	5c	Sitka Spruce & Lodgepole Pine	1987	10	8	Poor
Coille Nan Clach	5d	Sitka Spruce & Lodgepole Pine	1988	8	4	Poor
Coille Saobhaidhe	10a	Lodgepole Pine	1986	14	6	Poor
Coille Saobhaidhe	10c	Sitka Spruce & Lodgepole Pine	1986	13	7	Poor
Coille Saobhaidhe	10c	Sitka Spruce & Lodgepole Pine	1986	no data	4	Stunted
Coille Saobhaidhe	10d	Sitka Spruce & Lodgepole Pine	1986	14	9	Average
Coille Saobhaidhe	1a	Sitka Spruce & Lodgepole Pine	1983	15	10	Average
Coille Saobhaidhe	2a	Sitka Spruce & Lodgepole Pine	1983	12	7	Poor
Coille Saobhaidhe	2e	Sitka Spruce & Lodgepole Pine	1983	13	8	Poor
Coille Saobhaidhe	3e	Sitka Spruce & Lodgepole Pine	1984	13	8	Poor
Coille Saobhaidhe	4c	Sitka Spruce & Lodgepole Pine	1984	10	7	Poor
Coille Saobhaidhe	4d	Sitka Spruce & Lodgepole Pine	1984	12	8	Poor
Coille Saobhaidhe	4e	Sitka Spruce & Lodgepole Pine	1984	10	6	Poor
Coille Saobhaidhe	5b	Sitka Spruce & Lodgepole Pine	1985	10	6	Poor
Coille Saobhaidhe	5c	Sitka Spruce & Lodgepole Pine	1985	12	6	Poor
Coille Saobhaidhe	6a	Sitka Spruce & Lodgepole Pine	1985	10	6	Poor
Coille Saobhaidhe	6b	Sitka Spruce & Lodgepole Pine	1985	10	6	Poor
Coille Saobhaidhe	6c	Sitka Spruce & Lodgepole Pine	1985	10	7	Poor
Coille Saobhaidhe	6e	Sitka Spruce & Lodgepole Pine	1985	12	8	Average
Coille Saobhaidhe	7b	Sitka Spruce & Lodgepole Pine	1985	10	7	Poor
Coille Saobhaidhe	7c	Sitka Spruce & Lodgepole Pine	1985	12	8	Average
Coille Saobhaidhe	7c	Sitka Spruce & Lodgepole Pine	1985	12	8	Average
Coille Saobhaidhe	7d	Sitka Spruce & Lodgepole Pine	1985	12	9	Average
Coille Saobhaidhe	7e	Sitka Spruce & Lodgepole Pine	1985	13	7	Poor
Coille Saobhaidhe	7f	Sitka Spruce & Lodgepole Pine	1985	12	7	Poor
Coille Saobhaidhe	7g	Sitka Spruce & Lodgepole Pine	1985	13	7	Poor
Coille Saobhaidhe	8a	Sitka Spruce & Lodgepole Pine	1986	14	9	Average
Coille Saobhaidhe	8b	Sitka Spruce & Lodgepole Pine	1986	12	7	Average
Coille Saobhaidhe	8c	Sitka Spruce & Lodgepole Pine	1986	15	10	Average
Coille Saobhaidhe	8d	Sitka Spruce & Lodgepole Pine	1986	12	7	Average
Coille Saobhaidhe	8e	Sitka Spruce & Lodgepole Pine	1986	12	8	Poor
Coille Saobhaidhe	8f	Sitka Spruce & Lodgepole Pine	1986	12	8	Poor
Coille Saobhaidhe	9a	Sitka Spruce & Lodgepole Pine	1986	15	10	Average
Coille Saobhaidhe	9c	Sitka Spruce & Lodgepole Pine	1986	12	7	Poor
Coille Saobhaidhe	9d	Sitka Spruce & Lodgepole Pine	1986	11	7	Poor
Coille Saobhaidhe	9d	Sitka Spruce & Lodgepole Pine	1986	16	10	Average
Coille Saobhaidhe	9e	Sitka Spruce & Lodgepole Pine	1986	12	8	Average
Coille Saobhaidhe	9f	Sitka Spruce & Lodgepole Pine	1986	10	7	Poor
Coille Saobhaidhe	9f	Sitka Spruce & Lodgepole Pine	1986	13	8	Average
Coille Saobhaidhe	9g	Sitka Spruce & Lodgepole Pine	1986	10	7	Poor
Coille Saobhaidhe	9h	Sitka Spruce & Lodgepole Pine	1986	14	8	Average

APPENDIX 3 – DETAILS OF 2009 ADDITIONAL BIRD SURVEYS

1. Common Prey Surveys

6.

7. For Strathy North, where a short sward was the target habitat after forest removal, survey work was carried out in 2009 to determine the characteristic prey assemblage likely to evolve on that more heavily managed 'short sward' target habitat. For Strathy South, where SHN have clearly stated their preference for peatland restoration, this short sward information is no longer relevant. Comparable information on prey abundance on peatland habitats was also collected in 2009, however, and this is relevant to the habitat management objective for Strathy South,

8.

9. Therefore, this information (specifically, the survey methods for common prey items, and the results) are presented below.

10.

1.1 Comparative Breeding Bird Surveys

11. *Introduction*

The breeding bird assemblage that may develop at Strathy South is of interest in its own right, but it is also important because of its potential influence on raptors coming on site to forage or breed. As a result, some species of conservation interest may therefore be at increased risk of collision with wind turbines compared to current levels, depending on the relative availability of prey items (as well as other factors, such as distance from nest location etc.).

12. *Methods*

A series of breeding bird surveys were therefore carried out between April and June 2009 inclusive (comparative breeding bird and specific meadow pipit/skylark surveys), within two moorland sample plots which are detailed below:



Plot 1b – Open moorland at NC838 634, looking SW with Strathy forest to the right (area 5.24 ha)

13. *Plot 1b – Open moorland – M17/M19 NVC Blanket mire*

The sample plot was dominated by common heather and deergrass, with abundant hare's-tail cotton grass, reindeer lichen and cross-leaved heather. There was approximately 10% cover of soft rush. In wetter areas, bog myrtle was present. Other species included tufted hair grass, *Sphagnum spp.*, bog asphodel and tormentil. There was evidence of light cattle grazing. Average sward height was less than 10cm.



Plot 2b – open moorland at NC837622, looking SSW with Strathy Forest on right (area 11.36 ha)

14. Plot 2b – Open Moorland M17/M19 Blanket Mire and Upland Rough Grassland mix

The sample plot was a mixture of blanket mire and upland rough grassland, and contained around 33% common heather coverage, with the remainder including fescues, common bent, bog myrtle, bog asphodel mat-grass and tormentil. No rushes were present. Sward height reached up to 20cm, and no obvious livestock grazing was evident. This area shows signs of some fire damage.

For both survey types, three survey visits were made on 30 April (visit one), 12 May (visit two) and 24 June (visit three) in order to ensure that key phases of the breeding cycle are not missed.

Breeding bird surveys to record species diversity and abundance were conducted on Plot 1b, based on the standard Brown and Shepherd (1993)²² survey methodology. This method normally requires a standardised survey effort per unit area (20-25 minutes per 500 m x 500 m square), but since sample plots were considerably smaller than this, one transect per plot was carried out for each survey on the same day. A single surveyor walked a pre-determined transect route ensuring that all parts of the survey area were approached to within 100 m. A handheld GPS unit was used to ensure that the survey route was maintained and repeated between surveys. The location and behaviour of all birds encountered during the survey visits were recorded.

Whilst the Brown and Shepherd method was originally designed for recording wader species in upland habitats, it is commonly used to provide indices of upland passerine breeding activity, although it may produce under-estimates in the numbers of some species such as skylark and meadow pipit. A separate series of transect surveys were therefore carried out to record these two species, based on methodology by

²² Brown, A.F. and Shepherd, K.B. 1993. A method of censusing upland breeding waders. *Bird Study* 40: 189-195.

Thirgood *et al* (1995)²³. Plot 1b was again surveyed, but to obtain broader data, a second survey plot was surveyed in May and June (Plot 2b). During these surveys a transect was walked within each plot, and the number, location and breeding evidence of birds was recorded.

Meadow pipit and skylark transects were located as follows:

- Plot 1b (open moorland): NC83883 63602 to NC83750 63259;
- Plot 2b (open moorland): NC83802 62233 to NC83772 61765.

For both survey types, the location and behaviour of birds were recorded in the field on 1:10,000 scale maps. Records from all three visits were combined to allow an estimate of comparative numbers of species and individuals within each sample plot. Breeding evidence was also recorded to show whether a species uses the habitat potentially for nesting, foraging or non-breeding purposes. In the absence of any of these indicative behaviours, a pair observed together in suitable habitat was considered to represent a breeding pair. Other records were considered to be of non-breeding birds.

Within visits, duplicate records of passerines separated by less than a threshold distance of 200 m were as standard considered to correspond to birds of the same pair, while those separated by more than this threshold distance were considered to be from different pairs. Exceptions to this are where the surveyor recorded that birds seen within this threshold distance of each other represented different pairs and vice versa. Appropriate annotations were made on the field maps to indicate whether this was the case.

Estimates of the number of pairs/territories were derived by comparing the three visit maps. Passerine breeding records or territories were generally considered to be separate from each other if they were over 200 m apart.

15. Results

Results of comparative breeding surveys within the Plot 1b show that six species were recorded in the open moorland sample plots (Tables 4.A.1 and 4.A.2). No SPA species were recorded in either plot.

TABLE 4.A.1 - PLOT 1B (OPEN MOORLAND) – SWARD HEIGHT = 34 CM				
Species	Visit 1	Visit 2	Visit 3	Estimated Breeding Pairs
Redpoll sp.	2	-	-	0
Siskin	1	-	-	0
Meadow pipit	6	6	7	3
Skylark	3(1)	3(2)	1	3
Red grouse	1	2	-	1
Snipe	-	1(1)	-	1

Table 4.A.3 below summarises the results of common prey surveys (skylark and meadow pipit), and estimates of breeding pairs per sample plot.

TABLE 4.A.2 – RESULTS OF 2009 COMMON PREY SURVEYS			
	Skylark	Meadow Pipit	Notes
Plot 1b (open moorland)			
Visit 1	3(1)	6	possible 3 MP territories, but only 1 record of singing; 3 singing S
Visit 2	3(2)	6	2 singing MP and 3 alarm calls; 1 singing and 2 calling S
Visit 3	1	7	3 singing MPs; one singing S
Estimated Breeding Pairs	3	4	
Plot 2b (open moorland)			
Visit 1	n/s	n/s	
Visit 2	4	2	4 singing S; 2 MPs only 1 calling
Visit 3	4	4	4 singing S; one MP singing with 2 possible juveniles
Estimated Breeding Pairs	4	2	

²³ Thirgood, S J, Leckie, F M and Redpath, S M (1995). Diurnal and seasonal variation in line transect counts of moorland passerines. *Bird Study* 42: 257-259.

1.2 Field Vole Surveys

16. Introduction

The distribution and abundance of voles on site is a notable influence on the presence of raptors, particularly short-eared owl and hen harrier. These raptors would be attracted to the wind farm area if prey density was higher than surrounding areas, putting them at increased risk of collision.

The felling of forest blocks will lead to alterations in prey abundance and availability within the wind farm area, and the aim of these surveys was to help predict what possible relative densities of vole abundance could be found, depending on future habitat management decisions.

A set of vole surveys were conducted to demonstrate comparative levels of presence in different habitats at Strathy North and on the RSPB Forsinard reserve.

17. Methodology

Vole surveys were undertaken on 28th and 29th May 2009 within the Strathy North plantation, and in adjacent moorland 1b sample site (see above) at approximately NC837 637. All quadrats within the forest were placed in rides or open areas. Although no vole surveys have been carried out at Strathy South, they are likely to be relatively comparable to Strathy North.

On 15th June 2009 an area of the clear-felled Lonielist plantation on RSPB land was also surveyed for vole signs. This area was selected as it is known to host at least one pair each of breeding hen harrier and short-eared owl, so helps provide an example of what levels of vole abundance can support raptor species.

A series of 30 quadrats (25 x 25 cm) were randomly placed during each survey, in order to establish the presence and density of field voles.

Quadrats were searched for the presence and absence of vole signs (as per Lambin, Petty and MacKinnon 2000)²⁴. These include runways, fresh clippings and fresh droppings. Vole sign indices have generally been shown to be linearly related to actual vole densities based on snap-trapping methods and are widely used to estimate vole abundance. In order to determine population estimates, the number of quadrats containing fresh clippings is counted. A calibration method is then employed to determine the density of field voles.

Whilst these methods were developed in clearfell blocks within commercial plantations in northern England, Wheeler (2002)²⁵ also recommends using feeding signs for statistical analysis of field vole abundance in upland grass areas.

Results from the vole surveys carried out at all plots are shown in Table 4.A.3 below:

	Sward Height (cm)	Droppings	Old Clippings	Fresh Clippings	Tunnels	Total
Strathy North Rides	55	17	10	7	3	37
Open Moorland	34	5	4	1	0	10
Lonielist	24	8	2	5	0	15

Results from vole presence surveys showed that abundance in the forest rides was highest, with the second highest being at Lonielist felled forest.

18. Conclusions

Surveys of breeding birds reveal that the diversity and abundance of the potential avian prey species important for raptors were at moderate abundance on the open moorland. For field voles, it appears that rides can support relatively high vole densities, and this differential may lead to preferential foraging once the forest has been removed.

²⁴ Lambin, X., Petty, S.J. and MacKinnon, J.L. (2000) Cyclic dynamics in field vole populations and generalist predation. *Journal of Animal Ecology*, 69, 106–118.

²⁵ Wheeler P (2002). The distribution of mammals across the upland landscape Unpublished Ph.D. thesis, University of Manchester.

Comparative Vantage Point Surveys

Introduction

Bird usage and therefore flight activity patterns may vary between habitats. As such, bird activity post-felling at the Strathy South Wind farm site is expected to be different from previously observed activity over forestry. The aim of this survey was to examine potential future activity, particularly flight height, over the clear-felled wind farm site, by conducting a comparative study of flight activity over a wooded and an un-wooded slope with similar underlying physical characteristics at Strathy North. Whilst this work was not done specifically for Strathy South, it was considered that the pre-existing information was sufficiently transferable between sites.

Methods

Simultaneous vantage point surveys were conducted by two observers, back-to-back, from one point located at NC828 585 alongside the access track to the east of Strathy Forest, in the valley between east-facing (wooded) and west-facing (un-wooded) hill slopes. This site was selected as both sides of the valley are of comparable topography. Conducting simultaneous surveys helped negate any differences that may be down to factors other than habitat, such as weather and time of day.

A series of surveys were carried out during the breeding season, between April and July 2009 inclusive, to accurately determine flight activity of target species. Methodology was based on standard VP methodology described by SNH (2005)^{Error! Bookmark not defined.}

Each survey was undertaken in conditions of good visibility. Watches were limited to three hours duration by any single observer, with a break of at least one hour between surveys on any day. Four experienced ornithological surveyors were used – Julian Smith (JS), Martyn Elwell (ME), Graeme Cook (GAC) and Rob Martin (RM).

During each watch, the landscape was scanned continuously until a target species was detected. Once detected, the bird was observed until it landed or flew out of sight. The time of first detection was noted, and the flight height was recorded for each 15 second period that the bird was in view, as one of one of five height bands: <10 m, 10-20 m, 20-40 m, 40-100 m and >100 m. The paths of all observed flights (flight lines) were drawn onto 1:10,000 scale maps in the field.

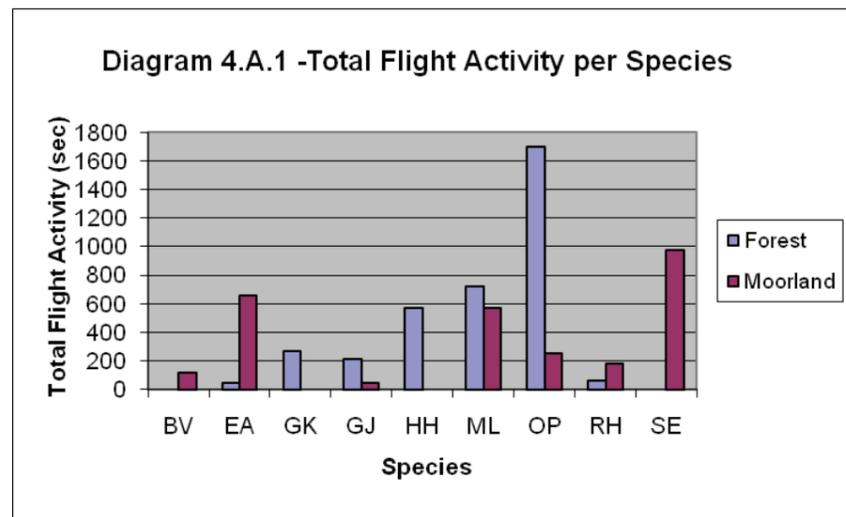
A map showing the flight lines for each target species was compiled in a Geographic Information System (GIS) (ArcView v9.3), with each flight line linked to its associated flight duration and height information held in a Microsoft Access database.

Results

A total of 60 hours of survey per vantage point direction (east and west facing) was conducted. From these surveys, a total of nine target species were recorded – black-throated diver, golden eagle, greylag goose, greenshank, hen harrier, merlin, osprey, red-throated diver and short-eared owl (Table 4.A.4).

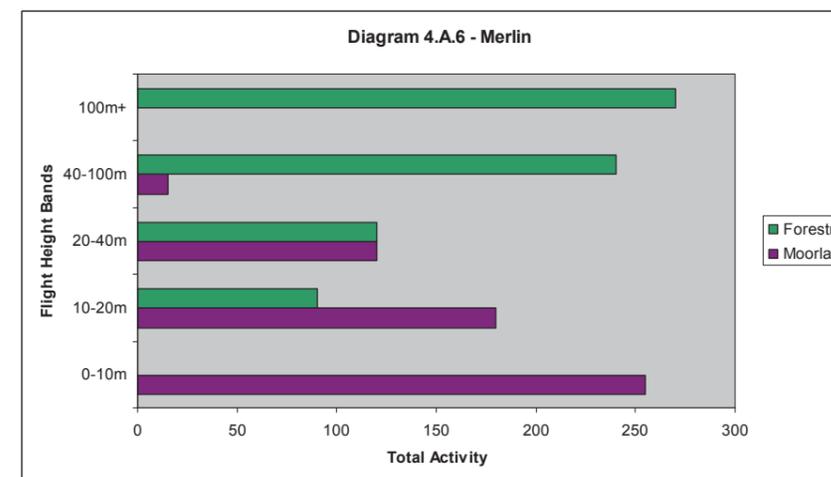
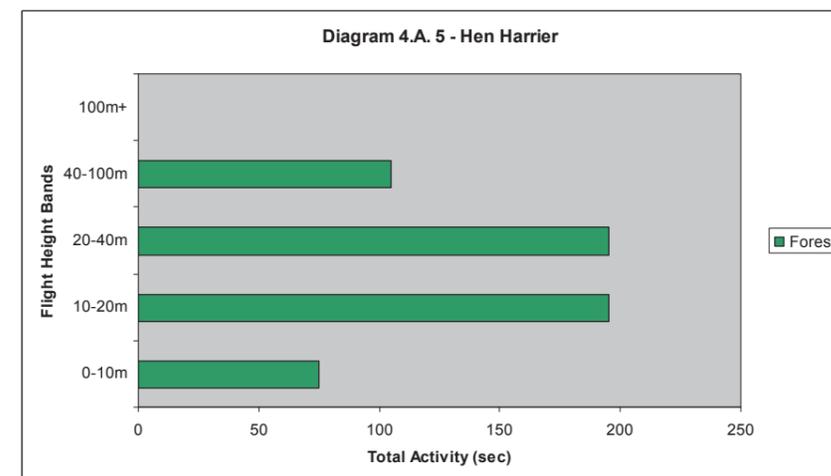
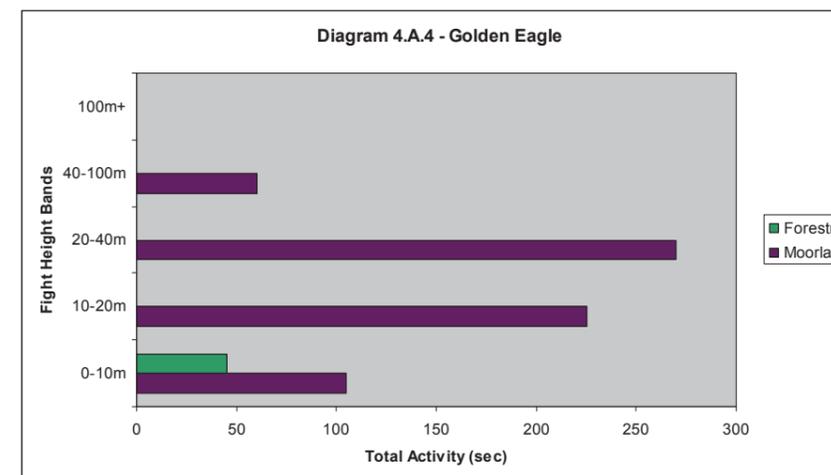
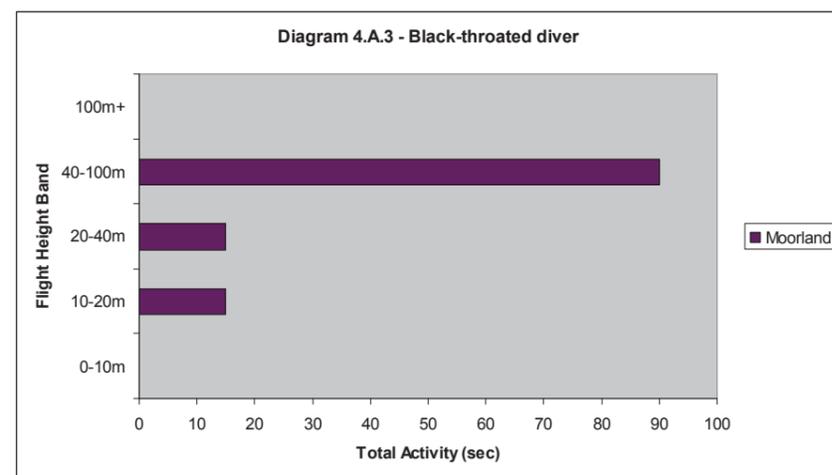
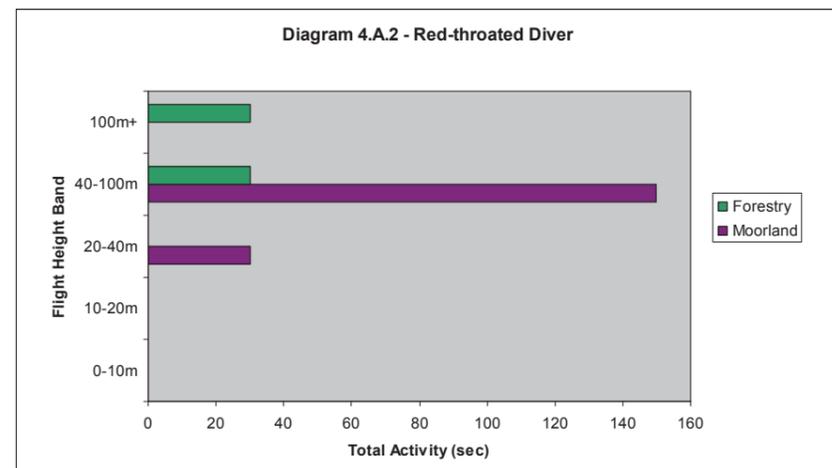
Species	Flights over Forestry	Flights over Moorland
Black-throated diver	0	1
Golden eagle	1	3
Greylag goose	0	1
Greenshank	2	0
Hen harrier	5	0
Merlin	2	4
Osprey	2	3
Red-throated diver	2	2
Short-eared owl	0	4

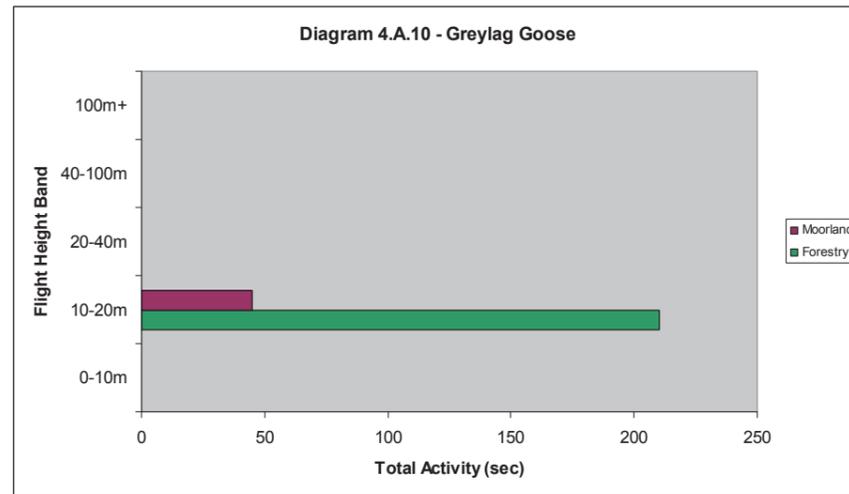
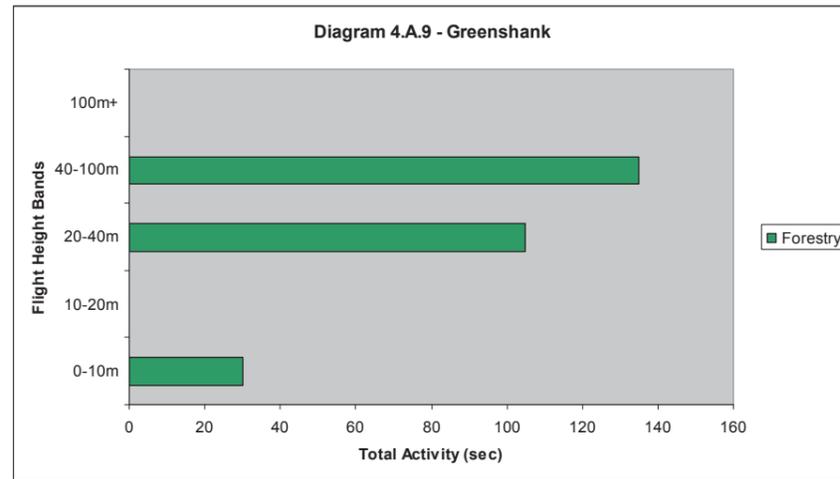
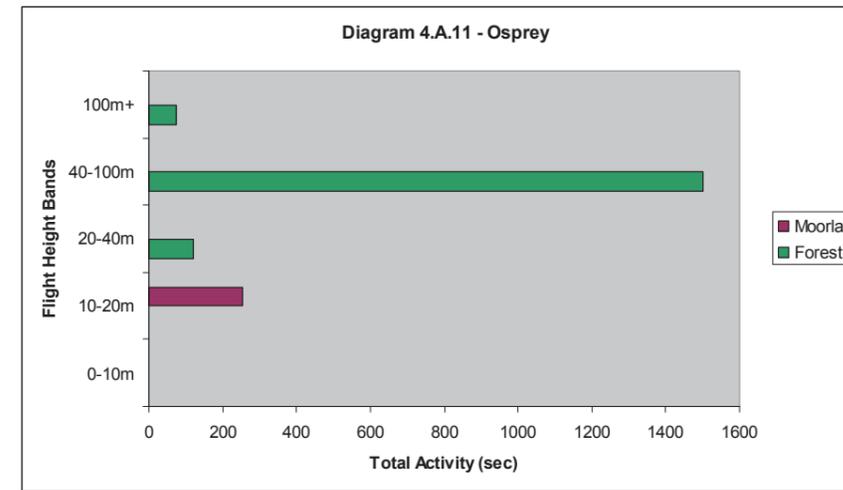
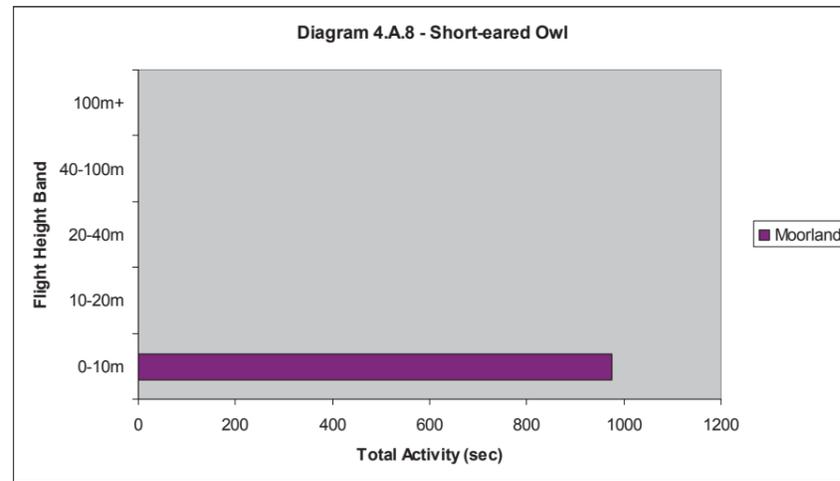
From the 60 hours of surveying per vantage point, a total of 38 flight events were recorded. Of these, 19 flight events each were recorded over forestry and moorland slopes. Records show that there were differences in occurrence for each species, as shown below in Diagram 4.A.1.



BV = black-throated diver; EA = golden eagle; GK = greenshank; GJ = greylag goose; HH = hen harrier; ML = merlin; OP = osprey; RH = red-throated diver; SE = short-eared owl

Differences in flight height distribution per habitat for each species are shown below in Diagrams 4.A.2 to 4.A.11.





Nocturnal Wader Surveys

Background to the Study

This report documents the methods, results and analysis of a RPS survey of the nocturnal activity of breeding wader species carried out for Strathy North Wind Farm. The study location was to the north of Strathy South, but nonetheless of relevance since (a) it quantified the extent of nocturnal flight activity around a characteristic pool system supporting breeding waders, and (b) any commuting flights to the north would have been identified.

Wader Activity

To address the question of whether target species present perform flights at collision risk height during hours of darkness above the forestry a similar method to that developed by RPS for surveying nightjar²⁶ was employed. This involves using a combination of a thermal imaging camera to sample a section of the sky at risk height and image intensifiers to assess activity levels of target species within the vicinity.

The principal target species for the study were greenshank and golden plover, with red-throated and black-throated diver also target. Secondary species included dunlin, greylag goose and any other waterbirds.

Thermal Imaging Technology

Thermal imaging in nocturnal avian surveys is becoming a steadily more attractive means of observing bird activity at night. Unaffected by varying light levels and object colour, thermal imaging is highly suited to monitoring bird activity at night.

Objects radiate heat if their temperature is above 0° Kelvin or -273°C. Thermal imaging cameras operate in the infrared spectrum, and measure heat emitted. Images produced from thermal imaging cameras typically show heat detected in a scene through differing intensities. Bird targets have a different heat emittance compared to the background they are flying against, typically at ambient temperature, and can be seen with a thermal imaging camera.

As with all survey methods, there are limitations. Thermal imaging limitations for this survey are as follows:

Range and field of view – Due to the limited resolution available with thermal imagers, the field of view available is much smaller in comparison to normal 'light' digital cameras. There is either a choice of a long range and a narrow field of view, or a wide field of view and a short observation range. These choices are dependent also on the species being observed. The larger the species, the wider the field of view can be without compromising on range. This is also true of image intensifiers, and to some extent radar.

Occlusion – thermal imaging is unable to observe targets that are occluded by objects such as trees, hedges and dense vegetation. To observe a target, a clear line of sight is required.

There is also a small reduction in detection range with thermal imaging cameras, due to fog and a medium reduction due to heavy precipitation.

Image intensifier – an image intensifier operates by magnifying the available light in a scene and providing the operator with the magnified-lit scene image. Image intensifiers typically rely on a certain amount of ambient light to be available in the scene to operate, such as a clear night with a full moon. Poor weather conditions, overcast nights, and partial moon may result in very poor visibility with image intensifiers. To boost the effectiveness of image intensifiers, a strong infrared lamp can be used to illuminate the scene however this can have an influencing affect on observed targets²⁷.

Study Area

The Strathy North study area consists of a coniferous forestry block surrounded by blanket bog with scattered pools. Greenshank, golden plover and dunlin breed on the blanket bog within 500 m of the

²⁶ RPS (2007). Project Alaska Wind farm Breeding Bird Report 2007. RPS Cambs.

²⁷ Beason, R.C. (1999). The bird brain: magnetic cues, visual cues, and radio frequency (RF) effects. Avian Mortality at Communications Towers Workshop. www.towerkill.com/index.html

southern edge of the forestry (Plate 4.A.1). It is hypothesised that these species make flights from their breeding sites to foraging sites that will take them over the forestry block, potentially at collision risk height.

Observations with the image intensifiers will provide a general baseline of target species nocturnal activity both within the blanket bog habitat and flying above the forestry block. The thermal imager will be used to attempt to quantify how many flights are recorded within a sample of the area within the collision risk zone, i.e. above 20 m altitude and within the proposed development footprint.

Comparison of the activity recorded in both habitats and an assessment of the flight data from the thermal imager will provide a guide to the levels of potential collision risk for the target species present within the proposed wind farm area.



Plate 4.A.1 – Southern boundary of Strathy North Forest looking east from survey area. Moorland where towards Strathy South is to the right, across a pool complex used by breeding waders both (out of picture).

Methods

Thermal Imaging Camera Survey

A FLIR systems camera with a 12° objective lens was used to conduct the thermal imaging camera survey.

Two experienced ornithologists undertook the surveys. The study area was visited in daylight prior to the survey to identify the most suitable locations for positioning the camera equipment and resolve any access issues.

A location at the southern edge of the forestry was chosen to provide a view to the northeast over the forest within close proximity of several pairs of breeding greenshank and golden plover within the bog habitat. It was considered that if these birds, or birds from Strathy South, were travelling from their nest sites over the forests to feeding locations they would cross the forest at this point. Plate 4.A.1 shows the location used for the thermal imaging camera survey.

Due to the extended period of dusk and dawn and limited period of actual darkness experienced in northern Sutherland during the time of the surveys a survey period of 6 hours per night was chosen to thoroughly cover the dark period.

Two different start periods were used. An early start between 21:05 and 21:15 for three nights and a late start between 22:00 and 22:05 for the other three nights. This was in case of differences in

activity levels between dusk and dawn and to cover as long a period as possible. The dark period was entirely covered each night. In order to ensure that the equipment was ready to begin recording at sunset surveyors were on site at least an hour prior to beginning recording.

For all fieldwork the thermal imager was set up using the continuous adjust function, to ensure that an appropriate range of temperatures was being employed at all times. Continuous adjust is particularly good for clear skies, however when there is patchy, fast moving cloud it can result in large areas of the image being assigned the warmest temperature, within which targets become indistinct.

To ensure that data was captured at various heights at which targets may be considered at risk of collision (between 20-100 m) the thermal imager was moved in the vertical plane at a pre-determined periodicity to a series of different heights. Activity of targets can be assessed at different height bands that can be related to areas of differing risk, as in the collision-risk model used for assessing potential impacts from wind farm developments.

Marks relating to different vertical angles were made on the tripod head prior to the surveys. The angles used were 34 degrees, 25 degrees and 16 degrees. The pivot point of the tripod head was used as the central location of the set-up for measuring the angles.

The time that video-capture began and ended was recorded. The temperature, cloud cover, wind direction and strength, and precipitation were recorded at the start of each recording section and immediately after ending video-capture.

During the surveys the starting angle of the camera was recorded. The angle was changed every 40 minutes, cycling through 34, 25, 16 degrees. For a six-hour survey period this gave 2 hours of data at each angle per night. The times that the imager spent at each angle was also recorded, with the start and finish times. The starting angle was changed each night to ensure that the time of night did not confound any effects of angle. Many species show a peak in activity around dawn and dusk.

A shower curtain was used to protect the camera during light rain showers. In this way video-capture could continue while precipitation was light. If rain was persistent or became heavier then capture was ended and the imager was brought inside the tent until conditions improved. The time of each suspension and restart was recorded, with the capture continuing from the position at which it was abandoned.

Light Intensifying Binocular Vantage Point Survey

To compliment the thermal imaging camera survey additional data was collected using light intensifying binoculars. The equipment used to undertake these surveys was as follows:

Data capture:

- Two Thales image intensifying Nightsights with spare AA batteries and hard carry cases

The 'Midi-Binokite' Image Intensified Goggle used by RPS is a passive night vision device that may be used in the hand or mounted on a tripod. Powered by two double AA batteries it amplifies available light from the sky and presents a bright picture of the scene, which the observer sees through two eyepieces. The eyepieces are adjustable for separation and dioptric setting to suit individual users.

A Vantage Point (VP) based methodology was used. Two vantage points were established, one at the thermal camera location and one approximately 60 m to the northwest. These were located so as to cover the area underneath the thermal imager sample point and to cover the greatest extent of forest edge without requiring extensive walking during darkness.

Given the eyestrain caused by prolonged use of image-intensifying equipment a maximum of 30 minutes use in an hour per observer was agreed.

Two experienced ornithologists shared the VP duties during the night. VP watches were started once the camera was known to be correctly recording. Six repetitions were made during the night.

During each VP the observer used the Image Intensifiers to scan an approximate 180-degree field of view. Any birds picked up on these scans were recorded onto a Microsoft Word Mobile document using a handheld PDA device. An estimate of flight height and duration was recorded along with time of the observation and any additional field observations were recorded. All species detected were recorded, including calls.

Survey Effort

Table 2.1 gives the dates and start and finish times for the thermal imager survey.

Date	Starting angle	Start time	Finish time	Duration
23 rd June 2009	16 degrees	22:06	04:06	6:00
24 th June 2009	16 degrees	21:15	03:15	6:00
25 th June 2009	25 degrees	21:05	03:05	6:00
26 th June 2009	25 degrees	21:55	04:15	6:00*
27 th June 2009	34 degrees	22:05	04:05	6:00
28 th June 2009	34 degrees	21:21	03:38	6:00†
				36:00

* Recording suspended between 01:20 and 01:40 due to rain.

† Recording suspended between 02:36 and 02:53 due to connection fault.

Table 2.3 lists the survey effort at each image intensifier VP together with the number of hours of data collected. Observers spent a total of almost 51 hours on the VPs over the course of the six nights.

Date	VP		Total (mins)
	1	2	
23 rd June	210	210	420
24 th June	209	270	479
25 th June	270	270	540
26 th June	270	270	540
27 th June	270	270	540
28 th June	270	270	540
Total (mins)	1499	1560	3059

Camera Data Analysis

After each survey, the video collected was analysed using software that identifies any contacts made during the survey period. All targets identified by the software were segmented from the video.

Once all of the segments from all of the visits had been collated, an experienced ornithologist looked through the segments and identified the observed targets. Identification was based on general shape of the bird, flight pattern and size of bird. Where birds could not be identified to species, they are noted down to family level. Where necessary, video clips were slowed down using video viewing software.

Having identified the flights, the captured images were analysed to identify the flight height. The approach taken for the flight height calculations is presented in Appendix B.

The DHMT (Distance Height Measuring Tool) software can be used to obtain an estimate target height and distance from camera, based on a focussed target under ideal conditions. A frame clipped from the ANADAS programme can be opened in DHMT and the surveyor enters the lens used, camera angle of elevation, camera height from ground and average bird length of the identified target

Survey Limitations

The survey results do not represent data from the full season when the target species are present in the study area and as such can only represent their activity during the mid-summer period. Furthermore due to the limitations of the thermal imaging technology the survey data collected is taken from a relatively small section of the study area.

Identification of contacts is dependent upon a sufficient duration of contact and clarity of image being obtained. Due to the attenuation of the heat signal and the varying efficacy of a bird's thermal insulation the image obtained may not be identifiable, particularly if the target is distant. Birds of similar size and weight may look virtually identical and for some groups generic identification is the best that can be achieved.

The following have been identified as the main sources of error when using the calculations in Appendix B: elevation angle; pixel width of target, reflecting target position relative to camera; and actual target length.

Possible errors can occur in the calculation and measurement of angles A and θ (Appendix B). It is expected that the error calculating A will be negligible. The biggest area for error is from θ . The elevation angle was measured as accurately as possible using a precision tripod and spirit level to minimise the impact of the error.

The length of the bird target measured in pixels is subject to variance based on how the length is measured, bird posture and whether the bird is exactly parallel with the camera or at an angle. Measurements used are taken from several different frames to provide the range of heights within which the target has been detected.

As actual target length cannot be measured, a reference source for bird species length is required. Bird lengths can span between minimum and maximum measured lengths, hence there is likely to be a degree of uncertainty with target distance. Height is therefore calculated with both the maximum and minimum length given for a particular species, and the range in flight height that results in incorporated into the figure presented. Lengths used are those given in Perrins and Snow (1997)²⁸.

Weather was suitable for survey throughout the survey period, apart from a rain shower between 01:20 and 01:40 during the recording period that began the evening of 26th June 2009.

Results

Thermal Imaging Camera Surveys

A total of 3 records were identified using the thermal imaging camera following of observation. Table 3.1 presents data for all confirmed and possible target species records from the thermal imaging survey at the Strathy study area.

Date	Time	Considered Identification	Size range used (cm)	Flight Height (metres above ground level)
23 rd June 2009	01:34:15	Medium sized wader; likely greenshank	30-33	23-26m
26 th June 2009	01:15:09	Possible diver	53-73	54-75m
28 th June 2009	00:19:42	Prob. Wader (greenshank or golden plover)	26-33	36-45m

The images obtained were difficult to identify to species level. Due to the similarities in size between greenshank and golden plover it was not considered possible from the video clip alone to separate these. The possible diver was a considerable distance from the camera and it was therefore difficult to discern an accurate shape of the target. Wingbeat repetition rate was used along with flight style. Additionally a diver call was heard immediately prior to this recording.

Date	Time	Considered Identification	Size range used	Flight Height (metres above ground level)
24 th June 2009	21:19:05	Large gull spp.	53 -78	70-100 m

One other bird image was obtained from the thermal imaging survey, considered to be a large gull species.

Image Intensifier View Point Surveys

A total of 47 greenshank flights were record during the image intensifier VPs. Table 3.2 presents the data collected for greenshank during the image intensifier VPs.

One flight took place over the forest, at a maximum height of 30 metres above ground level. The maximum flight height recorded was approximately 40 metres above ground level in the bog habitat. The 46 flights observed over the bog habitat lasted a total of 650 seconds, an average of 14.1 seconds per flight. Many of the flights were 'short-hops' between tussocks lasting only a few seconds.

Date (night of)	Number of flights		Max. flight duration (seconds)		Total flight duration (s)		Max. flight height (metres above ground level)	
	Bog	Forest	Bog	Forest	Bog	Forest	Bog	Forest
24 th June 2009	5	0	20	0	65	0	<5	-
25 th June 2009	10	0	120	0	290	0	40	-
26 th June 2009	9	1	<15	15	60	15	15	30
27 th June 2009	12	0	30	0	150	0	20	-
28 th June 2009	10	0	25	0	85	0	<20	-
	46	1	120	15	650	15	40	30

A total of 4 golden plover flights were recorded during the image intensifier VPs. Table 3.3 present the data collected for golden plover during the image intensifier VPs.

Date (night of)	Number of flights		Max. flight duration (seconds)		Total flight duration (s)		Max. flight height (metres above ground level)	
	Bog	Forest	Bog	Forest	Bog	Forest	Bog	Forest
23 rd June 2009	0	0	0	0	0	0	-	-
24 th June 2009	1	0	10	0	10	0	<3	-
25 th June 2009	1	0	45	0	45	0	40	-
26 th June 2009	1	1	10	5	10	5	5	20
27 th June 2009	0	1?	0	?	0	?	-	?
28 th June 2009	0	0	0	0	0	0	-	-
	3	2	45	5	65	5	40	20

? = Heard only, considered to be in flight above the forest, but not visible from the vantage point location.

Only 3 golden plover flights were recorded over the bog habitat, with potentially two flights over the forestry. The average duration of flights over the bog habitat was 21.7 seconds. The maximum height of flights was 40 m over the bog habitat and 20 m above ground level in the forest habitat. The one confirmed flight over the forest lasted 5 seconds. The other flight over the forest was not seen; consequently no further information could be derived.

Supplementary Observations

One further observation was made outside of the VP watches. A greenshank was observed over the forest at 21:37 on 26th June 2009, for 10 seconds with a maximum altitude of 20 m before flying across the bog for 10 seconds at a maximum height of 15m and landing. This was during the time taken to set-up the thermal imager.

Secondary and Other Species

A total of 6 flights of non-target species were recorded. Table 3.4 presents the non-target flights observed during the VPs.

²⁸ Perrins, C. M. and Snow, D. W. (1997). The Birds of the Western Palearctic: Concise Edition. Oxford University Press, Oxford.

Date (night of)	Species	Habitat	Number of flights	Max. flight duration (seconds)	Max. flight height (metres above ground level)
24 th June 2009	BZ	Forest	1	120	25
24 th June 2009	T.	Bog	1	<5	3
25 th June 2009	H.	Bog	1	60	20
26 th June 2009	DN	Bog	1	5	3
28 th June 2009	DN	Bog	1	5	3
28 th June 2009	DN	Bog	1	2	2

Three flights of dunlin (DN) were observed over the bog habitat. All were individuals located on call and observed immediately prior to landing, rather than for full flights. Single flights of buzzard (BZ), teal (T.) and grey heron (H.) were also recorded.

Survey Data Evaluation

The numbers of flights by target species recorded during the surveys are presented below:

- Thermal imaging camera survey3 in 36 hours
- Image intensifier VPs52 in 51 hours
- Supplemental observations1

Over the course of 86 hrs 59 mins of data collection 56 flights of target species were recorded - 48 of these were greenshank. There were five records of golden plover flights, two flights of likely greenshank/golden plover and one flight of a probable diver species.

Due to the similarities in size between greenshank and golden plover it was not considered possible from the recordings made by the thermal imager to separate these species.

97.8% of definite greenshank flights were recorded over the bog habitat close to their nests.

Three out of the four definite golden plover flights were also recorded over the bog habitat, with one heard only flight record also being considered to be over the forest.

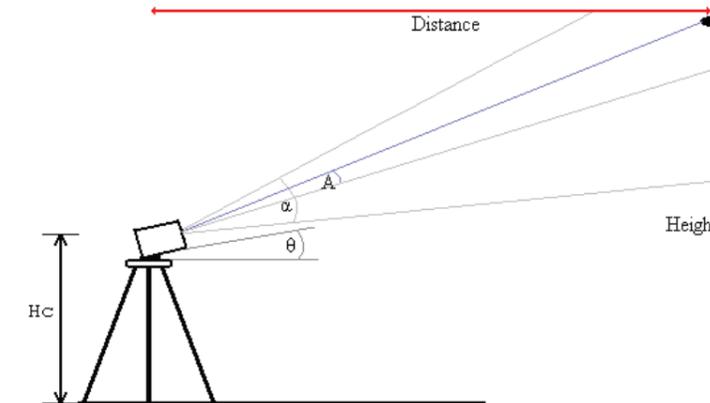
Both of the expected target species were recorded making flights over the forest during the survey. Greenshank appeared to make largely incidental flights over the forest, passing over as part of circular flights around the nest sites on the bog habitat.

Golden plover appeared to make more purposeful flights across the forestry out to the nest site on the bog habitat, suggesting that adults may be feeding beyond the forestry and returning over the forestry to the nest sites.

The diver species recorded was a considerable distance from the camera, but was considered likely to be at collision risk height, at between 54 and 75m altitude. This would not have been recorded without the thermal imager being present. However the image obtained is not clear and is not certainly that of a diver, but the balance of available evidence suggests this is the likely identification. This displays both the strength and weakness of the thermal imager, being excellent for picking up targets but poor for providing sufficient information by itself to arrive at a specific identification.

Calculation of Target Flight Heights from Thermal Imaging Camera Surveys

The below method is based on optimal conditions, defined as low humidity, target is in focus and is lengthwise parallel with camera. The target is the same as indicated from a reputable field guide. Landscape is uniform and flat. Target flies unobstructed across a clear sky and there is no motion drag. It is assumed the camera is in standard landscape position.



θ = Camera elevation angle

α = Lens

S = Spot size

V = Number of vertical pixels from target to frame mid point

x = Vertical distance from target to frame mid point in metres

H_{FOV} = Number of pixels in horizontal field of view

H_c = Height of camera from ground

A = Angle of object from frame mid point

$$A = \arctan\left(\tan\left(\frac{\alpha}{2}\right) \cdot \frac{2V}{H_{FOV}}\right)$$

$$S = \frac{\text{target length (metres)}}{\text{target length (pixels)}}$$

$$x = SV$$

If a target appears in top half of the frame

$$\text{Height} = H_c + \frac{x}{\sin A} \cdot \sin(A + \alpha + \theta)$$

$$\text{Distance} = \frac{x}{\sin A} \cdot \cos(A + \alpha + \theta)$$

If a target appears in bottom half of the frame

$$\text{Height} = H_c + \frac{x}{\sin A} \cdot \sin(\alpha + \theta - A)$$

$$\text{Distance} = \frac{x}{\sin A} \cdot \cos(\alpha + \theta - A)$$

APPENDIX 4 – OUTLINE HABITAT MANAGEMENT PLAN

Introduction

In light of the measures prescribed in the Strathy South 2007 ES Appendix 4.1 - Landscape/Ecology Mitigation Strategy, the findings of the subsequent additional reports presented in support of the 2013 ES Addendum, and the proximity of designated sites, the overriding goal of this Outline HMP is to benefit peatland habitats typical of the SAC and the SSSIs' features of scientific interest. Ancillary goals include mitigating any adverse effects on the SPA's qualifying species. These goals are also in line with recent consultation undertaken with SNH (email 17th May 2013) whereby SNH indicated a preference for blanket bog restoration where possible over reduction in site attractiveness to raptors and waders.

In pursuing the above goals, the HMP incorporates the issues raised in post-submission responses from SNH and RSPB Scotland, and the recent policy position of SEPA on forest waste. The HMP also recognises the need to deliver landscape enhancement and to promote public access.

HMP Aims, Objectives and Prescriptions

In view of the mitigation required for the 2013 Modified Scheme, and considering Peatlands of Caithness and Sutherland Management Strategy (2005-2015)²⁹, UKBAP and Sutherland Local Biodiversity Action Plan (2003) objectives, the HMP has the following aims. These are:-

1. To encourage, at appropriate locations, active peat-forming vegetation, to contribute to the restoration of blanket bog and wet heath habitats.
2. To maintain and improve peatland habitats within non-forested land units adjacent to the wind farm.
3. To reduce collision risk to breeding and foraging raptors (in particular hen harrier and short-eared owl), and waders (greenshank) associated with the Caithness and Sutherland Peatlands SPA; and
4. To mitigate collision risk for breeding divers by provision of diver rafts at suitable locations off site, in consultation with SNH.

Figure A.11.2.5 shows indicative areas which would be targeted for peatland restoration (Aim 1). These areas are indicative until more detailed site data can be collected post forest removal. These areas are currently based on a number of characteristics including: low slope angle; low forest productivity; areas of deeper peat (assumed to coincide with wetter areas on shallow slope); and, proximity to areas of open habitat comprised primarily of 'encapsulated bog' or SAC habitats. Although Figure A.11.2.5 highlights targeted peatland restoration areas, all areas within Strathy South Forest would be considered for peatland restoration if conditions were suitable.

Where required and in keeping with other aims, vegetation would be controlled in targeted areas in order to reduce the attractiveness to nesting and foraging raptors and waders (Aim 2). Specifically, vegetation would be controlled in proximity to turbines (or particular turbines) where it may result in habitats becoming attractive to these species or their prey, and provided control does not interfere with other aims of the HMP. In practice, control is likely to focus on unwanted plant species, for example, regenerating conifer trees and rushes on blanket bog and wet heath. Management of this vegetation would contribute to Aim 1 and Aim 2. Vegetation may also be controlled where non-peatland habitats characterised by deep swards (e.g. dry heath, grasslands or tall ruderal vegetation) develop in proximity to turbines.

Land management units adjacent to the north and west of Strathy South will be managed for their peatland interests (Aim 3). This will include the control of unwanted vegetation (notably regenerating conifer trees) and blocking of any appropriate drains.

Finalisation of the extent of these areas and methods used to maintain them in an optimal condition will be achieved through consultation with SNH, RSPB and any other relevant parties. The aim is to

²⁹ <http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=home.showFileandrep=fileandfil=Peatlands%20management%20Strategy.pdf>

evolve the Outline HMP into a detailed prescriptive document that will be implemented through an appropriate and legally binding mechanism. Initial prescriptions for each of the Outline HMP's three aims are given below. Issues involving grazing by deer will be dealt with in a separate Deer Management Plan, the primary aim of which will be to ensure deer grazing does not impact on SAC qualifying habitats due to displacement during or following construction activities.

The objectives of the Outline HMP aims are detailed below. The associated prescriptions are based on the information presented in Technical Appendix A11.2.

Aim 1. To encourage, at appropriate locations, active peat-forming vegetation, to contribute to the restoration of blanket bog and wet heath habitats.

Objective 1.1. To raise water table levels across appropriate areas.

Prescriptions:

Pscr. 1.1. Mulch trees or harvest trees and mulch remaining brash and stumps across all areas. These operations will be undertaken in order to remove the influence of trees (lowering water table levels and shading out peat forming vegetation) and restore the homogeneity of the ground surface.

Pscr. 1.2. Block active drainage ditches. Following tree removal, a site survey will identify appropriate locations and methods of drain blocking.

Objective 1.2. To control non-peat forming vegetation where this impacts on peatland restoration.

Prescriptions: Pscr. 1.3. Control unwanted species including regenerating conifer trees and rushes where these are likely to reduce the long-term effectiveness of restoration activities. Control methods will be dependant upon the type of vegetation present and is likely to include use of manual, mechanical and/or light grazing techniques.

Aim 2. To maintain and improve peatland habitats within non-forested land units adjacent to the wind farm.

Objective 2.1 To improve conditions for peatland plant species where appropriate.

Prescriptions:

Pscr. 2.1. Identify and block active drainage ditches if present.

Pscr. 2.2. Control unwanted species including regenerating conifer trees where these are likely to impact on the development and function of peatland habitats.

Aim 3. Within the wind farm, reduce the collision risk to breeding and foraging divers, raptors and waders associated with the Caithness and Sutherland Peatlands SPA (specifically red-throated divers, hen harrier, short-eared owl and greenshank);

Objective 3.1. Restrict suitable nesting habitat for raptors or waders in proximity to all wind turbines, or those considered to pose higher collision risk.

Prescriptions:

Pscr. 3.1. Mulch trees, or harvest trees and mulch remaining brash and stumps, across all areas in order to improve homogeneity of the ground surface and subsequent ability to manage vegetation sward structure.

Pscr. 3.2. Monitor vegetation height on a monthly basis from March to July within 250 m of turbines to assess its recovery after conifer removal.

Pscr. 3.3. Control vegetation height and species composition providing this does not impact on the ability to achieve Objectives associated with Aim 1. This is likely to include the control of regenerating conifer trees, treatment of brash mats and conifer stumps, and

localised rush control. It may also include light grazing or mechanical control of grass and heath species.

Pscr. 3.4. Divert breeding attempts by red-throated divers onto the SPA by ensuring there are no suitable nesting lochans on site.

Aim 4. To mitigate collision risk for breeding divers by provision of diver rafts at suitable locations off site, in consultation with SNH.

Objective 4.1 To improve breeding success and productivity of red and black-throated divers at selected locations in the SPA, and potentially also elsewhere in North Scotland.

Prescriptions:

Pscr. 4.1. Provide and maintain diver rafts over the lifetime of the wind farm, with the number of rafts based on feedback from SNH, in combination with site suitability, access and the level of potential nesting benefit assessed at each potential location.

REPORT

Forest Unit	Sub-Compar tment	Species	Planting Year	Yield Class	Planted Area (ha)	Proposed Forest Removal
Coille Am Sealbach	9d	Mixed Broadleaves	1994	0	0.31	
Coille Am Sealbach	9d	Mixed Broadleaves	1994	0	0.10	
Coille Am Sealbach	9d	Mixed Broadleaves	1994	0	0.14	
Coille Am Sealbach	9d	Mixed Broadleaves	1994	0	0.13	
Coille Am Sealbach	9d	Mixed Broadleaves	1994	0	0.08	
Coille Am Sealbach	9d	Mixed Broadleaves	1994	0	0.07	
Coille Am Sealbach	9e	Sitka Spruce / Petersburg Lodgepole Pine Mix	1994	4	1.20	
Coille Am Sealbach	9e	Sitka Spruce / Petersburg Lodgepole Pine Mix	1994	4	0.05	
Coille Am Sealbach	9e	Sitka Spruce / Petersburg Lodgepole Pine Mix	1994	4	2.73	Small tree- mulch
Coille Am Sealbach	9e	Sitka Spruce / Petersburg Lodgepole Pine Mix	1994	4	0.02	
Coille Am Sealbach	9e	Sitka Spruce / Petersburg Lodgepole Pine Mix	1994	4	0.05	
Coille Am Sealbach	9e	Sitka Spruce / Petersburg Lodgepole Pine Mix	1994	4	0.10	
Coille Am Sealbach	9e	Sitka Spruce / Petersburg Lodgepole Pine Mix	1994	4	0.23	Small tree- mulch
Coille Am Sealbach	9e	Sitka Spruce / Petersburg Lodgepole Pine Mix	1994	4	0.20	
Coille Am Sealbach	9g	Mixed Broadleaves	1994	0	1.32	
Coille Am Sealbach	9g	Mixed Broadleaves	1994	0	0.42	
Coille Am Sealbach	9h	Mixed Broadleaves	1994	0	0.26	
Coille Am Sealbach	9h	Mixed Broadleaves	1994	0	0.13	
Coille An Reidhe	1a	Sitka Spruce / Lodgepole Pine Mix	1983/84	6	6.51	
Coille An Reidhe	1a	Sitka Spruce / Lodgepole Pine Mix	1983/84	6	0.44	
Coille An Reidhe	1b	Sitka Spruce / Lodgepole Pine Mix	1983/84	6	4.50	
Coille An Reidhe	1b	Sitka Spruce / Lodgepole Pine Mix	1983/84	6	0.79	
Coille An Reidhe	1b	Sitka Spruce / Lodgepole Pine Mix	1983/84	6	1.69	
Coille An Reidhe	2a	Sitka Spruce / Lodgepole Pine Mix	1984	8	4.62	
Coille An Reidhe	2a	Sitka Spruce / Lodgepole Pine Mix	1984	8	0.20	
Coille An Reidhe	2a	Sitka Spruce / Lodgepole Pine Mix	1984	8	0.23	
Coille An Reidhe	2a	Sitka Spruce / Lodgepole Pine Mix	1984	8	1.56	
Coille An Reidhe	2b	Sitka Spruce / Lodgepole Pine Mix	1985	6	3.96	
Coille An Reidhe	2b	Sitka Spruce / Lodgepole Pine Mix	1985	6	0.67	
Coille An Reidhe	2b	Sitka Spruce / Lodgepole Pine Mix	1985	6	0.25	
Coille An Reidhe	2b	Sitka Spruce / Lodgepole Pine Mix	1985	6	1.17	
Coille An Reidhe	2b	Sitka Spruce / Lodgepole Pine Mix	1985	6	0.41	
Coille An Reidhe	3a	Sitka Spruce / Lodgepole Pine Mix	1985	8	2.34	
Coille An Reidhe	3a	Sitka Spruce / Lodgepole Pine Mix	1985	8	1.05	
Coille An Reidhe	3a	Sitka Spruce / Lodgepole Pine Mix	1985	8	0.61	
Coille An Reidhe	3b	Sitka Spruce / Lodgepole Pine Mix	1985	8	4.91	
Coille An Reidhe	3b	Sitka Spruce / Lodgepole Pine Mix	1985	8	0.38	
Coille An Reidhe	3b	Sitka Spruce / Lodgepole Pine Mix	1985	8	1.24	
Coille An Reidhe	3c	Sitka Spruce / Lodgepole Pine Mix	1985	8	4.13	
Coille An Reidhe	3c	Sitka Spruce / Lodgepole Pine Mix	1985	8	0.03	
Coille An Reidhe	3c	Sitka Spruce / Lodgepole Pine Mix	1985	8	0.91	
Coille An Reidhe	3c	Sitka Spruce / Lodgepole Pine Mix	1985	8	0.57	
Coille An Reidhe	4a	Sitka Spruce / Lodgepole Pine Mix	1986	8	4.74	
Coille An Reidhe	4a	Sitka Spruce / Lodgepole Pine Mix	1986	8	0.24	
Coille An Reidhe	4a	Sitka Spruce / Lodgepole Pine Mix	1986	8	0.41	
Coille An Reidhe	4b	Sitka Spruce / Lodgepole Pine Mix	1986	8	3.61	
Coille An Reidhe	4b	Sitka Spruce / Lodgepole Pine Mix	1986	8	0.11	

REPORT

Forest Unit	Sub-Compar tment	Species	Planting Year	Yield Class	Planted Area (ha)	Proposed Forest Removal
Coille An Reidhe	4b	Sitka Spruce / Lodgepole Pine Mix	1986	8	0.02	
Coille An Reidhe	4b	Sitka Spruce / Lodgepole Pine Mix	1986	8	0.01	
Coille An Reidhe	4b	Sitka Spruce / Lodgepole Pine Mix	1986	8	0.02	
Coille An Reidhe	4b	Sitka Spruce / Lodgepole Pine Mix	1986	8	0.84	
Coille An Reidhe	4b	Sitka Spruce / Lodgepole Pine Mix	1986	8	1.06	
Coille An Reidhe	4c	Sitka Spruce / Lodgepole Pine Mix	1986	8	2.18	
Coille An Reidhe	4d	Sitka Spruce / Lodgepole Pine Mix	1986	8	0.95	
Coille An Reidhe	4e	Sitka Spruce / Lodgepole Pine Mix	1986	8	2.86	
Coille An Reidhe	4f	Sitka Spruce / Lodgepole Pine Mix	1986	8	3.68	
Coille An Reidhe	4g	Sitka Spruce / Lodgepole Pine Mix	1986	8	2.61	
Coille An Reidhe	5a	Sitka Spruce / Petersburg Lodgepole Pine Mix	1987	10	3.18	
Coille An Reidhe	5b	Sitka Spruce / Lodgepole Pine Mix	1987	10	4.55	
Coille An Reidhe	5c	Sitka Spruce / Petersburg Lodgepole Pine Mix	1987	10	0.11	
Coille An Reidhe	5c	Sitka Spruce / Petersburg Lodgepole Pine Mix	1987	10	4.80	
Coille An Reidhe	5c	Sitka Spruce / Petersburg Lodgepole Pine Mix	1987	10	1.03	
Coille An Reidhe	5d	Sitka Spruce / Petersburg Lodgepole Pine Mix	1987	10	6.86	
Coille An Reidhe	5d	Sitka Spruce / Petersburg Lodgepole Pine Mix	1987	10	0.48	
Coille An Reidhe	5e	Sitka Spruce / Petersburg Lodgepole Pine Mix	1987	10	3.94	
Coille An Reidhe	5e	Sitka Spruce / Petersburg Lodgepole Pine Mix	1987	10	0.04	
Coille An Reidhe	5e	Sitka Spruce / Petersburg Lodgepole Pine Mix	1987	10	0.01	
Coille An Reidhe	5e	Sitka Spruce / Petersburg Lodgepole Pine Mix	1987	10	0.02	
Coille An Reidhe	5f	Sitka Spruce / Petersburg Lodgepole Pine Mix	1987	10	2.82	
Coille Fada	1a	Sitka Spruce / Lodgepole Pine Mix	1984	6	11.93	Potential Harvest
Coille Fada	1a	Sitka Spruce / Lodgepole Pine Mix	1984	6	0.65	Potential Harvest
Coille Fada	1a	Sitka Spruce / Lodgepole Pine Mix	1984	6	0.67	Potential Harvest
Coille Fada	1b	Sitka Spruce / Lodgepole Pine Mix	1984	8	4.14	Potential Harvest
Coille Fada	1b	Sitka Spruce / Lodgepole Pine Mix	1984	8	1.06	Potential Harvest
Coille Fada	1c	Sitka Spruce / Lodgepole Pine Mix	1984	8	3.00	Potential Harvest
Coille Fada	1c	Sitka Spruce / Lodgepole Pine Mix	1984	8	0.82	Potential Harvest
Coille Fada	1c	Sitka Spruce / Lodgepole Pine Mix	1984	8	0.09	Potential Harvest
Coille Fada	1c	Sitka Spruce / Lodgepole Pine Mix	1984	8	0.10	Potential Harvest
Coille Fada	1c	Sitka Spruce / Lodgepole Pine Mix	1984	8	0.89	Potential Harvest
Coille Fada	1c	Sitka Spruce / Lodgepole Pine Mix	1984	8	1.09	Potential Harvest
Coille Fada	1c	Sitka Spruce / Lodgepole Pine Mix	1984	8	0.39	Potential Harvest
Coille Fada	2a	Sitka Spruce / Lodgepole Pine Mix	1984	6	4.18	Small tree- mulch
Coille Fada	2b	Sitka Spruce / Lodgepole Pine Mix	1984	6	4.14	Potential Harvest
Coille Fada	2b	Sitka Spruce / Lodgepole Pine Mix	1984	6	0.48	Potential Harvest
Coille Fada	2c	Sitka Spruce / Lodgepole Pine Mix	1984	6	3.78	Small tree- mulch
Coille Fada	2c	Sitka Spruce / Lodgepole Pine Mix	1984	6	1.46	Potential Harvest
Coille Fada	2d	Sitka Spruce / Lodgepole Pine Mix	1984	6	5.39	Potential Harvest
Coille Fada	2d	Sitka Spruce / Lodgepole Pine Mix	1984	6	0.52	Potential Harvest
Coille Fada	3a	Sitka Spruce / Lodgepole Pine Mix	1985	10	2.80	Potential Harvest
Coille Fada	3a	Sitka Spruce / Lodgepole Pine Mix	1985	10	0.63	Potential Harvest
Coille Fada	3b	Sitka Spruce / Lodgepole Pine Mix	1985	10	1.32	Potential Harvest
Coille Fada	3c	Sitka Spruce / Lodgepole Pine Mix	1985	6	1.35	Potential Harvest
Coille Fada	3c	Sitka Spruce / Lodgepole Pine Mix	1985	6	1.62	Potential Harvest
Coille Fada	3c	Sitka Spruce / Lodgepole Pine Mix	1985	6	1.02	Potential Harvest

REPORT

Forest Unit	Sub-Compar tment	Species	Planting Year	Yield Class	Planted Area (ha)	Proposed Forest Removal
Coille Meadhonach	1c	Sitka Spruce / Lodgepole Pine Mix	1984	10	0.53	
Coille Meadhonach	1d	Sitka Spruce / Lodgepole Pine Mix	1984	10	3.46	
Coille Meadhonach	2a	Sitka Spruce / Lodgepole Pine Mix	1985	8	0.51	
Coille Meadhonach	2b	Sitka Spruce / Lodgepole Pine Mix	1985	8	0.31	
Coille Meadhonach	2b	Sitka Spruce / Lodgepole Pine Mix	1985	8	1.66	
Coille Meadhonach	2c	Sitka Spruce / Lodgepole Pine Mix	1985	8	0.81	
Coille Meadhonach	3a	Sitka Spruce / Lodgepole Pine Mix	1985	8	2.45	
Coille Meadhonach	3b	Sitka Spruce / Lodgepole Pine Mix	1985	8	1.4	Potential Harvest
Coille Meadhonach	3b	Sitka Spruce / Lodgepole Pine Mix	1985	8	0.11	Potential Harvest
Coille Meadhonach	3b	Sitka Spruce / Lodgepole Pine Mix	1985	8	0.27	Potential Harvest
Coille Meadhonach	3c	Sitka Spruce / Lodgepole Pine Mix	1985	8	2.77	Potential Harvest
Coille Meadhonach	3c	Sitka Spruce / Lodgepole Pine Mix	1985	8	0.01	Potential Harvest
Coille Meadhonach	3c	Sitka Spruce / Lodgepole Pine Mix	1985	8	0.82	Potential Harvest
Coille Meadhonach	3d	Sitka Spruce / Lodgepole Pine Mix	1985	8	3.27	
Coille Meadhonach	3d	Sitka Spruce / Lodgepole Pine Mix	1985	8	0.82	
Coille Meadhonach	4a	Sitka Spruce / Lodgepole Pine Mix	1986	8	3.13	
Coille Meadhonach	4b	Sitka Spruce / Lodgepole Pine Mix	1986	8	4.62	Potential Harvest
Coille Meadhonach	4b	Sitka Spruce / Lodgepole Pine Mix	1986	8	0.3	Potential Harvest
Coille Meadhonach	4b	Sitka Spruce / Lodgepole Pine Mix	1986	8	0.28	Potential Harvest
Coille Meadhonach	4b	Sitka Spruce / Lodgepole Pine Mix	1986	8	0	Potential Harvest
Coille Meadhonach	4b	Sitka Spruce / Lodgepole Pine Mix	1986	8	0.04	Potential Harvest
Coille Meadhonach	4b	Sitka Spruce / Lodgepole Pine Mix	1986	8	0.1	Potential Harvest
Coille Meadhonach	4b	Sitka Spruce / Lodgepole Pine Mix	1986	8	1.11	Potential Harvest
Coille Meadhonach	4c	Sitka Spruce / Lodgepole Pine Mix	1986	10	3.66	Potential Harvest
Coille Meadhonach	4c	Sitka Spruce / Lodgepole Pine Mix	1986	10	2.08	Potential Harvest
Coille Meadhonach	4c	Sitka Spruce / Lodgepole Pine Mix	1986	10	0.15	Potential Harvest
Coille Meadhonach	4c	Sitka Spruce / Lodgepole Pine Mix	1986	10	0.25	Potential Harvest
Coille Meadhonach	4c	Sitka Spruce / Lodgepole Pine Mix	1986	10	0.26	Potential Harvest
Coille Meadhonach	4c	Sitka Spruce / Lodgepole Pine Mix	1986	10	0	Potential Harvest
Coille Meadhonach	4c	Sitka Spruce / Lodgepole Pine Mix	1986	10	0.22	Potential Harvest
Coille Meadhonach	4c	Sitka Spruce / Lodgepole Pine Mix	1986	10	1.01	Potential Harvest
Coille Meadhonach	4d	Sitka Spruce / Lodgepole Pine Mix	1986	8	0.1	
Coille Meadhonach	5a	Sitka Spruce / Lodgepole Pine Mix	1988	8	1.19	
Coille Meadhonach	5a	Sitka Spruce / Lodgepole Pine Mix	1988	8	0.05	
Coille Meadhonach	5a	Sitka Spruce / Lodgepole Pine Mix	1988	8	0.71	
Coille Meadhonach	5b	Sitka Spruce / Lodgepole Pine Mix	1987	10	5.96	
Coille Meadhonach	5c	Sitka Spruce / Lodgepole Pine Mix	1987	10	9.42	
Coille Meadhonach	5d	Sitka Spruce / Lodgepole Pine Mix	1988	6	0.54	
Coille Meadhonach	5d	Sitka Spruce / Lodgepole Pine Mix	1988	6	0.13	
Coille Meadhonach	5d	Sitka Spruce / Lodgepole Pine Mix	1988	6	0.37	
Coille Nan Clach	1a	Sitka Spruce / Lodgepole Pine Mix	1983/84	6	3.63	
Coille Nan Clach	1a	Sitka Spruce / Lodgepole Pine Mix	1983/84	6	0.35	
Coille Nan Clach	1b	Sitka Spruce / Lodgepole Pine Mix	1983/84	6	0.53	
Coille Nan Clach	1c	Sitka Spruce / Lodgepole Pine Mix	1983/84	4	3.08	
Coille Nan Clach	1c	Sitka Spruce / Lodgepole Pine Mix	1983/84	4	0.4	
Coille Nan Clach	1c	Sitka Spruce / Lodgepole Pine Mix	1983/84	4	0.84	
Coille Nan Clach	1d	Sitka Spruce / Lodgepole Pine Mix	1983/84	6	2.38	

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Forest Unit	Sub-Compar tment	Species	Planting Year	Yield Class	Planted Area (ha)	Proposed Forest Removal
Coille Nan Clach	1d	Sitka Spruce / Lodgepole Pine Mix	1983/84	6	0.85	
Coille Nan Clach	1e	Sitka Spruce	1983	4	2.05	
Coille Nan Clach	1e	Sitka Spruce	1983	4	0.02	
Coille Nan Clach	1e	Sitka Spruce	1983	4	0.12	
Coille Nan Clach	1f	Sitka Spruce / Lodgepole Pine Mix	1983/84	6	0.08	
Coille Nan Clach	1f	Sitka Spruce / Lodgepole Pine Mix	1983/84	6	0.05	
Coille Nan Clach	1f	Sitka Spruce / Lodgepole Pine Mix	1983/84	6	3.67	
Coille Nan Clach	1f	Sitka Spruce / Lodgepole Pine Mix	1983/84	6	1.52	
Coille Nan Clach	1f	Sitka Spruce / Lodgepole Pine Mix	1983/84	6	0.58	
Coille Nan Clach	1f	Sitka Spruce / Lodgepole Pine Mix	1983/84	6	0.22	
Coille Nan Clach	1g	Sitka Spruce / Lodgepole Pine Mix	1983/84	6	4.23	
Coille Nan Clach	1g	Sitka Spruce / Lodgepole Pine Mix	1983/84	6	0.55	
Coille Nan Clach	2a	Sitka Spruce / Lodgepole Pine Mix	1985	6	5.09	
Coille Nan Clach	2a	Sitka Spruce / Lodgepole Pine Mix	1985	6	0.23	
Coille Nan Clach	2b	Sitka Spruce / Lodgepole Pine Mix	1984	6	3.36	
Coille Nan Clach	2b	Sitka Spruce / Lodgepole Pine Mix	1984	6	0.88	
Coille Nan Clach	2c	Sitka Spruce / Lodgepole Pine Mix	1985	6	8.99	
Coille Nan Clach	2c	Sitka Spruce / Lodgepole Pine Mix	1985	6	0.11	
Coille Nan Clach	2c	Sitka Spruce / Lodgepole Pine Mix	1985	6	0.12	
Coille Nan Clach	2c	Sitka Spruce / Lodgepole Pine Mix	1985	6	0.21	
Coille Nan Clach	2d	Sitka Spruce / Lodgepole Pine Mix	1985	6	2.47	
Coille Nan Clach	2e	Sitka Spruce / Lodgepole Pine Mix	1985	6	1.28	
Coille Nan Clach	2e	Sitka Spruce / Lodgepole Pine Mix	1985	6	0.3	
Coille Nan Clach	3a	Sitka Spruce / Lodgepole Pine Mix	1986	6	5.05	
Coille Nan Clach	3b	Sitka Spruce / Lodgepole Pine Mix	1986	6	3.75	
Coille Nan Clach	3c	Sitka Spruce / Lodgepole Pine Mix	1986	6	2.1	
Coille Nan Clach	3c	Sitka Spruce / Lodgepole Pine Mix	1986	6	0.07	
Coille Nan Clach	4a	Sitka Spruce / Lodgepole Pine Mix	1987	6	1.2	
Coille Nan Clach	4b	Sitka Spruce / Lodgepole Pine Mix	1987	6	1.24	
Coille Nan Clach	4c	Sitka Spruce / Lodgepole Pine Mix	1987	6	1.9	
Coille Nan Clach	4d	Sitka Spruce / Lodgepole Pine Mix	1987	6	3.54	
Coille Nan Clach	4e	Sitka Spruce / Lodgepole Pine Mix	1987	6	2.78	
Coille Nan Clach	4f	Sitka Spruce / Petersburg Lodgepole Pine / Japanese Larch Mix	1987	6	2.45	
Coille Nan Clach	4f	Sitka Spruce / Petersburg Lodgepole Pine / Japanese Larch Mix	1987	6	2.7	
Coille Nan Clach	4f	Sitka Spruce / Petersburg Lodgepole Pine / Japanese Larch Mix	1987	6	0.74	
Coille Saobhaidhe	10a	Unknown	Unknown	0	0.3	Potential Harvest
Coille Saobhaidhe	10a	Unknown	Unknown	0	0	Potential Harvest
Coille Saobhaidhe	10b	Sitka Spruce / Lodgepole Pine Mix	1986	10	1.95	Potential Harvest
Coille Saobhaidhe	10b	Sitka Spruce / Lodgepole Pine Mix	1986	10	0.21	Potential Harvest
Coille Saobhaidhe	10b	Sitka Spruce / Lodgepole Pine Mix	1986	10	1.87	Potential Harvest
Coille Saobhaidhe	10b	Sitka Spruce / Lodgepole Pine Mix	1986	10	0.1	Potential Harvest
Coille Saobhaidhe	10b	Sitka Spruce / Lodgepole Pine Mix	1986	10	0.11	Potential Harvest
Coille Saobhaidhe	10b	Sitka Spruce / Lodgepole Pine Mix	1986	10	0.11	Potential Harvest
Coille Saobhaidhe	10b	Sitka Spruce / Lodgepole Pine Mix	1986	10	0.07	Potential Harvest
Coille Saobhaidhe	10b	Sitka Spruce / Lodgepole Pine Mix	1986	10	0.08	Potential Harvest

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Forest Unit	Sub-Compar tment	Species	Planting Year	Yield Class	Planted Area (ha)	Proposed Forest Removal
South Strathy	9h	Sitka Spruce / Lodgepole Pine Mix	1991	8	0.01	Potential Harvest
South Strathy	9h	Sitka Spruce / Lodgepole Pine Mix	1991	8	0.09	Potential Harvest
South Strathy	9h	Sitka Spruce / Lodgepole Pine Mix	1991	8	0.09	Potential Harvest
South Strathy	9h	Sitka Spruce / Lodgepole Pine Mix	1991	8	0.03	Potential Harvest
South Strathy	9h	Sitka Spruce / Lodgepole Pine Mix	1991	8	0.01	Potential Harvest
South Strathy	9h	Sitka Spruce / Lodgepole Pine Mix	1991	8	0.03	Potential Harvest
South Strathy	9i	Sitka Spruce / Lodgepole Pine Mix	1990	8	0.02	
South Strathy	9i	Sitka Spruce / Lodgepole Pine Mix	1990	8	0.03	Potential Harvest
South Strathy	9i	Sitka Spruce / Lodgepole Pine Mix	1990	8	0.05	
South Strathy	9i	Sitka Spruce / Lodgepole Pine Mix	1990	8	1.45	Potential Harvest
South Strathy	9i	Sitka Spruce / Lodgepole Pine Mix	1990	8	0.85	Small tree- mulch
South Strathy	9i	Sitka Spruce / Lodgepole Pine Mix	1990	8	0.02	
South Strathy	9i	Sitka Spruce / Lodgepole Pine Mix	1990	8	0.02	
South Strathy	9i	Sitka Spruce / Lodgepole Pine Mix	1990	8	0.45	Potential Harvest
South Strathy	9i	Sitka Spruce / Lodgepole Pine Mix	1990	8	0.07	Potential Harvest
South Strathy	9i	Sitka Spruce / Lodgepole Pine Mix	1990	8	0.01	
South Strathy	9i	Sitka Spruce / Lodgepole Pine Mix	1990	8	0.02	
South Strathy	9i	Sitka Spruce / Lodgepole Pine Mix	1990	8	0.05	Potential Harvest
South Strathy	9i	Sitka Spruce / Lodgepole Pine Mix	1990	8	0.05	Potential Harvest
South Strathy	9i	Sitka Spruce / Lodgepole Pine Mix	1990	8	0.03	Potential Harvest
South Strathy	9i	Sitka Spruce / Lodgepole Pine Mix	1990	8	0.29	Potential Harvest
South Strathy	9i	Sitka Spruce / Lodgepole Pine Mix	1990	8	0.27	Potential Harvest
South Strathy	9i	Sitka Spruce / Lodgepole Pine Mix	1990	8	0.07	Small tree- mulch
South Strathy	9i	Sitka Spruce / Lodgepole Pine Mix	1990	8	0.06	Potential Harvest
South Strathy	9i	Sitka Spruce / Lodgepole Pine Mix	1990	8	0.04	Potential Harvest
South Strathy	9i	Sitka Spruce / Lodgepole Pine Mix	1990	8	0.05	Potential Harvest
South Strathy	9i	Sitka Spruce / Lodgepole Pine Mix	1990	8	0.23	Potential Harvest
South Strathy	9i	Sitka Spruce / Lodgepole Pine Mix	1990	8	0.14	Potential Harvest
South Strathy	9i	Sitka Spruce / Lodgepole Pine Mix	1990	8	0.22	Potential Harvest
South Strathy	9i	Sitka Spruce / Lodgepole Pine Mix	1990	8	0.39	Potential Harvest

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Appendix 3

Forestry Compartment Condition for the Strathy South Plantation

Table 9.6.6: Full Breakdown of the Forestry Compartments Condition at the Strathy South Plantation

Forest Unit	Sub-Compar tment	Species	Planting Year	DHC (cm)	Top Height (M)	Condition
Bad Coille	1c	Lodgepole Pine	1985	10	6	Poor
Bad Coille	1c	Sitka Spruce	1985	15	8	Poor
Bad Coille	2a	Sitka Spruce	1985	10	7	Poor
Bad Coille	2b	Lodgepole Pine	1985	8	6	Stunted
Bad Coille	2c	Sitka Spruce	1985	14	7	Poor
Bad Coille	2c	Lodgepole Pine	1985	12	6	Poor
Bad Coille	2d	Lodgepole Pine	1985	11	6	Poor
Bad Coille	2d	Sitka Spruce	1985	13	7	Poor
Bad Coille	2i	Sitka Spruce	1985	10	7	Poor
Bad Coille	2i	Lodgepole Pine	1985	8	6	Stunted
Bad Coille	3b	Sitka Spruce	1985	14	7	Average
Bad Coille	3b	Lodgepole Pine	1985	10	6	Poor
Bad Coille	3c	Lodgepole Pine	1985	10	6	Poor
Bad Coille	3d	Sitka Spruce	1985	10	6	Poor
Bad Coille	3d	Sitka Spruce	1985	11	7	Poor
Bad Coille	3d	Lodgepole Pine	1985	10	6	Poor
Bad Coille	4c	Sitka Spruce	1985	15	10	Average
Bad Coille	4c	Lodgepole Pine	1985	12	6	Poor
Bad Coille	4d	Sitka Spruce	1985	15	10	Average
Bad Coille	4d	Lodgepole Pine	1985	12	6	Poor
Bad Coille	4e	Sitka Spruce	1985	14	9	Poor
Bad Coille	4e	Lodgepole Pine	1985	10	6	Poor
Bad Coille	6a	Sitka Spruce	1985	15	11	Average
Bad Coille	6a	Lodgepole Pine	1985	12	8	Average
Bad Coille	6b	Sitka Spruce	1985	12	6	Stunted
Bad Coille	6b	Lodgepole Pine	1985	10	6	Stunted
Bad Coille	6c	Sitka Spruce & Lodgepole Pine	1985	13	7	Poor
Bad Coille	8a	Lodgepole Pine	1985	10	8	Poor
Bad Coille	8b	Sitka Spruce	1985	12	8	Poor
Bad Coille	8b	Lodgepole Pine	1985	16	8	Poor
Bad Coille	8e	Sitka Spruce	1985	17	12	Average
Coille Am Sealbach	3b	Sitka Spruce & Lodgepole Pine	1986	10	6	Poor
Coille Am Sealbach	3c	Sitka Spruce	1986	6	5	Stunted
Coille Am Sealbach	3d	Sitka Spruce & Lodgepole Pine	1986	15	10	Average
Coille Am Sealbach	3d	Sitka Spruce & Lodgepole Pine	1986	10	6	Poor
Coille Am Sealbach	3e	Sitka Spruce & Lodgepole Pine	1986	14	10	Average
Coille Am Sealbach	3g	Sitka Spruce & Lodgepole Pine	1986	13	8	Good
Coille Am Sealbach	4b	Sitka Spruce & Lodgepole Pine	1987	12	7	Poor
Coille Am Sealbach	4c	Sitka Spruce & Lodgepole Pine	1987	10	6	Poor

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Forest Unit	Sub-Compar tment	Species	Planting Year	DHC (cm)	Top Height (M)	Condition
Coille Am Sealbach	4d	Sitka Spruce & Lodgepole Pine	1987	15	7	Average
Coille Am Sealbach	4f	Lodgepole Pine	1987	14	7	Poor
Coille Am Sealbach	5a	Sitka Spruce & Lodgepole Pine	1987	13	8	Average
Coille Am Sealbach	5a	Sitka Spruce	1987	15	9	Average
Coille Am Sealbach	7a	Sitka Spruce & Lodgepole Pine	1994	6	4	Stunted
Coille Am Sealbach	7c	Sitka Spruce & Lodgepole Pine	1994	5	3	Stunted
Coille Am Sealbach	7d	Sitka Spruce & Lodgepole Pine	1994	5	3	Stunted
Coille Am Sealbach	7e	Sitka Spruce & Lodgepole Pine	1994	5	3	Stunted
Coille Am Sealbach	7f	Sitka Spruce & Lodgepole Pine	1994	5	3	Stunted
Coille Am Sealbach	7g	Sitka Spruce & Lodgepole Pine	1994	5	4	Stunted
Coille Am Sealbach	7h	Sitka Spruce & Lodgepole Pine	1994	6	4	Stunted
Coille Am Sealbach	8a	Sitka Spruce & Lodgepole Pine	1994	5	3	Stunted
Coille Am Sealbach	8b	Sitka Spruce & Lodgepole Pine	1994	5	3	Stunted
Coille Am Sealbach	8d	Sitka Spruce & Lodgepole Pine	1994	6	3	Stunted
Coille Am Sealbach	9d	Broadleaved	1994	no data	no data	Dead
Coille Am Sealbach	9e	Lodgepole Pine	1994	6	4	Stunted
Coille Am Sealbach	9g	Sitka Spruce & Lodgepole Pine	1994	6	5	Poor
Coille Am Sealbach	9h	Broadleaved	1994	no data	no data	no data
Coille An Reidhe	1a	Sitka Spruce & Lodgepole Pine	1983	10	6	Poor
Coille An Reidhe	2b	Sitka Spruce & Lodgepole Pine	1985	10	6	Poor
Coille An Reidhe	5b	Sitka Spruce	1987	14	10	Average
Coille An Reidhe	5f	Sitka Spruce	1987	14	10	Average
Coille Buidhe	1a	Sitka Spruce & Lodgepole Pine	1984	14	10	Average
Coille Buidhe	1b	Sitka Spruce & Lodgepole Pine	1985	10	5	Poor
Coille Buidhe	1c	Sitka Spruce	1985	12	7	Poor
Coille Buidhe	1c	Lodgepole Pine	1985	10	5	Poor
Coille Buidhe	3b	Sitka Spruce & Lodgepole Pine	1986	15	9	Average
Coille Buidhe	3b	Broadleaved	1986	no data	3	Poor
Coille Buidhe	3c	Sitka Spruce & Lodgepole Pine	1986	13	9	Average
Coille Buidhe	4b	Sitka Spruce & Lodgepole Pine	1986	12	8	Average
Coille Buidhe	5c	Sitka Spruce & Lodgepole Pine	1986	12	7	Average
Coille Buidhe	5f	Sitka Spruce & Lodgepole Pine	1986	12	7	Average
Coille Buidhe	5g	Sitka Spruce & Lodgepole Pine	1986	15	9	Average
Coille Buidhe	5g	Sitka Spruce & Lodgepole Pine	1986	12	8	Average
Coille Buidhe	6b	Sitka Spruce & Lodgepole Pine	1987	11	6	Poor
Coille Buidhe	6c	Sitka Spruce & Lodgepole Pine	1987	11	6	Poor
Coille Buidhe	6c	Sitka Spruce & Lodgepole Pine	1987	10	7	Average
Coille Buidhe	7a	Sitka Spruce & Lodgepole Pine	1987	12	7	Average
Coille Buidhe	7b	Sitka Spruce	1987	10	4	Stunted
Coille Buidhe	7c	Sitka Spruce & Lodgepole Pine	1987	13	7	Average
Coille Buidhe	7e	Sitka Spruce & Lodgepole Pine	1987	10	7	Poor
Coille Buidhe	7f	Sitka Spruce & Lodgepole Pine	1987	10	7	Poor
Coille Buidhe	8d	Sitka Spruce & Lodgepole Pine	1990	10	6	Poor
Coille Buidhe	8e	Sitka Spruce & Lodgepole Pine	1990	10	6	Poor
Coille Buidhe	8g	Sitka Spruce & Lodgepole Pine	1990	10	5	Poor
Coille Buidhe	8i	Sitka Spruce & Lodgepole Pine	1990	10	6	Poor
Coille Buidhe	8j	Sitka Spruce & Lodgepole Pine	1990	10	5	Poor

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Forest Unit	Sub-Compar tment	Species	Planting Year	DHC (cm)	Top Height (M)	Condition
Coille Buidhe	8l	Sitka Spruce & Lodgepole Pine	1990	10	4	Poor
Coille Buidhe	8n	Sitka Spruce & Lodgepole Pine	1990	10	6	Poor
Coille Fada	2b	Sitka Spruce	1984	13	8	Average
Coille Fada	2b	Lodgepole Pine	1984	12	6	Average
Coille Fada	3a	Sitka Spruce & Lodgepole Pine	1985	14	9	Average
Coille Fada	3b	Sitka Spruce & Lodgepole Pine	1985	14	9	Average
Coille Fada	3c	Sitka Spruce	1985	12	7	Average
Coille Fada	3c	Lodgepole Pine	1985	12	6	Poor
Coille Fada	3e	Sitka Spruce	1985	13	8	Average
Coille Fada	3e	Lodgepole Pine	1985	13	6	Poor
Coille Fada	3g	Sitka Spruce & Lodgepole Pine	1985	8	5	Poor
Coille Fada	3h	Sitka Spruce	1985	6	3	Stunted
Coille Fada	3i	Sitka Spruce & Lodgepole Pine	1985	5	5	Stunted
Coille Fada	4a	Sitka Spruce & Lodgepole Pine	1986	14	9	Average
Coille Fada	4b	Sitka Spruce & Lodgepole Pine	1986	12	8	Average
Coille Fada	4b	Sitka Spruce & Lodgepole Pine	1986	14	8	Average
Coille Fada	4c	Sitka Spruce & Lodgepole Pine	1986	14	9	Average
Coille Fada	4d	Sitka Spruce	1986	10	6	Poor
Coille Fada	4d	Lodgepole Pine	1986	9	5	Poor
Coille Fada	4e	Sitka Spruce & Lodgepole Pine	1986	14	9	Average
Coille Fada	4f	Sitka Spruce & Lodgepole Pine	1986	14	10	Average
Coille Fada	5c	Sitka Spruce & Lodgepole Pine	1987	16	10	Average
Coille Fada	5e	Lodgepole Pine	1987	15	10	Average
Coille Meadhonach	1b	Sitka Spruce & Lodgepole Pine	1984	10	7	Poor
Coille Meadhonach	1b	Sitka Spruce & Lodgepole Pine	1984	16	10	Average
Coille Meadhonach	1c	Sitka Spruce & Lodgepole Pine	1984	15	10	Average
Coille Meadhonach	1d	Sitka Spruce & Lodgepole Pine	1984	16	10	Average
Coille Meadhonach	3a	Sitka Spruce & Lodgepole Pine	1985	12	7	Average
Coille Meadhonach	3b	Sitka Spruce & Lodgepole Pine	1985	12	8	Average
Coille Meadhonach	3c	Sitka Spruce	1985	10	7	Poor
Coille Meadhonach	3d	Sitka Spruce & Lodgepole Pine	1985	13	8	Average
Coille Meadhonach	4a	Sitka Spruce & Lodgepole Pine	1986	13	8	Average
Coille Meadhonach	4b	Sitka Spruce & Lodgepole Pine	1986	12	8	Average
Coille Meadhonach	4c	Sitka Spruce & Lodgepole Pine	1986	15	9	Average
Coille Nan Clach	1a	Sitka Spruce & Lodgepole Pine	1983	10	6	Poor
Coille Nan Clach	1b	Sitka Spruce & Lodgepole Pine	1983	10	6	Poor
Coille Nan Clach	1c	Sitka Spruce	1983	12	7	Poor
Coille Nan Clach	1c	Lodgepole Pine	1983	10	6	Poor
Coille Nan Clach	1d	Sitka Spruce & Lodgepole Pine	1983	10	6	Poor
Coille Nan Clach	1e	Sitka Spruce & Lodgepole Pine	1983	6	4	Stunted
Coille Nan Clach	1f	Sitka Spruce & Lodgepole Pine	1983	10	6	Poor
Coille Nan Clach	1g	Sitka Spruce & Lodgepole Pine	1983	7	6	Poor
Coille Nan Clach	4a	Sitka Spruce	1987	no data	no data	Stunted
Coille Nan Clach	4a	Sitka Spruce & Lodgepole Pine	1987	8	5	Poor
Coille Nan Clach	4a	Sitka Spruce & Lodgepole Pine	1987	8	6	Poor
Coille Nan Clach	5b	Sitka Spruce	1987	10	8	Poor
Coille Nan Clach	5c	Sitka Spruce & Lodgepole Pine	1987	10	8	Poor

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Forest Unit	Sub-Compartment	Species	Planting Year	DHC (cm)	Top Height (M)	Condition
Coille Nan Clach	5d	Sitka Spruce & Lodgepole Pine	1988	8	4	Poor
Coille Saobhaidhe	10a	Lodgepole Pine	1986	14	6	Poor
Coille Saobhaidhe	10c	Sitka Spruce & Lodgepole Pine	1986	13	7	Poor
Coille Saobhaidhe	10c	Sitka Spruce & Lodgepole Pine	1986	no data	4	Stunted
Coille Saobhaidhe	10d	Sitka Spruce & Lodgepole Pine	1986	14	9	Average
Coille Saobhaidhe	1a	Sitka Spruce & Lodgepole Pine	1983	15	10	Average
Coille Saobhaidhe	2a	Sitka Spruce & Lodgepole Pine	1983	12	7	Poor
Coille Saobhaidhe	2e	Sitka Spruce & Lodgepole Pine	1983	13	8	Poor
Coille Saobhaidhe	3e	Sitka Spruce & Lodgepole Pine	1984	13	8	Poor
Coille Saobhaidhe	4c	Sitka Spruce & Lodgepole Pine	1984	10	7	Poor
Coille Saobhaidhe	4d	Sitka Spruce & Lodgepole Pine	1984	12	8	Poor
Coille Saobhaidhe	4e	Sitka Spruce & Lodgepole Pine	1984	10	6	Poor
Coille Saobhaidhe	5b	Sitka Spruce & Lodgepole Pine	1985	10	6	Poor
Coille Saobhaidhe	5c	Sitka Spruce & Lodgepole Pine	1985	12	6	Poor
Coille Saobhaidhe	6a	Sitka Spruce & Lodgepole Pine	1985	10	6	Poor
Coille Saobhaidhe	6b	Sitka Spruce & Lodgepole Pine	1985	10	6	Poor
Coille Saobhaidhe	6c	Sitka Spruce & Lodgepole Pine	1985	10	7	Poor
Coille Saobhaidhe	6e	Sitka Spruce & Lodgepole Pine	1985	12	8	Average
Coille Saobhaidhe	7b	Sitka Spruce & Lodgepole Pine	1985	10	7	Poor
Coille Saobhaidhe	7c	Sitka Spruce & Lodgepole Pine	1985	12	8	Average
Coille Saobhaidhe	7c	Sitka Spruce & Lodgepole Pine	1985	12	8	Average
Coille Saobhaidhe	7d	Sitka Spruce & Lodgepole Pine	1985	12	9	Average
Coille Saobhaidhe	7e	Sitka Spruce & Lodgepole Pine	1985	13	7	Poor
Coille Saobhaidhe	7f	Sitka Spruce & Lodgepole Pine	1985	12	7	Poor
Coille Saobhaidhe	7g	Sitka Spruce & Lodgepole Pine	1985	13	7	Poor
Coille Saobhaidhe	8a	Sitka Spruce & Lodgepole Pine	1986	14	9	Average
Coille Saobhaidhe	8b	Sitka Spruce & Lodgepole Pine	1986	12	7	Average
Coille Saobhaidhe	8c	Sitka Spruce & Lodgepole Pine	1986	15	10	Average
Coille Saobhaidhe	8d	Sitka Spruce & Lodgepole Pine	1986	12	7	Average
Coille Saobhaidhe	8e	Sitka Spruce & Lodgepole Pine	1986	12	8	Poor
Coille Saobhaidhe	8f	Sitka Spruce & Lodgepole Pine	1986	12	8	Poor
Coille Saobhaidhe	9a	Sitka Spruce & Lodgepole Pine	1986	15	10	Average
Coille Saobhaidhe	9c	Sitka Spruce & Lodgepole Pine	1986	12	7	Poor
Coille Saobhaidhe	9d	Sitka Spruce & Lodgepole Pine	1986	11	7	Poor
Coille Saobhaidhe	9d	Sitka Spruce & Lodgepole Pine	1986	16	10	Average
Coille Saobhaidhe	9e	Sitka Spruce & Lodgepole Pine	1986	12	8	Average
Coille Saobhaidhe	9f	Sitka Spruce & Lodgepole Pine	1986	10	7	Poor
Coille Saobhaidhe	9f	Sitka Spruce & Lodgepole Pine	1986	13	8	Average
Coille Saobhaidhe	9g	Sitka Spruce & Lodgepole Pine	1986	10	7	Poor
Coille Saobhaidhe	9h	Sitka Spruce & Lodgepole Pine	1986	14	8	Average