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7. Forestry

7.1. Introduction

7.1.1. This chapter of the Environmental Impact Assessment (EIA) Report describes the forestry aspects of the Shepherds' Rig Wind Farm (hereafter referred to as the Proposed Development).

7.1.2. Forestry is not being regarded as a receptor for Environmental Impact Assessment purposes in this chapter. Commercial forests are dynamic and their structure continually undergoes change due to normal felling and restocking by the landowner; natural events, such as windblow, pests or diseases; and external factors, such as a wind farm development. This EIA Report chapter therefore describes the Proposed Development plans for felling, restocking and forest management practices; the process by which these were derived; and the changes to the physical structure of the forest. It further discusses the issue of forestry waste arising from the Proposed Development. The forestry proposals are interrelated with environmental effects, which are assessed separately. This chapter should be read in conjunction with the other EIA Report chapters, in particular, Chapter 4: Description of the Proposed Development Chapter 8: Landscape & Visual; Chapter 9: Ecology and Chapter 10: Ornithology as they are interrelated to the changes in the forest structure.

7.1.3. This chapter identifies areas of forest to be removed for the construction and operation of the Proposed Development (as described in Chapter 4: Description of the Proposed Development) and outlines the proposed management practices, while identifying the likely restocking proposals and future land management of the remaining forest within the Proposed Development Area. The responsibility for the management of the remainder of the forest lies with the landowner and therefore the wider felling operations, restocking, and aftercare operations do not form part of the Proposed Development for which consent is sought.

7.1.4. The Proposed Development (as shown in EIA Report Figure 4.1 in Volume 2 of the EIA Report,) lies within existing commercial forestry plantations. The forestry is privately owned and managed. The forestry proposals have been developed to:

- identify areas of forest to be removed for the construction and operation of the Proposed Development, including habitat management works;
- identify those areas which may or may not be replanted as part of the Proposed Development; and
- propose management practices for the forestry works.

7.1.5. In general, throughout this chapter data labelled "baseline" refers to the current crop composition and any existing plans without any modification as a result of the Proposed Development. Data labelled "wind farm" refers to the forestry plans incorporating the Proposed Development.

7.1.6. This chapter is structured as follows:

- Legislation, Policy and Guidance;
- Forestry Study Area;

- Forest Plans;
- Development of the Wind Farm Forest Plan;
- Baseline Conditions;
- Wind Farm Forest Plan;
- Requirement for Compensatory Planting;
- Forestry Waste;
- Forestry Management Practices; and
- Summary.

7.2. Legislation, Policy and Guidance

7.2.1. Relevant overarching planning policies for the Proposed Development are detailed in Chapter 5: Planning Policy Context and within the Planning Statement that accompanies the application. A desktop study was undertaken drawing upon published National, Regional and local level publications, assessments and guidance to establish the broad planning and forestry context within which the Proposed Development is located. Forestry related policies and documents listed below have been considered within the forestry assessment. The following section provides an outline of those planning policies which are relevant to the Proposed Development and in particular to forestry.

Scottish Forestry Strategy (SFS)

7.2.2. The SFS¹ provides the wider context and Scottish Ministers' vision for multi-benefit woodland management and expansion focussing on the key themes of climate change, timber, business development, community development, access and health, environmental quality, and biodiversity. It sets out a vision that acknowledges the central role that the forestry resource will play in the culture, environment and economy of Scotland. The Scottish Forestry Strategy informs other policies and guidance about woodland expansion and removal in Scotland.

7.2.3. The SFS set the following targets:

- 25% woodland cover in Scotland by the second half of this century;
- a woodland creation target of 10,000 hectares per year over the period 2012-2022; and
- the forestry sector delivering annual carbon savings of 0.6 million tonnes of carbon (MtC) by 2010, 0.8 MtC by 2015, and 1.0 MtC by 2020.

The Scottish Land Use Strategy

7.2.4. The Scottish Land Use Strategy² sets out a strategic framework for getting the best out of Scotland's land resources. It looks at the potential of the land and the ways in which it is used, both now and in the future. Principles of sustainable land use are central to its vision for the future. With specific reference to forestry, the strategy seeks to identify more closely which types of land are best for tree planting in the context of other land-based objectives and promote good practice and local processes in relation to tree planting so as to secure multiple benefits. This will be achieved by a partnership approach

¹ The Scottish Government (2006). The Scottish Forestry Strategy. Edinburgh.

² The Scottish Government (2011). Scottish Land Use Strategy. Edinburgh.

through Forestry and Woodland Strategies to be developed by the local authorities.

Third National Planning Framework (NPF3)

- 7.2.5. Scotland's NPF33 recognises woodlands and forestry are an economic resource, as well as an environmental asset (NPF3 Paragraph 4.2). It further supports the continued expansion of Scotland's woodland and forestry resource (NPF3 Paragraph 4.23). A key action of NPF3 (NPF3 Paragraph 6.10) is a commitment to create on average 10,000 ha per annum of new woodland from 2015.

Scottish Planning Policy (SPP)

- 7.2.6. The SPP4 includes a section on woodlands (SPP Paragraphs 216 - 218). This refers to the Scottish Government's Control of Woodland Removal Policy (Forestry Commission Scotland, 2009) which is discussed in more detail below. The SPP states that woodland removal should only be permitted where it would achieve significant and clearly defined additional public benefits. It further states that where woodland is removed in association with development proposals, developers will generally be expected to provide compensatory planting and that the acceptability of woodland removal, in the context of the Control of Woodland Removal Policy, should be taken into account in determining applications.

Control of Woodland Removal Policy

- 7.2.7. In parallel with the SFS and other national policies on woodland expansion, there is a strong presumption against permanent deforestation unless it addresses other environmental concerns. In Scotland, such deforestation is dealt with under the Scottish Government's 'Control of Woodland Removal Policy'. The guidance relating to the implementation of the policy was revised and updated in 2015.
- 7.2.8. The purpose of the policy is to provide direction for decisions on woodland removal in Scotland. The policy document lays out the background to the policy, places it into the current policy and regulatory context, and discusses the principles, criteria and process for managing the policy implementation. The following paragraphs summarise the policy relative to the Proposed Development.
- 7.2.9. The principal aims of the policy include:
- to provide a strategic framework for appropriate woodland removal; and
 - to support climate change mitigation and adaptation in Scotland.
- 7.2.10. The guiding principles behind the policy include:
- There is a strong presumption in favour of protecting Scotland's woodland resources; and

3 The Scottish Government (2014). Scotland's Third National Planning Framework (NPF3). Edinburgh

4 The Scottish Government (2014). Scottish Planning Policy. Edinburgh

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

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- Woodland removal should be allowed only 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.
- 7.2.11. Woodland removal, without a requirement for compensatory planting, is most likely to be appropriate where it would contribute significantly to:
- enhancing priority habitats and their connectivity;
 - enhancing populations of priority species;
 - enhancing nationally important landscapes, designated historic environments and geological Sites of Special Scientific Interest (SSSI);
 - improving conservation of water or soil resources; or
 - public safety.
- 7.2.12. Woodland removal, with compensatory planting, is most likely to be appropriate where it would contribute significantly to:
- helping Scotland mitigate and adapt to climate change;
 - enhancing sustainable economic growth or rural/community development;
 - supporting Scotland as a tourist destination;
 - encouraging recreational activities and public enjoyment of the outdoor environment;
 - reducing natural threats to forests or other land; or
 - increasing the social, economic or environmental quality of Scotland's woodland cover.
- 7.2.13. The consequences of the policy are stated as:
- minimising the inappropriate loss of woodland cover in Scotland;
 - enabling appropriate woodland removal to proceed with no net loss of woodland -related public benefits other than in those circumstances detailed in the policy; and
 - facilitating achievement of the Scottish Government's woodland expansion ambition in a way that integrates with other policy drivers (such as increasing sustainable economic growth, tackling climate change, rural/community proposed development, renewable energy and biodiversity objectives).
- 7.2.14. Addressing the policy requirements can be met through changes to forest design, increasing designed open space, changing the woodland type, changing the management intensity, or completing off site compensation planting.

The Dumfries and Galloway Forestry and Woodland Strategy

- 7.2.15. The Dumfries and Galloway Forestry and Woodland Strategy (DGFWS)⁶ supports national policies whilst integrating with other Dumfries and Galloway Council (DGC) strategies and plans. It provides a framework for guiding forestry and woodland practice within Dumfries and Galloway. It is intended to guide both woodland creation and the restructuring and management of existing forests and woodlands, to maximise the benefits for the local economy, communities and environment. The strategy supports Scottish Ministers' desire to see an expansion in woodland cover, delivering multiple benefits across the country.

⁶ Dumfries and Galloway Council (2014): The Dumfries and Galloway Forestry and Woodland Strategy. Dumfries.

- 7.2.16. The DGFWS forms Supplementary Guidance to the Local Development Plan. It supersedes the Dumfries and Galloway Indicative Forestry Strategy Technical Paper No. 4; the Forestry Strategy Diagram, which forms part of the Dumfries and Galloway Structure Plan (approved 1999); and the Galloway and Langholm/Lockerbie Local Forestry Framework (2000). It does not supersede the 'Landscape Design Guidance for Forests and Woodlands in D&G' (SNH/DGC 1998).
- 7.2.17. In DGFWS Paragraph 4.32, the DGFWS recognises that the region has attracted a lot of interest from wind energy developers and that many afforested areas are also potentially suitable locations for windfarms. It states that integrating wind energy developments into wooded areas can have advantages in that the visual impacts of infrastructure may be screened or softened by planting whilst contributing to overall forest design objectives.
- 7.2.18. This has resulted in a policy within the DGFWS (page 23): LAN 9 "Work with emerging guidance on integrating wind energy developments within forest landscapes."
- 7.2.19. Under the of Theme of "Woodlands, Forestry and Climate Change" one of the key policy objectives, of the DGFWS, is to encourage effective development of renewable energy from forests in the form of biomass wood fuel and the integration of appropriate renewable energy schemes within forests and woodlands.
- 7.2.20. Paragraph 6.13 of the DGFWS states that there may be potential within some of the existing forested areas for the siting of windfarms; however, this needs to be balanced against the loss of trees and carbon emissions from their construction. Both the Local Development Plan and the Wind Energy Supplementary Guidance emphasise the need for replacement planting of woodland lost as a result of development.
- 7.2.21. Paragraph 6.14 of the DGFWS identifies that the access and transportation needs of both the timber industry and windfarm construction should be planned for in a comprehensive and inclusive manner.
- 7.2.22. This has resulted in a policy within the DGFWS: DRE 2 (page 39): "Develop effective local guidance and practice to minimise woodland loss from renewable energy developments." The DGFWS goes on to state in Paragraph 8.5 that locating windfarms or turbines within woodland or productive forests can lead to a loss of woodland cover and refers specifically to the Scottish Government's policy on "The Control of Woodland Removal".

7.3. Forestry Study Area

- 7.3.1. The Forestry Study Area, as shown on **Figure 7.1**, extends to approximately 820.5 hectares (ha) and contains two separate commercial forest blocks under separate ownership. To the north is Craigengillan North Forest covering 297.1 ha, and to the south, Smittons Forest covering 523.4 ha. The combined forestry study area contains a range of woodland types and age classes due to recent restructuring. The forest is comprised largely of commercial conifers with small areas of mixed broadleaves. There is an active felling and restocking programme underway across the study area with areas of ground currently

felled awaiting restock. There is evidence of *Phytophthora ramorum* in the younger Larch crop. Further information on the composition of the woodlands in the Forestry Study Area is provided in the baseline description below.

- 7.3.2. One of the original key objectives of the Forestry Commission was forest expansion, in both state and private forests, to produce a strategic reserve of timber, and consequently, a limited range of species was planted. More recently, greater emphasis has been placed on developing multi-purpose forests, which require a restructuring of age and species in existing woodlands. Restructuring is achieved through the forest planning process.

7.4. Forest Plans

- 7.4.1. A Forest Plan will typically contain felling and restocking proposals covering a 10 year period in detail, with outline proposals for the remainder of the forest. There are forest plans in place for both Smittons and Craigengillan North. For the purposes of this assessment, both plans will be brought together and assessed as one plan.
- 7.4.2. Restructuring presents forest managers with many challenges and opportunities, particularly in relation to the management of potential catastrophic windblow. The forest planning process allows forest managers to review and revise proposals in a structured way to take account of such external factors. The inclusion of a wind farm within the forest is an example of one such external factor. The current guidelines require diversification of species and woodland types as part of the forest planning process, specifically an increase in the proportion of broadleaf woodland, other conifers, and open ground. The restructuring process is well underway across the forestry study area.
- 7.4.3. The incorporation of the Proposed Development into the forest would result in earlier restructuring of some crops compared with the baseline.
- 7.4.4. A Forest Plan relates to individual forests or groups of woodlands. It describes the woodlands, places them in context with the surrounding area, and identifies issues that are relevant to the woodland or forest. Forest Plans describe how the long-term strategy would meet the management objectives of the owner, the criteria of the UK Forestry Standard (UKFS)⁷ and the UK Woodland Assurance Standard 4th Edition (UKWAS)⁸, under which the woodlands would be managed if certificated.
- 7.4.5. The Forest Plan involves a scoping exercise whereby the views of Statutory Consultees, neighbours and stakeholders are sought, resulting in an agreed Scoping Report. The results of the scoping exercise are incorporated into the Forest Plan. The Forest Plan covers all aspects, such as conservation, archaeology, landscape and the local community in addition to forestry and silvicultural considerations. Restructuring of age class and species are important factors in this process to ensure proposals meet the current standards. The Wind Farm Forest Plan is prepared along the same principles

⁷ Forestry Commission (2017). The UK Forestry Standard: The Government's Approach to Sustainable Forestry, Forestry Commission, Edinburgh.

⁸ UKWAS (2018). The UK Woodland Assurance Standard Fourth Edition, UKWAS, Edinburgh.

with the relevant information being provided by other members of the project team.

7.5. Development of the Wind Farm Forest Plan

Introduction

- 7.5.1. Existing crop information was provided by the landowner and crop surveys. Landowner information comprised existing species and planting year, felling and restocking plans. Site inspections were undertaken in June 2018 to verify the data and update information. Information from aerial photographs was incorporated including more accurate mapping of species, open ground, and management boundaries.
- 7.5.2. Details of turbine locations, new tracks, storage compounds, borrow pits, substations and other infrastructure were provided by other disciplines within the project team. This data was amalgamated with the forestry data to construct the forestry proposals. The location of turbines and infrastructure is heavily influenced by site constraints and technical considerations, e.g. wind capture, ground conditions, etc. The final location of turbines and infrastructure takes the various site constraints into consideration. Environmental constraints, such as peat depth, habitat management requirements and ecological and hydrological buffers, together with any land management requirements, associated with the proposed construction of the Proposed Development would also be incorporated into the forestry proposals, where appropriate.
- 7.5.3. The wind farm felling programme would largely be driven by technical constraints. Within forests habitats, areas of crop require to be felled to accommodate the construction and operation of a Proposed Development. Typically, a minimum area of approximately 2 ha (80 m radius) would be required to be felled for each turbine; a 10 m buffer around each item of infrastructure, in addition to the area required for the infrastructure; and a 25 m - 30 m wayleave for access roads, though this is project and site dependent. In certain cases, further felling may be required for wind yield, turbine performance and forest management purposes in addition to the felling required for the infrastructure.
- 7.5.4. In this case taking into account technical and environmental constraints a 2.5 ha (90 m radius) keyhole was adopted around each turbine location within woodland for construction, operation and environmental mitigation, with 10 m buffers for other infrastructure and 30 m corridor for road lines. No additional felling would be required for wind yield or turbine performance purposes.

Felling Plan

- 7.5.5. Felling required for a Proposed Development can be divided into two categories. Firstly, that required during the construction phase of the Proposed Development, which for the purposes of this assessment, has been anticipated as 2021; secondly, felling required during the operational period of the Proposed Development. In this case no additional felling for wind resource is planned during the operational period.

- 7.5.6. The crops were assessed to identify those areas which would require to be felled for a number of reasons. Due to the crop growth rates and current crop height it has been assessed that some infrastructure within woodland areas could be keyholed into the crops. Other areas of infrastructure will require clear felling of more mature crop back to a windfirm edge.
- 7.5.7. Additional felling was required for forest management purposes, for example, to reduce the risk of subsequent windblow; to reduce coupe fragmentation; and to ensure access for future forest operations.
- 7.5.8. The resultant wind farm felling plan shows which woodlands within the Forestry Study Area would be felled as a result of the Proposed Development and when this felling would take place.

Restocking Plan

- 7.5.9. The wind farm restocking plan shows which woodlands would be restocked and with which species. The majority of the areas to be felled for the Proposed Development would be restocked except for the areas discussed below:
- Land required for the Proposed Development's permanent infrastructure subject to the buffer zones described above; and
 - Land to be left unplanted for forest management or forest design purposes.
- 7.5.10. It has been assumed that temporary infrastructure, such as construction compounds and borrow pits would be re-instated and available for restocking post completion of construction.
- 7.5.11. In modifying the existing restocking plan a number of points are taken into account as detailed below:
- Fragmentation of coupes to be minimised as much as possible;
 - Coupe shapes would be modified to ensure that access for future forestry operations, principally harvesting, is maintained; and
 - Coupe shapes and edges would be modified to follow good practice.
- 7.5.12. In addition, the opportunity to provide on-site compensatory planting would be identified where possible to offset any loss of woodland area resulting from the Proposed Development.
- 7.5.13. Species composition was also considered taking into account existing restocking plans, the Proposed Development operational objectives, landowner objectives and forestry policies.
- 7.5.14. The forestry proposals have been assessed by each of the separate environmental disciplines / consultants as part of the EIA process and the effects are reported in individual chapters of this EIA Report and supporting Technical Appendices.

7.6. Baseline Conditions

Baseline Planting Year/Age Class Structure

- 7.6.1. The woodlands are currently undergoing restructuring and as a result there is a broad range of age classes across the study area. Many woodlands

established in the mid to late 1900s were planted in large contiguous blocks, often over a limited number of years and with a limited range of species. Such woodlands develop poor structural diversity, especially on upland sites. Restructuring the age class and species of such forests is desirable and would yield both forest management and environmental benefits.

7.6.2. The current age class composition of the forestry study area is detailed in Figure 7.2 of Volume 2 of the EIA Report and in Table 7.1 below.

7.6.3. Please note there may be discrepancies in the totals within the tables contained in this chapter. This is due to rounding of the individual values for the different parameters in the tables.

Table 7.1: Baseline Age Class Composition

Age (years)	Area (ha)	Area (%)
0	223.2	27%
1 – 5	116.0	14%
6 – 10	93.9	11%
11 – 15	35.7	4%
35 – 40	96.3	12%
41 – 45	255.2	31%
Totals	820.5	100%

7.6.4. The current recommendations contained within the UKFS are for a minimum interval between felling adjacent coupes of 8 - 15 years in the uplands and 7 - 15 years in the lowlands. There can be implications from such a strategy, which involves both advancing and delaying felling, on crop stability and financial returns. For forest planning purposes the target interval between felling adjacent coupes is taken as 7 years or at least 2 m in crop height. It is recognised that in large even-aged plantations, especially in the uplands, restructuring age class structure to meet this target may take more than one rotation.

Species Composition

7.6.5. The current baseline species composition of the woodlands within the Forestry Study Area is shown in Figure 7.3 in Volume 2 of the EIA Report and illustrated in Table 7.2 below. The main species are commercial conifers, principally Sitka spruce which accounts for approximately 64% of the total area. Other conifer woodland and broadleaves form very small components of the woodlands. Open ground accounts for the second largest component at 15%. Approximately 11% of the woodland area is felled awaiting restocking.

Table 7.2: Baseline Species Composition

Species	Area (ha)	Area (%)
Open ground	124.9	15%
Felled	87.0	11%
Mixed broadleaves	18.3	2%
Mixed broadleaves/Open ground	6.7	1%
Sitka spruce	527.8	64%
Sitka spruce/Other conifer	45.5	6%
Other conifer	10.2	1%
Totals	820.5	100%

7.6.6. The species composition, in particular the low broadleaf woodland presence and the high proportion of Sitka spruce, reflect the period when the woodlands were planted. Such woodlands tended to lack species diversity as discussed above.

7.7. Baseline Felling and Restocking Plans

7.7.1. The baseline felling plan has been prepared by the forest managers and takes into account recent amendments. The baseline felling plan takes into account the requirement to restructure the age class of even aged forests as described in paragraph 7.3.2. The baseline felling programme is illustrated in Figure 7.4 in Volume 2 of the EIA Report and presented in Table 7.3 below. The data is summarised in 5-year bands as per standard practice.

Table 7.3: Baseline Felling Plan

Felling Phase	Area (ha)	Area (%)
No felling	129.7	16%
Phase 1 2014-2018	41.3	5%
Phase 2 2019-2023	204.7	25%
Phase 3 2024-2028	89.7	11%
Long term retentions	10.0	1%
Natural reserves	34.0	4%
Outside plan period	311.2	38%
Totals	820.5	100%

7.7.2. Phase 1 of the baseline felling plan is due to expire in 2018. There are crops detailed for felling in phase 1 which have yet to be felled.

- 7.7.3. A large proportion of the forest has been designated as Outside Plan Period. These areas are generally younger crops recently replanted, whose prospective felling year lies outside of the current forest plan period.
- 7.7.4. There are areas within the Forest Study Area which have been designated as Natural Reserves (NR). These are areas which are considered of high conservation interest or potential and are managed by minimum intervention unless alternative management has higher conservation or biodiversity value.
- 7.7.5. Some areas of crop in the baseline felling plan have been assigned a delayed felling period by the forest managers. These areas are Long Term Retentions (LTR), crops to be retained beyond their age of economic or silvicultural maturity for conservation and biodiversity purposes. These woodlands would otherwise be managed as normal and would in due course be felled and replanted. The identification of LTRs and NRs is part of the requirements of UKWAS and the UKFS.
- 7.7.6. The draft baseline felling programme is designed to provide the required separation between felling coupes, where possible. This may take more than one rotation to achieve, especially in the uplands where windfirm boundaries between felling coupes are limited.

7.8. Baseline Restocking Plan

- 7.8.1. The baseline restocking plan as detailed in the forest plan is illustrated in EIA Report Figure 7.5 in Volume 2 of the EIA Report and outlined below in Table 7.4 below.

Table 7.4: Baseline Restocking Plan

Species	Area (ha)	Area (%)
Open ground	149.1	18%
Mixed woodland	9.4	1%
Mixed broadleaves	35.0	4%
Mixed broadleaves/Open ground	5.4	1%
Sitka spruce	490.1	60%
Sitka spruce/Other conifer	77.9	9%
Other conifer	53.6	7%
Totals	820.5	100%

- 7.8.2. The draft restocking proposals illustrate how the forest would be structured at the end of the Forest Plan period if the entire plan was implemented. Table 7.5 below compares the baseline current species composition and the baseline restocking species composition at the end of the plan period without the effect of the proposed Development.

Table 7.5: Baseline Species Comparison

Species	Baseline	Restock	Difference
	Area (ha)	Area (ha)	Area (ha)
Open ground	124.9	149.1	24.2
Felled	87.0	0	-87.0
Mixed broadleaves	18.3	35.0	16.6
Mixed broadleaves/Open ground	6.7	5.4	-1.3
Sitka spruce	527.8	490.1	-37.7
Sitka spruce/Other conifer	45.5	77.9	32.4
Other conifer	10.2	53.6	43.4
Mixed woodland	0.0	9.4	9.4
Totals	820.5	820.5	

7.8.3. The changes between the current species composition and that contained within the revised baseline restocking plan are discussed below:

- The proportion of primary conifer crops (Sitka spruce and Sitka spruce/other conifers) decreases by 5.4 ha;
- The area of secondary conifers increases by 43.4 ha;
- The proportion of open ground increases by 24.2 ha;
- The area of mixed woodland increases by 9.4 ha; and
- The proportion of broadleaf / native woodland increases by 16.6 ha.

7.8.4. The majority of these changes reflect the nature of Proposed Development area, the management objectives, and the need to meet current guidelines, e.g. the inclusion of designed open ground and a minimum proportion of broadleaves.

7.8.5. The net effect is a reduction in the proportion of commercial conifers in favour of broadleaf woodland and open ground. Generally, the proportion of conifer species would be expected to decline in a forest undergoing restructuring to meet current standards.

7.9. Wind Farm Forest Plan

Introduction

7.9.1. The effect of the Proposed Development on the structure of the woodlands within the Forestry Study Area has been compared against the baseline restocking species. This has concentrated on changes to the felling plan, species composition, and the restocking design required to accommodate the Proposed Development.

Felling Plan

7.9.2. The Proposed Development wind farm felling plan is shown in Figure 7.6 and summarised in Table 7.6.

Table 7.6: Wind Farm Felling Plan

Felling Phase	Area (ha)	Area (%)
No felling	127.4	16%
Phase 1 2014-2018	41.3	5%
Phase 2 2019-2023	259.9	32%
Phase 3 2024-2028	68.0	8%
Long term retentions	6.3	1%
Natural reserves	33.1	4%
Outside plan period	284.5	35%
Totals	820.5	100%

Comparison of Baseline and Wind Farm Felling Plans

7.9.3. The baseline and wind farm felling plans are compared below in Table 7.7.

Table 7.7: Felling Plan Comparisons

Felling Phase	Baseline	Wind Farm	Difference
	Area (ha)	Area (ha)	Area (ha)
No felling	129.7	127.4	-2.2
Phase 1 2014-2018	41.3	41.3	0.0
Phase 2 2019-2023	204.7	259.9	55.1
Phase 3 2024-2028	89.7	68.0	-21.7
Long term retentions	10.0	6.3	-3.7
Natural reserves	34.0	33.1	-0.8
Outside plan period	311.2	284.5	-26.6
Totals	820.5	820.5	

7.9.4. There would be a felling increase of 55.1 ha in the felling programme during Phase 2 (2019-2023) due to the Proposed Development felling plan. There would be no further felling as a result of the Proposed Development. This increase is balanced by decreases in later phases.

7.9.5. There is a decrease of 26.6 ha in the Outside Plan Period phase due to the proposed development. This is clearance of young crops for wind farm infrastructure within this category. It is assumed that this area will have been

felled and restocked by the time of construction and will require keyhole clearance into the young crop.

Restocking Plan

- 7.9.6. The current species plan has been amended to integrate the Proposed Development infrastructure and habitat management requirements into the forest design and to take account of the site conditions. The wind farm restocking plan is shown in Figure 7.7 and summarised in Table 7.8. This includes areas of on-site compensatory planting to offset the loss of woodland area resulting from the Proposed Development.

Table 7.8: Wind Farm Restock Plan

Species	Area (ha)	Area (%)
Open ground	138.2	17%
Mixed woodland	7.4	1%
Mixed broadleaves	37.7	5%
Mixed broadleaves/Open ground	7.6	1%
Sitka spruce	436.5	53%
Sitka spruce/Other conifer	69.0	8%
Other conifer	52.0	6%
Wind farm open ground	71.9	9%
Totals	820.5	100%

- 7.9.7. The baseline current species and wind farm restocking data have been analysed to assess the changes construction of the Proposed Development would have on the species composition of the forest. These data are presented in Table 7.9.

Table 7.9: Wind Farm Restocking Plan Comparison

Species	Baseline Restocking Plan	Wind Farm Restocking Plan	Difference
	Area (ha)	Area (ha)	Area (ha)
Open ground	149.1	138.2	-10.9
Mixed woodland	9.4	7.4	-2.0
Mixed broadleaves	35.0	37.7	2.7
Mixed broadleaves/Open ground	5.4	7.6	2.2
Sitka spruce	490.1	436.5	-53.6
Sitka spruce/Other conifer	77.9	69.0	-8.9

Species	Baseline Restocking Plan	Wind Farm Restocking Plan	Difference
	Area (ha)	Area (ha)	Area (ha)
Other conifer	53.6	52.0	-1.6
Wind farm open ground	0.0	71.9	71.9
Open ground	149.1	138.2	-10.9
Totals	820.5	820.5	

7.9.8. The change in area of stocked woodland due to the proposed development is shown in Table 7.10.

Table 7.10: Stocked Woodland Area Comparison

	Baseline Restocking Plan	Wind Farm Restocking Plan	Difference
	Area (ha)	Area (ha)	Area (ha)
Stocked Area	671.3	610.3	-61.1
Unstocked Area	149.1	210.2	61.1
Totals	820.5	820.5	

7.9.9. The changes in the structure of the woodlands are discussed below. The changes refer to a comparison of the wind farm restocking plan against the baseline restocking plan:

- There is a net reduction in the area of conifer woodland of 64.1 ha;
- Broadleaf woodland increases by 4.9 ha; and
- As a result of the woodland re-design, the stocked area of woodland in the Forestry Study Area would decrease under the wind farm restocking proposals by 61.1 ha.

7.10. Requirement for Compensatory Planting

7.10.1. As a result of the construction of the Proposed Development, there would be a net loss of woodland area. The area of stocked woodland in the study area would decrease by 61.1 ha, equivalent to 7.4% of the forestry Study Area.

7.10.2. In order to comply with the criteria of the Scottish Government's Control of Woodland Removal Policy, off-site compensation planting would be required. The Applicant is committed to providing appropriate compensation planting. The extent, location and composition of such planting to be agreed with FCS, taking into account any revision to the felling and restocking plans prior to the commencement of construction.

7.11. Forestry Waste

- 7.11.1. The SEPA guidance document WST-G-027, "Management of Forestry Waste" (SEPA, 2013)⁹ highlights that all waste producers have a statutory duty to adopt the waste hierarchy as per the Waste (Scotland) Regulations 2012 (the Scottish Government, 2012)¹⁰, which amended Section 34 of the Environmental Protection Act (EPA) 1990 (duty of care) (UK Government, 1990)¹¹. This places a specific duty on any person who produces, keeps or manages (controlled) waste to take all such measures available to them to apply the waste hierarchy in Article 4 (1) of the revised Waste Framework Directive (rWFD), which is:
- prevention;
 - preparing for re-use;
 - recycling;
 - other recovery, including energy recovery; and
 - disposal, in a way which delivers the best overall environmental outcome.
- 7.11.2. Further guidance is contained in LUPS-GU27, "Use of Trees Clear Felled to Facilitate Proposed Development on Afforested Land" (SEPA, 2014)¹².
- 7.11.3. A hierarchy of uses for forestry materials is proposed, derived from the waste hierarchy contained within the regulations, summarised as follows:
- prevention via the production of timber products and associated materials for use in timber and other markets;
 - the re-use of materials on site for a valid purpose, where such a use exists e.g. road construction;
 - there is no valid re-cycling use for forestry residues;
 - other recovery via collection and use as biomass for energy recovery or other markets, where not included above; and
 - where no valid on or off site use can be found for the material, disposal would be in a way that is considered delivers the best overall environmental outcome.
- 7.11.4. Where no valid on or off site use or other disposal method can be found for the material, it should be regarded as waste and handled accordingly. Disposal of timber residues as waste in or on land requires a landfill permit or a waste exemption licence and should be considered the option of last resort.
- 7.11.5. As discussed in this EIA Report chapter, the majority of the crops will be replanted in accordance with the landowner's baseline plan except where required for infrastructure. Brash would be left in situ to provide nutrients for the next rotation where the crops are being replanted as per standard forestry practice. Stumps would be left in situ as per good practice guidance.
- 7.11.6. There are areas of younger crops into which the Proposed Development infrastructure would be keyholed. The objective would be to recover as much

⁹ SEPA (2013): SEPA Guidance Notes WST-G-027 "Management of Forestry Waste"

¹⁰ The Scottish Government (2012): The Waste (Scotland) Regulations 2012 No. 148 available at <https://www.legislation.gov.uk/sdsi/2012/9780111016657>

¹¹ UK Environmental Protection Act 1990 1990 c. 43 Part II Duty of care etc. as respects waste Section 34 available at <http://www.legislation.gov.uk/ukpga/1990/43/section/34>

¹² SEPA (2014): LUPS-GU27 "Use of Trees Cleared to Facilitate Development of Afforested Land."

merchantable timber from these crops and failing that to treat them in line with the hierarchy outlined above. As a result, it is anticipated the forestry waste arising from the works will be minimal.

- 7.11.7. It is proposed that full consideration and further clarification on this issue should be included in a Forestry Waste Management Plan to form part of the Construction Environmental Management Plan (CEMP) during the detailed planning phase following receipt of section 36 consent.

7.12. Forestry Management Practices

Crop Clearance

- 7.12.1. It is anticipated that areas of higher yield class crops would be of sufficient tree size and standing volume that they would be harvested conventionally. Timber operations would be undertaken with conventional harvesting and forwarding equipment utilising flotation tracks. The flotation devices are fitted to each machine wheel which gives the machines very low ground pressure and minimises the ground disturbance during the forestry operations.
- 7.12.2. Stemwood down to 7 cm or below would be removed from site and sold into the timber markets. The harvester would maximise timber recovery wherever possible by cutting a fuelwood product, this would result in the maximum timber volume being recovered to ensure the volume used in the brash mats is kept to a minimum. On wetter ground the harvester would build stronger brash mats to ensure there would be minimal damage to the peat and soil structure by the forwarder during extraction.
- 7.12.3. Lop and top resulting from such felling would be left in 'brash mats' created by the harvesting machines and would be used to aid extraction of the timber to roadside. These brash mats would remain in place to degrade naturally and provide nutrients for the next rotation in areas being replanted. Brash would be removed in areas where excavation would be carried out to facilitate construction or where crops would be permanently cleared with no replanting. Such material would be treated in line with the hierarchy of uses described above. On soft ground, the bottom layers of brash mats become embedded into the soil and removal could result in more environmental damage than leaving the material to naturally degrade.
- 7.12.4. In areas of lower yield class crops, where little or no merchantable timber would be recovered, a number of options could be utilised depending on the factors prevailing at the time of clearance. The methodology used would depend on tree size; site conditions; the availability of suitable equipment; and the markets prevailing at the time of the works being carried out.
- 7.12.5. Where there was suitable access and ground conditions the trees could be whole tree harvested and extracted to roadside for chipping as biomass. Where trees are very small or ground conditions prevent access, it may be more viable to fell the crop manually using scrub cutters or chainsaws. The end use of the material would depend on the factors mentioned above, but could potentially be used on site in the base of floating roads, extracted and processed for biomass, or used for ecological enhancement.

- 7.12.6. Stumps would be left in situ as per the guidance contained in the Forestry Commission Research Note "Environmental effects of stump and root harvesting" (Forestry Commission, 2011)¹³ except where they would be removed for borrow pits, excavated roads, turbine bases and other infrastructure requiring excavation. Such material would be treated as described above.

Restocking / Planting Methodology

- 7.12.7. Restocking and compensatory planting would be carried out to current standard practice and in accordance with the guidelines contained in the UK Forestry Standard and UKWAS as a minimum, where applicable. Methodology would vary depending on the type of restocking being carried out. The following information is provided for guidance as to the restocking methodology which may be adopted.

- 7.12.8. On commercial conifer areas the methodology would normally include:

- site preparation by machine mounding and drainage;
- manual planting;
- subsequent follow-up establishment operations such as the replacement of failures, weeding and protection measures until the crops are satisfactorily established; and
- replanting would be carried out with the conifer species identified in the restocking plan at the minimum density of 2,500 trees per hectare.

- 7.12.9. Restocking within the broadleaf woodland areas would be carried out to the same specification with the following changes:

- Variable planting density would be used with decreasing density towards the woodland margins; and
- The principal species would be downy and silver birch with small components of other species as appropriate such as oak, rowan, hazel, gean, grey willow, goat willow, alder and woody shrubs.

Aftercare Works

- 7.12.10. Aftercare establishment works would normally include, but are not limited to, the following:

- The woodlands would be beaten up (replacement of failures) to ensure satisfactory stocking levels by year 5;
- The woodlands would be weeded as necessary to ensure satisfactory establishment by year 5;
- the woodlands would be protected against pine weevils by management inspections and remedial treatment as necessary;
- The woodlands would be protected against browsing damage from wild and domestic animals;
- The woodlands would be protected against fire;
- Fertiliser would be applied as necessary to ensure satisfactory establishment and growth; and
- Other works to be agreed as reasonably required ensuring satisfactory establishment of the woodlands.

¹³ Forestry Commission Research Note "Environmental effects of stump and root harvesting" (Forestry Commission, 2011)

7.13. Standards and Guidelines

- 7.13.1. All forestry operations would be carried out in strict accordance with current good practice and guidelines. This would include, but not be limited to:
- UK Forestry Standard Guidelines (Forestry Commission 2011b)¹⁴; and
 - Forest Industry Safety Accord (FISA, 2014) Guides¹⁵ (or equivalent).
- 7.13.2. All operations would be carried out in accordance with current relevant legislation including, but not limited to, Health and Safety at Work Act 1974 (UK Government, 2014).

7.14. Summary

- 7.14.1. The total Forestry Study Area extends to 820.5ha and is comprised of privately owned and managed woodlands.
- 7.14.2. The species composition of the forest would change as a result of the Proposed Development forestry proposals. In particular, the area of productive conifer mixtures would decrease by 64.1 ha whilst the area of broadleaf woodland would increase by 4.9 ha.
- 7.14.3. As a result, there would be a net loss of woodland area of 61.1 ha.
- 7.14.4. In order to comply with the Scottish Government's Control of Woodland Removal Policy, off-site compensation planting would be required by the legal agreement attached to any consent. The applicant is committed to providing appropriate compensation planting.

¹⁴ Forestry Commission (2011b): The UK Forestry Standard Guidelines.

¹⁵ Forest Industry Safety Accord (2014). FISA Safety Guides (various).