

CLASHINDARROCH II

WIND FARM

Forestry

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Produced by DGA Forestry Ltd.

Technical Appendix 3.2

**Clashindarroch II Wind Farm Development
EIA Report Technical Appendix 3.2: Forestry
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FORESTRY

1 INTRODUCTION

This Technical Appendix of the Environmental Impact Assessment Report (EIA Report) evaluates the potential effects of the proposed Clashindarroch II Wind Farm (the proposed development) on the woodland resource. This assessment was undertaken by DGA Forestry LLP.

Forestry is not being regarded as a receptor for Environmental Impact Assessment (EIA) purposes. 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 or other renewable energy based development.

This EIA Report Technical Appendix therefore describes the plans as a result of the proposed development 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 Technical Appendix should be read in conjunction with the EIA Report chapters, in particular, Chapter 2 Site Description and Design Evolution; Chapter 3 Description of the Development; Chapter 7 Landscape and Visual Assessment; Chapter 8 Ornithology; Chapter 9 Ecology; and Chapter 11 Hydrology, Hydrogeology and Geology as they are interrelated to the changes in the forest structure.

This Technical Appendix identifies areas of forest to be removed for the construction and operation of the proposed development and outlines the proposed management practices, while identifying the likely restocking proposals and future land management of the remaining forest. The responsibility for the management of the remainder of the forest outwith the proposed development lies with the landowner of that area and therefore the wider felling operations, restocking, and aftercare operations do not form part of the proposed development for which consent is sought.

The proposed development (as shown in EIA Report Figure 3.1) lies within existing commercial forestry plantations. The forestry is owned by the Scottish Ministers and managed by Forestry and Land Scotland (See paragraph 2.1). The forestry proposals have been developed to:

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

In general, throughout this Technical Appendix 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.

This Technical Appendix 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.

2 LEGISLATION, POLICY AND GUIDANCE

Relevant overarching planning policies for the proposed development are detailed in Chapter 6 Legal and 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 to forestry in particular.

2.1 Forestry and Land Management (Scotland) Act 2018

Until 1st April 2019, the Scottish Ministers owned the National Forest Estate (NFE), provided funding and had responsibility for forestry strategy and policy, but the management of the NFE and delivery of forestry functions had been the responsibility of the Forestry Commissioners.

The Forestry Commission was a cross-border public authority and a UK non-ministerial department with a statutory Board of Commissioners. The Commission was made up of a number of parts, including in Scotland:

- Forest Enterprise Scotland (FES), which carried out forestry operations and managed the NFE on Scottish Ministers' behalf; and
- Forestry Commission Scotland (FCS), which was responsible for the other forestry functions in Scotland.

When full devolution of forestry to the Scottish Government was completed on 1 April 2019, FCS and FES became two new agencies of the Scottish Government:

- Scottish Forestry (SF) will be responsible for regulatory, policy and support functions; and
- Forestry and Land Scotland (FLS) will be responsible for the management of the NFE and any other land managed for the purposes of the Forestry and Land Management (Scotland) Act 2018.

With the introduction of the Forestry and Land Management (Scotland) Act 2018¹ and its associated Regulations on April 1st 2019, the old regulatory regime of felling control under the Forestry Act 1967² was repealed in Scotland. From 1 April 2019, anyone wishing to fell trees in Scotland requires a Felling Permission issued by SF, unless an exemption applies or another form of felling approval such as a felling licence (including a forest plan) has previously been issued.

Under the new Regulations felling which is authorised by planning permission/consent continues to be exempt from the Regulations and does not require a Felling Permission issued by SF.

¹ The Scottish Government (2018). The Forestry and Land Management (Scotland) Act 2018, Edinburgh. Available at <http://www.legislation.gov.uk/asp/2018/8/contents/enacted> [accessed on 15.04.19].

² UK Government (1967). Forestry Act 1967 (as amended). HMSO, London. Available at <https://www.legislation.gov.uk/ukpga/1967/10/contents> [accessed on 15.04.19]

2.2 Scotland's Forestry Strategy 2019 - 2029

Scotland's Forestry Strategy 2019 – 2029 (SFS)³, was published in 2019 after a consultation period. The strategy provides an overview of contemporary Scottish forestry; presents the Scottish Government's 50-year vision for Scotland's forests and woodlands; and sets out a 10-year framework for action.

The vision is that *"...in 2070, Scotland will have more forests and woodlands, sustainably managed and better integrated with other land uses. These will provide a more resilient, adaptable resource, with greater natural capital value, that supports a strong economy, a thriving environment, and healthy and flourishing communities."*

It lists a number of objectives summarised below:

- increase the contribution of forests and woodlands to Scotland's sustainable and inclusive economic growth;
- improve the resilience of Scotland's forests and woodlands and increase their contribution to a healthy and high quality environment; and
- increase the use of Scotland's forest and woodland resources to enable more people to improve their health, well-being and life chances.

It further describes the priorities as:

- ensuring forests and woodlands are sustainably managed;
- expanding the area of forests and woodlands, recognising wider land-use objectives;
- improving efficiency and productivity, and developing markets;
- increasing the adaptability and resilience of forests and woodlands;
- enhancing the environmental benefits provided by forests and woodlands; and
- engaging more people, communities and businesses in the creation, management and use of forests and woodlands.

There are ambitious targets included within the strategy for new woodland creation:

- 10 000 ha per year in 2018;
- 12 000 ha per year from 2020/21;
- 14 000 ha per year from 2022/23; and
- 15 000 ha per year from 2024/25.

The stated objective is to increase Scotland's woodland cover from the current 18.5% to 21% by 2032.

2.3 The Land Use Strategy for Scotland 2016 - 2021

The Land Use Strategy for Scotland 2016 - 2021⁴ 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 acknowledges forestry's role as a key multipurpose land use and the role it has to play in terms of delivering the Vision, Objectives and Principles of the Land Use Strategy in rural and urban Scotland. It comments that the sustainable management of Scotland's woodlands and forests makes an important contribution to Scotland's economy; it delivers health and wellbeing benefits for people and a range of other critical ecosystem services including climate change mitigation and adaptation.

To increase its role in addressing the challenge Scotland faces from climate change, a target of 100,000 ha of new woodland creation between 2012-2022 has been established.

³ The Scottish Government (2019). Scotland's Forestry Strategy 2019 -2029, Edinburgh.

⁴ The Scottish Government (2016). A Land Use Strategy for Scotland, Edinburgh.

Within the UK, Scotland is leading the way in terms of areas of new woodland creation, however it is recognised that more needs to be done to achieve the planting target. To support this, Scotland's Forestry Strategy 2019 – 2029 emphasises the continued protection of Scotland's forest resource.

2.4 **Third National Planning Framework**

Scotland's Third National Planning Framework (NPF3)⁵ recognises that 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 onwards, a target which has been superseded by the Scottish Forestry Strategy.

2.5 **Scottish Planning Policy**

The Scottish Planning Policy (SPP)⁶ 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.

2.6 **Control of Woodland Removal Policy**

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'⁷. The guidance relating to the implementation of the policy was revised and updated in 2015.

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 relevant to the Development.

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.

The guiding principles behind the policy include:

- there is a strong presumption in favour of protecting Scotland's woodland resources; and
- 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.

⁵ The Scottish Government (2014). Scotland's Third National Planning Framework (NPF3). Edinburgh.

⁶ The Scottish Government (2014). Scottish Planning Policy. Edinburgh.

⁷ Forestry Commission Scotland (2009). The Scottish Government's Policy on Control of Woodland Removal. Edinburgh.

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.

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.

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 development, renewable energy and biodiversity objectives).

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.

2.6.1 Aberdeenshire Forestry and Woodland Strategy

The Aberdeenshire Forestry and Woodland Strategy⁸ was published in 2016. The vision for the strategy was defined as:

"The forestry and woodlands of the Aberdeenshire Local Development Plan area are resilient to the effects of climate change, protect and enhance the environment and local culture, benefit and support the local and national economy and are valued and enjoyed by people, both residents and visitors."

The strategy was developed as statutory supplementary planning guidance which will be adopted as part of the Aberdeenshire Local Development Plan⁹, and replaces the Forest and Woodland Strategy for Aberdeenshire and Aberdeen City. The strategy integrates with other Aberdeenshire Council and partnership strategies and action plans, including the Aberdeenshire Land Use Strategy¹⁰, the Aberdeen City and Shire Strategic

⁸ Aberdeenshire Council (2016). The Aberdeenshire Forestry and Woodland Strategy, Aberdeen.

⁹ Aberdeenshire Council (2017). The Aberdeenshire Local Development Plan, Aberdeen.

¹⁰ Aberdeenshire Council (2015). The Aberdeenshire Land Use Strategy, Aberdeen.

Development Plan¹¹ and several national strategies including; the Scottish Forestry Strategy¹². It will primarily be used to guide woodland expansion within the region.

The strategy is based on the following four themes:

- Climate change and Tree Health;
- Timber and Business Development,
- Communities, Development, Health and Access,
- Environment, Landscape and Historic Assets.

Strategic priorities have been defined for each of the above themes with key issues and opportunities in relation to the priorities outlined.

In section 2.1 the strategy notes that the net area of forest cover within the region is forecast as 91,225 ha, a total of 18.7% of the Local Development Plan land area.

The Strategy states that in cases where compensatory planting of woodlands lost to development will be required, pre-emptive planting will be strongly encouraged. For any compensatory planting scheme Long-Term Woodland Management Plans are a necessity.

The Aberdeenshire Forestry and Woodland Strategy therefore supports and reinforces the aims of the Scottish Government's Control of Woodland Removal Policy.

3 FORESTRY STUDY AREA

The Forestry Study Area (FSA), as shown on Figure 3.2.1, extends to approximately 6,279.3 ha and is comprised of one large forest block. The forest contains a range of woodland types and age classes due to original planting and current felling programmes, together with areas of unplanted land. The crops are comprised largely of commercial conifers with areas of mixed broadleaves and open ground. The woodlands are in the production phase with rotational felling and restocking underway. Further information on the composition of the woodlands in the FSA is provided in the baseline description below.

4 FOREST PLANS

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.

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)¹³ and the UK Woodland Assurance Standard 4th Edition (UKWAS)¹⁴, under which the woodlands would be managed if certificated.

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

¹¹ Aberdeen City and Shire Strategic Development Planning Authority (2014). Aberdeen City and Shire Strategic Development Plan, Aberdeen.

¹² The Scottish Government (2019). Scottish Forestry Strategy, Edinburgh.

¹³ Forestry Commission (2017). The UK Forestry Standard: The Government's Approach to Sustainable Forestry, Forestry Commission, Edinburgh.

¹⁴ UKWAS (2018). The UK Woodland Assurance Standard Fourth Edition, UKWAS, Edinburgh.

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. A Wind farm Forest Plan is prepared along the same principles with the relevant information being provided by other members of the project team. 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 is an existing Land Management Plan (LMP) for the woodlands which is currently being reviewed.

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 incorporation of the proposed development into the forest would result in further restructuring of the crops.

5 PREPARATION OF THE PROPOSED DEVELOPMENT FOREST PLAN

5.1 Introduction

Existing crop information was collated from landowner data, desktop assessments and crop surveys as necessary, including species, planting year and felling and restocking plans, where available.

Details of turbine locations, new tracks, storage compounds, borrow pits, substation and other infrastructure was provided by other disciplines within the project team. The proposed development data was amalgamated with the forestry data to construct the forestry proposals.

The location of turbines and other infrastructure is heavily influenced by environmental constraints and technical considerations, e.g. sensitive habitats, wind capture, ground conditions, etc. The final location of infrastructure takes the various site constraints into consideration. Land management requirements associated with the proposed construction of the proposed development are also taken into account in the forestry proposals, where appropriate.

The proposed development felling programme is largely driven by technical constraints. Within forests and woodlands, areas of crop require to be felled to accommodate the construction and operation of the proposed development. In this case taking into account technical and environmental constraints a 2.0 ha (80 m radius) keyhole was adopted around each turbine location within woodland for construction, operation and environmental mitigation. There would be an area of additional disturbance at each turbine location over and above the keyhole which would be required to accommodate the infrastructure required for the erection of the proposed turbines. A 10 m buffer was applied around each item of infrastructure, in addition to the area required for the infrastructure. An indicative 30 m corridor was applied to all roads to be used for component delivery and construction purposes. These requirements would be reviewed at the detailed design stage post consent and prior to construction.

5.2 Wind farm Felling Plan

Felling required for a 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 commencing in 2021; secondly, felling required during the operational period of the proposed development.

The crops were assessed to identify those areas which would require to be felled for a number of reasons as described above. Where possible, due to the crop growth rates, age and current crop height the infrastructure within woodland areas could be keyholed into the existing crops. Where keyholing is not viable, the crop will be clear felled back to an existing wind farm edge.

Additional minor 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.

The resultant wind farm felling plan within this Technical Appendix shows which woodlands within the FSA would be felled as a result of the proposed development and when this felling would take place.

5.3 Wind farm Restocking Species Plan

The wind farm restocking species 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 itemised 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.

It has been assumed that where possible and as shown on Figure 3.2.7, some temporary infrastructure such as edges of re-profiled borrow pits would be re-instated and available for restocking post completion of construction. To ensure that the forestry establishes successfully, the soil should be restored to a depth of 1m to facilitate this.

In preparing the restocking plan a number of points would be considered as detailed below:

- fragmentation of coupes to be minimised as much as possible;
- coupe shapes to be modified to ensure that access for future forestry operations, principally harvesting, is maintained; and
- coupe shapes and edges to be modified to follow good practice.

Species composition was considered taking into account the proposed development operational objectives, landowner objectives and forestry policies.

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 their supporting Technical Appendices.

6 BASELINE CONDITIONS

6.1 Baseline Planting Year/Age Class Structure

Many woodlands established in the mid to late 1900's and into the early 2000's, 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.

A summary of the age class structure of the woodlands within the FSA is detailed in Figure 3.2.2 and in Table 3.2.1 below.

Please note there may be minor discrepancies in the totals within all tables contained in this Technical Appendix. This is due to rounding of the individual values for the different parameters in the database.

Table 3.2.1: Baseline Age Class Structure

Baseline Age Class		
Planting Year	Area (ha)	Area (%)
n/a	1,779.1	28.3
1930	203.5	3.2
1940	230.5	3.7
1950	499.0	7.9
1960	424.9	6.8
1970	354.4	5.6
1980	576.5	9.2
1990	789.1	12.6
2000	1,005.0	16.0
2010	417.3	6.6
Totals	6,279.3	100.0

The current guidelines contained within the UKFS is that in forests characterised by a lack of diversity due to extensive areas of even-aged trees, stands adjoining felled areas should be retained for 7 years or until the restocking of the first coupe has reached a minimum height of 2 metres (m). For planning purposes this is likely to be between 5 and 15 years depending on establishment success and growth rates. 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. The age class structure within the FSA is already significantly diverse.

Approximately 1779 ha has a planting year designation of n/a – this is area with no defined age class and contains open ground, other land such as quarries or agricultural holdings and recently felled sites awaiting restock.

6.2 Species Composition

The current baseline species composition of the woodlands within the FSA is shown in Figure 3.2.3 and illustrated in Table 3.2.2 below. The main species are commercial conifers, principally Sitka spruce, which in pure or mixed stands, accounts for approximately 45.3 % of the total FSA. Other conifer woodland and broadleaves form very small components of the woodlands. Open ground, including other land, accounts for the second largest component at 21.7 %. A proportion of this open ground is felled woodland awaiting restocking.

Table 3.2.2: Baseline Species Composition

Baseline Species Composition		
Species	Area (ha)	Area (%)
Open ground	1,362.7	21.7
Sitka spruce	1,896.8	30.2
Sitka spruce/ Mixed conifer	948.3	15.1
Mixed conifer	857.5	13.7
Mixed broadleaves	565.3	9.0

Mixed woodland	274.3	4.4
Felled	374.5	6.0
Totals	6,279.3	100.0

The species composition reflects the practice and guidance which prevailed at the time the woodlands were established.

6.3 Baseline Felling Plan

The baseline felling plan forms part of the LMP currently under review and was prepared by the forest managers. The baseline felling plan considers the requirement to restructure the age class of even aged forests as described above. The baseline felling plan is illustrated in Figure 3.2.4 and presented in Table 3.2.3 below. The data is summarised in 5-year bands as per standard practice.

Table 3.2.3: Baseline Felling Plan

Baseline Felling Plan		
Fell Phase	Area (ha)	Area (%)
No Felling	1,825.3	29.1
Phase 1: 2017-2021	328.4	5.2
Phase 2: 2022-2026	277.0	4.4
Phase 3: 2027-2031	242.6	3.9
Phase 4: 2032-2036	302.9	4.8
Phase 5: 2037-2041	289.3	4.6
Long Term Retentions	460.4	7.3
Natural Reserves	530.0	8.4
Outside Plan Period	2,023.4	32.2
Totals	6,279.3	100.0

A large proportion of the FSA is 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.

Areas within the FSA have been designated as Long Term Retentions (LTR). LTRs are assigned a delayed felling period by the forest managers. These are areas of 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 is part of the requirements of UKWAS and the UKFS.

The 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.

6.4 Baseline Restocking Plan

The baseline restocking plan as detailed in the Forest Plan is illustrated in Figure 3.2.5 and outlined in Table 3.2.4.

Table 3.2.4: Baseline Restocking Plan

Baseline Restock Species Composition		
Species	Area (ha)	Area (%)
Open ground	1281.2	20.4
Sitka spruce	2075.8	33.1
Sitka spruce/ Mixed conifer	994.4	15.8
Mixed conifer	866.7	13.8
Mixed broadleaves	788.4	12.6
Mixed woodland	272.9	4.3
Felled	0	0
Totals	6,279.3	100.0

The baseline restocking proposals illustrate how the forest would be structured at the end of the Forest Plan period, if the entire plan was implemented. Table 3.2.5 compares the baseline current species composition and the baseline restocking species composition at the end of the plan period without the implementation of the proposed development.

Table 3.2.5: Baseline Species Comparison

Baseline Species Comparison			
Species	Baseline Current Species (ha)	Baseline Restock Species (ha)	Difference (ha)
Open ground	1,362.7	1281.4	-82.4
Sitka spruce	1,896.8	2075.8	179.0
Sitka spruce/ Mixed conifer	948.3	994.4	46.1
Mixed conifer	857.5	866.7	9.2
Mixed broadleaves	565.3	788.4	223.1
Mixed woodland	274.3	272.9	-1.4
Felled	374.5	0	-374.5
Totals	6,279.3	6,279.3	0.0

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

- the proportion of primary conifer crops (Sitka spruce and Sitka spruce/other conifers) increases by 225.1 ha;
- the areas of open ground decreases by 82.4 ha; and
- the area of broadleaf woodland increases by 223.1 ha.

The majority of these changes reflect the nature of FSA, the management objectives and the need to meet current guidelines, e.g. a minimum proportion of broadleaves.

7 DEVELOPMENT FOREST PLAN

7.1 Introduction

The effect of the proposed development on the structure of the woodlands within the FSA has been compared against the baseline species. This has concentrated on changes to the felling plan and species plan required to accommodate the proposed development.

7.2 Wind Farm Felling Plan

The wind farm felling plan is shown in Figure 3.2.6 and summarised in Table 3.2.6 below.

Table 3.2.6: Wind Farm Felling Plan

Wind Farm Felling Plan		
Fell Phase	Area (ha)	Area (%)
No Felling	1,825.1	29.1
Phase 1: 2017-2021	453.7	7.2
Phase 2: 2022-2026	275.2	4.4
Phase 3: 2027-2031	221.8	3.5
Phase 4: 2032-2036	300.5	4.8
Phase 5: 2037-2041	270.1	4.3
Long Term Retentions	457.5	7.3
Natural Reserves	529.2	8.4
Outside Plan Period	1,946.1	31.0
Totals	6,279.3	100.0

Table 3.2.7 compares the baseline and wind farm felling plans.

Table 3.2.7 Felling Plan Comparison

Felling Plan Comparison			
Fell Phase	Baseline (ha)	Wind Farm (ha)	Difference (ha)
No Felling	1,825.3	1,825.1	-0.1
Phase 1: 2017-2021	328.4	453.7	125.3
Phase 2: 2022-2026	277.0	275.2	-1.8
Phase 3: 2027-2031	242.6	221.8	-20.8
Phase 4: 2032-2036	302.9	300.5	-2.4
Phase 5: 2037-2041	289.3	270.1	-19.2
Long Term Retentions	460.4	457.5	-2.9
Natural Reserves	530.0	529.2	-0.8
Outside Plan Period	2,023.4	1,946.1	-77.3
Totals	6,279.3	6,279.3	0.0

There would be advanced felling of 125.3 ha resulting from the proposed development felling plan.

Felling is required for infrastructure and construction of the proposed development. Where possible, due to the age of the crops, the proposed development infrastructure will be "keyholed" into the crops, where only the crops required for the infrastructure and its associated buffer zones will be cleared as detailed earlier. Where this is not possible the crops will be felled back to the nearest wind farm edge or management boundary.

7.3 Wind Farm Restocking Plan

The baseline restocking plan has been amended to integrate the proposed development infrastructure requirements into the forest design and to take account of the site conditions. The wind farm restocking plan is shown in Figure 3.2.7 and summarised in Table 3.2.8.

Table 3.2.8: Wind Farm Restocking Plan

Wind Farm Restocking Species Composition		
Species	Area (ha)	Area (%)
Open ground	1270.7	20.2
Sitka spruce	2011.7	32.0
Sitka spruce/ Mixed conifer	986.4	15.7
Mixed conifer	858.9	13.7
Mixed broadleaves	786.3	12.5
Mixed woodland	266.3	4.2
Wind Farm open ground	99.0	1.6
Totals	6,279.3	100.0

The baseline and wind farm restocking plans 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 3.2.9.

Table 3.2.9: Restocking Species Plan Comparison

Wind Farm Restock Species Comparison			
Species	Baseline Restocking Species (ha)	Wind Farm Restocking Species (ha)	Difference (ha)
Open ground	1281.2	1270.7	-10.5
Sitka spruce	2075.8	2011.7	--64.1
Sitka spruce/ Mixed conifer	994.4	986.4	-8.0
Mixed conifer	866.7	858.9	-7.8
Mixed broadleaves	788.4	786.3	-2.0
Mixed woodland	272.9	266.3	-6.6
Wind Farm open ground	0	99.0	99.0
Totals	6,279.3	6,279.3	0.0

The change in area of stocked woodland due to the proposed development is shown in Table 3.2.10.

Table 3.2.10: Stocked Woodland Area Comparison

Stocked Area Comparison			
Area	Baseline Restocking Species (ha)	Wind Farm Restocking Species (ha)	Difference (ha)
Stocked	4998.1	4909.6	-88.5
Unstocked	1281.2	1370.7	88.5
Totals	6,279.3	6,279.3	0.0

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

- there is a net reduction in the area of conifer woodland of 79.9 ha;
- broadleaf woodland decrease by 2 ha; and
- as a result of the woodland re-design, the stocked area of woodland in the FSA would decrease under the proposed development proposals by 88.5 ha.

8 REQUIREMENT FOR COMPENSATORY PLANTING

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 88.5 ha, equivalent to 1.4 % of the FSA.

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 compensatory planting. The extent, location and composition of such planting to be agreed with SF, taking into account any revision to the felling and restocking plans prior to the commencement of operation of the wind farm.

9 FORESTRY WASTE

The Scottish Environment Protection Agency (SEPA) guidance document WST-G-027, "Management of Forestry Waste" (SEPA, 2013)¹⁵ 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)¹⁶, which amended Section 34 of the Environmental Protection Act (EPA) 1990 (duty of care) (UK Government, 1990)¹⁷. 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 Directive¹⁸ (rWFD), which is:

- prevention;
- preparing for re-use;

¹⁵ SEPA (2013): SEPA Guidance Notes WST-G-027 "Management of Forestry Waste". https://www.sepa.org.uk/media/28957/forestry_waste_guidance_note.pdf [accessed 20/01/2019]

¹⁶ The Scottish Government (2012): The Waste (Scotland) Regulations 2012 No. 148 available at <https://www.legislation.gov.uk/sdsi/2012/9780111016657> [accessed 20/01/2019]

¹⁷ 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> [accessed 20/01/2019]

¹⁸ EU Waste Legislation Waste Framework Directive <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32008L0098> [accessed 20/01/2019]

- recycling;
- other recovery, including energy recovery; and
- disposal, in a way which delivers the best overall environmental outcome.

Further guidance is contained in the document LUPS-GU27, "Use of Trees Clear Felled to Facilitate Proposed development on Afforested Land" (SEPA, 2014)¹⁹.

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 including floating roads;
- there is no valid recycling 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 to deliver the best overall environmental outcome.

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.

As discussed in this EIA Report Technical Appendix, the crops will be replanted except where required for infrastructure associated with the proposed development. Brash would be left in situ to provide nutrients for the next rotation where the crops are being replanted as per standard forestry practice. Where crops are not being replanted brash would be removed and treated in line with the proposed hierarchy described above.

Stumps would be left in situ as per good practice guidance, except where excavated as part of the construction activities. Excavated stumps would be treated in line with the proposed hierarchy described above.

In areas of lower yielding crops into which the proposed development infrastructure would be keyholed. The objective would be to recover as much merchantable timber as possible and failing that to treat them in line with the hierarchy outlined above. Where suitable, whole trees would be extracted and used in the biomass market. As a result, it is anticipated the forestry waste arising from the works will be minimal.

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 planning consent and prior to commencement of construction.

10 FORESTRY MANAGEMENT PRACTICES

10.1 Crop Clearance

Areas of crops of sufficient tree size and standing volume would be harvested conventionally. Timber operations would be undertaken with conventional harvesting and forwarding equipment utilising flotation tracks as required. 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.

¹⁹ SEPA (2014): LUPS-GU27 "Use of Trees Cleared to Facilitate Development of Afforested Land.
https://www.sepa.org.uk/media/143799/use_of_trees_cleared_to_facilitate_development_on_afforested_land_sepa_snh_fcs_guidance-april_2014.pdf [accessed 20/01/2019]

Stemwood down to 7 centimetres (cm) or below would be removed from site and sold into the timber markets. The harvester would maximise timber recovery wherever possible, 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. 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.

In areas of young or 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. 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 due to age or poor growth 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 in some cases there would be no recoverable material. Where material was recoverable it could potentially be used on site in the base of floating roads; extracted and processed for biomass; or used for ecological enhancement if applicable.

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)²⁰ 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.

10.2 Restocking / Planting Methodology

Restocking would be carried out to current standard practice and in accordance with the guidelines contained in the UKFS 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.

On commercial conifer areas the methodology would normally include:

- site preparation by machine cultivation 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.

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

- the planting density would be 1,600 trees per ha; and
- the principal species would be mixed native broadleaves including , for example, downy and silver birch with small components of other species as appropriate to site such as oak, rowan, hazel, gear, grey willow, goat willow, alder and woody shrubs.

²⁰ Forestry Commission Research Note "Environmental effects of stump and root harvesting" (Forestry Commission, 2011). [https://www.forestry.gov.uk/pdf/FCRN009.pdf/\\$FILE/FCRN009.pdf](https://www.forestry.gov.uk/pdf/FCRN009.pdf/$FILE/FCRN009.pdf) [accessed 20/01/2019]

10.3 Aftercare Works

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, broadleaf woodlands by year 10;
- the woodlands would be weeded as necessary to ensure satisfactory establishment by year 5/year 10 for broadleaf woodlands;
- 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 as reasonably required ensuring satisfactory establishment of the woodlands.

10.4 Standards and Guidelines

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 (Forestry Commission 2017);
- Forest Industry Safety Accord Guides²¹ (or equivalent) (FISA, 2014); and
- current relevant legislation including, but not limited to, Health and Safety at Work Act 1974 (UK Government, 2014)²².

11 SUMMARY

The total study area extends to 6,279.3 ha.

Felling would be advanced on 125.3 ha.

The species composition of the forest would change as a result of the proposed development forestry proposals. In particular, the area of productive conifer woodland would decrease by 79.9 ha and the area of broadleaf woodland would decrease by 2 ha.

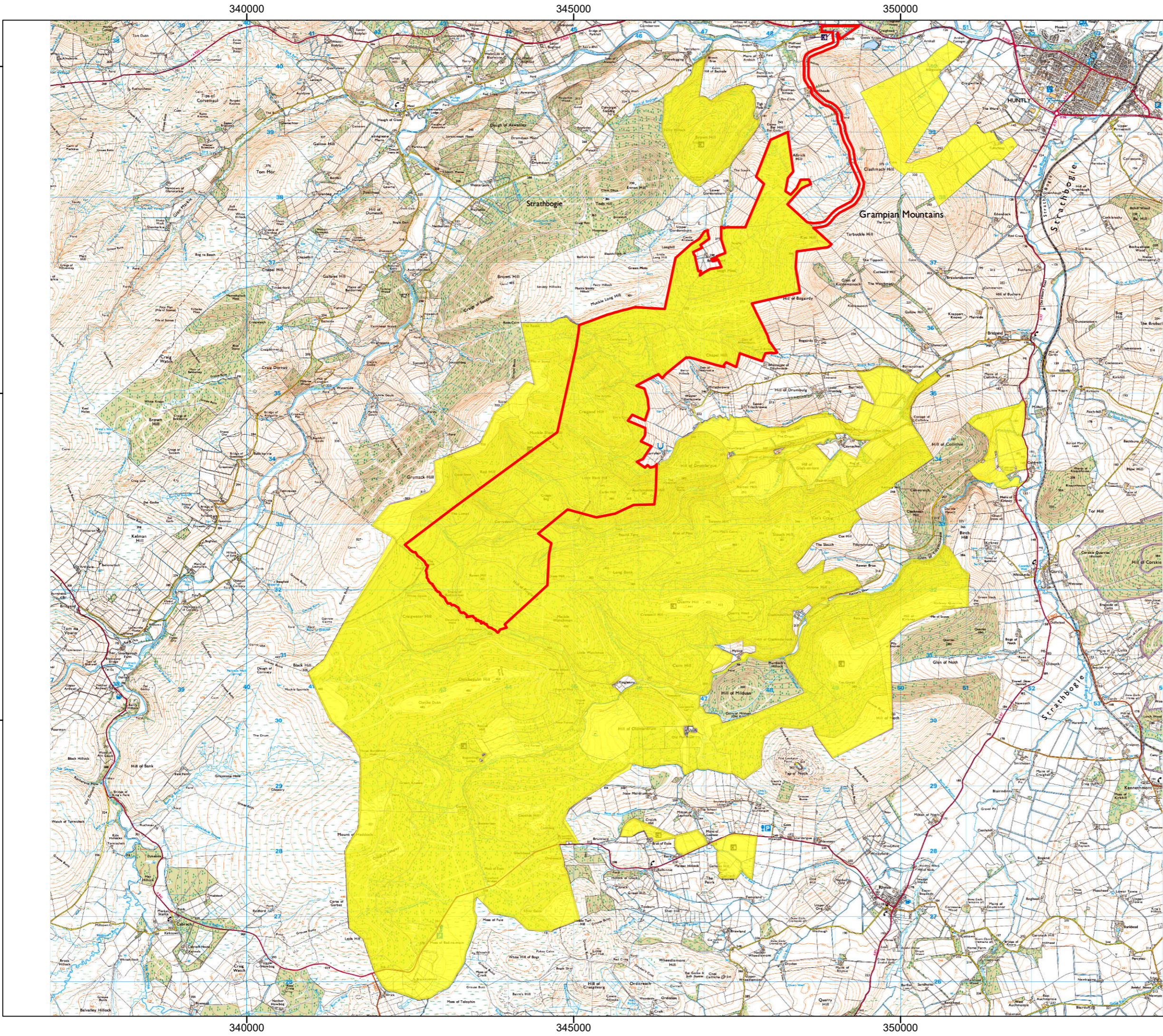
Overall, there would be a net loss of woodland area of 88.5 ha.



In order to comply with the Scottish Government's Control of Woodland Removal Policy, compensation planting would be required to mitigate for the loss of woodland area. The Applicant is committed to providing appropriate compensatory planting. The extent, location and composition of such planting to be agreed with SF, taking into account any revision to the felling and restocking plans prior to the commencement of operation of the wind farm.

²¹ Forest Industry Safety Accord (2014). FISA Safety Guides (various). Edinburgh.

²² UK Government (1974): Health and Safety at Work etc. Act 1974 available at <http://www.legislation.gov.uk/ukpga/1974/37/contents> [access 20/01/2019]

FIGURES



- Legend**
-  Development Site Boundary
 -  Forestry Study Area



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0 0.5 1 2 Km

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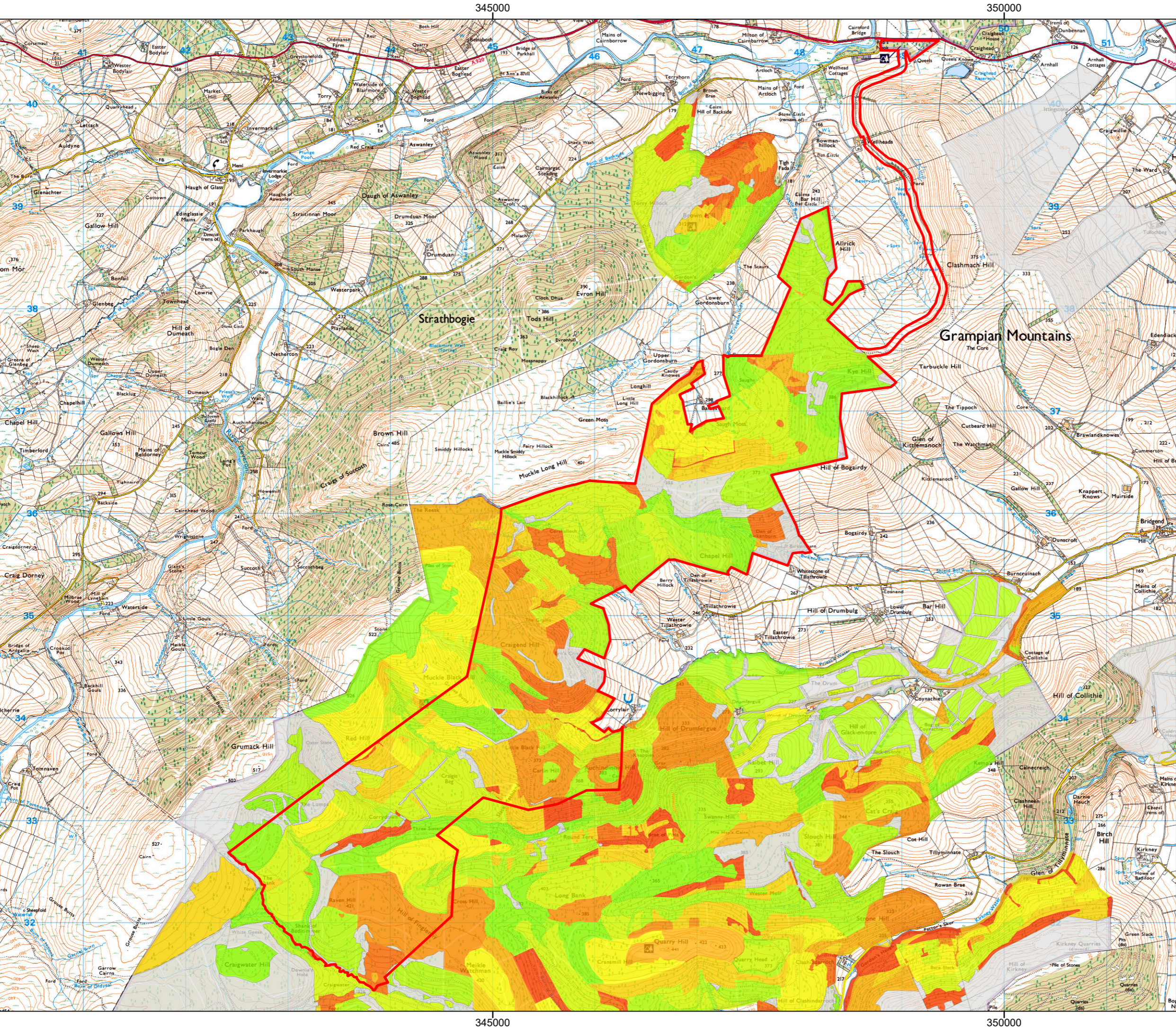
Clashindarroch II Wind Farm

Environmental Impact Assessment

Forestry Study Area

Figure 3.2.1

Date: Oct 2019	Prepared By: TW
Ref: Clashindarroch 2	




Legend


Development Site Boundary

Age class

- 0
- 1-10
- 11-20
- 21-30
- 31-40
- 41-50
- 51-60
- 61-70
- 71-80
- 81-90



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0 0.25 0.5 1 Km



Clashindarroch II Wind Farm

Environmental Impact Assessment

Baseline Age Class

Figure 3.2.2

Date: Oct 2019

Prepared By: TW

Ref: Clashindarroch 2