Appendices

Contents

Appendix I: Supporting Information

1.0 The existing forest and land

1.1 History of the land holding

The forest we see today at Whitelee is comprised of various former agricultural holdings purchased for the national forest estate predominantly between 1961 and 1984 with the majority of the area planted with commercial conifer during the intervening decades. Since the early 2000's patch clear-fells have been carried out beginning a process of forest restructuring and diversification which is still on-going.

Between 2006 & 2013 137 turbines were constructed within the forest as part of the wider, 215 turbine Whitelee Wind Farm. Two conditions were laid down as part of the wind farm planning approval:

1. *'To manage 2547 Ha under a Habitat Management Plan aiming to restore and improve moorland and blanket bog. This includes 531 Ha of Whitelee Forest, most of which was previously planted with Sitka spruce, and was deforested by 2007.'*
2. *'To develop an Access Plan to improve facilities and make the most of the windfarm infrastructure.'*

The lease agreed with Scottish Power Renewables on the initial windfarm developed (Whitelee 1) ends on 10th August 2032 with the lease on the second development (Whitelee 2) ending on 19th September 2038.

Numerous amendments were approved over the life of the current plan predominantly to allow felling for the construction of essential new road infrastructure.

This plan will replace the previous Forest Design Plan (Scottish Forestry File Ref: 032/07/02) which has had approval from 28th March 2008 and received an approval extension until 31/12/2019.

2.0 Analysis of previous plan

The general objective of the previous plan was to maintain timber production whilst enhancing structural diversity. Management of much of the forest was to be under Short Rotation Forestry. Each objective was to be achieved by a programme of felling and restocking, diversifying age ranges and habitats. There was also planned habitat enhancements through broadleaf forest habitat networks and enhanced open habitat.

Further detail and progress on the aims of the previous plan are provided below.

2.1 Aims of previous plan and achievements

Table 1 – Progress on previous LMP objectives

Objective	Proposed management actions	Progress to date 1 - Little/No progress 2 – Some progress 3 – Progress as per LMP
Felling, Regeneration and Forest Structure Enhancement	Felling and restocking are timed to ensure a spread of age classes throughout the area	3
	Creation of robust wind firm boundaries at restocking - ref Restocking Plan - enables further restructuring in subsequent rotations to meet the coupe size requirements of the UK Forestry Standard	3
Production of timber	An average 50,000 tonnes pa will be produced from the Plan area	3
	Sitka spruce will form the major component of restocking to ensure future timber supplies	3
Protection and enhancement of Wildlife Habitats	Age diversification will produce an increasing range of wildlife habitats	3
	A major increase in edge habitats will result from the felling and restocking proposals	3
	Native broadleaf trees and shrubs will be concentrated along the principal watercourses as a Forest Habitat Network, providing links from the lower ground outside the forest to the unplanted moorland and peat bogs	3
	Monitor blanket bog natural regeneration of conifer	3
	A moving patchwork of suitable habitat will be created throughout the forest, linked by the Forest Habitat Networks (FHN), which will allow the existing population to spread. Addition of	2 – With the tree health issues posed by DNB & *Phytopthera ramorum*, Scots pine and larch are no longer being considered with more significance being placed on native broadleaves and low density regeneration for habitat.

Objective	Proposed management actions	Progress to date 1 - Little/No progress 2 – Some progress 3 – Progress as per LMP
	significant amounts of larch, pine and broadleaves will enhance the feed value throughout the forest. Low density conifer regeneration on the destocked areas will also benefit Black Grouse by offering shelter in suitable habitat.	
	Review Sitka regen in Carrot scree and boulder fields for lichen & bryophyte conservation.	2 – Ongoing; This has been reviewed with nor urgent action required. To be followed up with further review.
Species Distribution	Larch, broadleaves and Scots pine will be included on crop edges where the soils are suitable to give benefits in reducing wind turbulence and improving appearance by softening edges.	2 – With the tree health issues posed by DNB & *Phytopthera ramorum,* Scots pine and larch are no longer being considered with more significance being placed on native broadleaves to provide shelter and aesthetic benefit where appropriate.
	Areas of Larch in mixture with Sitka spruce or Scots pine are used for landscape impact because of the colour contrast for most of the year. Close up, texture difference is also apparent. These are targeted towards better-drained soils, which are likely to permit longer rotations.	2 - With the tree health issues posed by DNB & *Phytopthera ramorum,* Scots pine and larch are no longer being considered with more significance being placed on native broadleaves to provide aesthetic benefit where appropriate.
Landscape Enhancement	An early opportunity will be taken with to remove the old shelterbelt beside the Munzie Burn forming the basis of a coupe	
	Opportunity will be taken at replanting to reduce the impact of straight line boundaries on the forest edge and internally, by more intricate shaping than can be shown at the scale of this Plan and addition of small areas of non-Sitka Spruce conifer.	3

Objective	Proposed management actions	Progress to date 1 - Little/No progress 2 – Some progress 3 – Progress as per LMP
Provision for Public Recreation	The windfarm development has created a fund for facilities to be created after the turbines are commissioned, which is currently held by the three Local Authorities involved in the Planning Permission. The Whitelee Windfarm Access Planning Group will develop options to make best use of the forest and windfarm infrastructure, and bids can be made to this fund to construct routes which provide the most benefits to and have support of local communities.	3 – A full-time Project Officer has been employed through a 3 year fixed-term contract. This post is hosted by East Renfrewshire Council on behalf of the 3 authorities, with costs shared pro-rata based on the distribution of turbines across the respective local authority areas. A wider partnership of organisations represented on the Whitelee Access Plan Group (WAPG) , on which FCS sit, will oversee development and implementation of the access project. The Councils and WAPG will review and update the Access Action Plan at 5 year intervals throughout the operational life of the windfarm.
Deer Management and Provision for Sporting	Deer control is carried out by the tenants of three shooting leases, with the FCS Wildlife Ranger managing those parts of the windfarm under active construction. This is kept under review to ensure successful establishment continues.	3
Conservation of Archaeological and Historic Sites	There are three important sites in the forest, a monument, a gravestone and a Covenanters' cairn. These are marked on the Survey Map, Felling and Restocking Plans. In addition there are many remnants of the agricultural use and history of the area. These are all considered when detailed plans are prepared and protected as far as possible.	3
	Planting is kept a minimum of 25m from these features.	3
Roads	During the 10-year period of this Plan, most of the proposed roads shown on	3

Objective	Proposed management actions	Progress to date 1 - Little/No progress 2 – Some progress 3 – Progress as per LMP
	the maps are required to service the planned felling coupes. Approval is also sought for roadline felling through coupes not covered by the 10-year Approval for this Plan.	
Short-Rotation Forestry (SRF) for the windfarm	FCS has agreed to reduce the mean height of the forest during the 30 years from construction to final removal. Initially this covers early felling of existing crops, but is followed by a commitment to fell replanted crops again if they reach a mean height of 12m before the windfarm is decommissioned.	3
	To avoid planned early felling options are to a) change species b) delay restocking c) standard restock	3
	Restocking Plan categorises the more visible slopes for 'Landscape Priority'. Here it is proposed that NS, SP, larch or productive MB will be planted. Sitka spruce may be included, but only as a proportion in mixtures. Diversity will be the expectation and opportunities taken to match species to detailed soils found after felling.	2 - With the tree health issues posed by DNB & *Phytopthera ramorum,* Scots pine and larch are no longer being considered with more significance being placed on native broadleaves to provide aesthetic benefit where appropriate.
	Standard crops' will be predominantly Sitka spruce, pure or in mixture with Lodgepole pine. Small scale additions of other species will be included at time of detailed site planning as is standard across all coupes	3
Biodiversity	Wet Woodland and Upland Mixed Ashwood	3

Objective	Proposed management actions	Progress to date 1 - Little/No progress 2 – Some progress 3 – Progress as per LMP
	▪ Expand habitat by planting site-matched species along watercourses	
	Blanket Bog and Upland Flushes, Fens and Swamps ▪ Maintain current areas of wetland identified by FCS survey ▪ Restore best areas of habitat where possible ▪ Enhance current wetlands by increasing buffer area of open space around them at restocking stage	3
	Black Grouse ▪ Implement SLFD Black Grouse Action Plan SLGN 17	3
	Soprano Pipistrelle ▪ Monitor bat boxes ▪ Replace bat boxes when required ▪ Liaise with Ayrshire and Clyde Bat Groups	3

2.2 How previous plan relates to today's objectives

This new revision of the plan largely follows on from the objectives of the previous plan to achieve a multi-purpose forest (see **Appendix II**).

3.0 Background information

3.1 Physical site factors

3.1.1 Soils & landform

Whitelee Forest sits on bedrock which is predominantly volcanic in origin. This bedrock was previously influenced by glaciation with glacial deposits providing the superficial geology however due to the topography and increased rainfall in the intervening millennia this led to

waterlogging and acidification producing the conditions that resist the normal breakdown and decomposition of dead plants, with organic material accumulating as deposits of peat. This has resulted in ~ 60% of the site comprising of unflushed blanket bog soils, ~ 24% flushed basin, blanket bog and unflushed eroded bog soils, and only ~ 16% mineral soils, therefore generally the soils are wet and poor in nutrients. Elevation across the site rises from ~110m - ~230m above sea level (asl).

See **Map 3a - Soils**

3.1.2 Current climate & exposure

The climate across the sites ranges from 'Warm' and 'Moist' to 'Cool' and 'Wet' with the vast majority of the forest lying at the latter end of that spectrum.

See **Map 3b - Climate**

Detailed Aspect Method Scoring (DAMS) is a measure of windiness of a site using the angle to the horizon in the eight compass points, weighted towards the prevailing wind direction. Scores range from 0-24: The higher the score the greater the exposure, with scores below 13 regarded as sheltered and above 22 as too high for commercial forestry. DAMS on the site range from moderately exposed 15 to severely exposed 19, with scores generally increasing with elevation. The majority of the plan area is a highly exposed 17.

The predominant climate and exposure across the forest also limit the choice of species suited to the conditions. Cumulatively the soils, climate and exposure limit the choice of tree species suitable for continued productive conifer crops.

3.1.3 Future climate

Climate data projections for 2050 and 2080 have been used to predict the anticipated future climate, which is expected to have warmer and drier summers, but with an increase in the frequency and severity of winter storms. Although this suggests that the range of suitable species may expand to accommodate more demanding species, and that the growing season may extend, it may also indicate an increased risk of drought which may, in future rotations, limit the site suitability of species which are currently suitable.

3.1.4 Hydrology

Dozens of small burns run though or adjacent to the site forming part of the catchments of the Avon, Calder, White Cart and Irvine. Water from the site supplies the Hareshawmuir, Lochgoin/Criagendunton & Dunwan public water catchments with Craignendunton & Lochgoin Reservoirs and Dunwan Dam lying nearby to the NW of the forest. Many private supplies also rely on water originating within the forest. With most of the water eventually draining off the plateau the only open waterbodies are the small Lochfield and Brocklees Lochs.

SEPA's Water Environment Hub indicates that the Hareshawmuir Water/Gawkshaw Burn, Craufurdland Water/Dunton Water, Calder Water and White Cart Water are all in a poor condition with only Glen Water in a good condition.

SEPA's Flood Risk Management Maps show that there are areas of moderate to high potential to reduce run off and to manage sediment.

3.2 The existing forest

3.2.1 Species, age structure & yield class

Table 4 below shows the species make-up of Whitelee Forest with Figure 2 further illustrating this. Both the table and figure show that the forest is predominantly conifer (~96%) of which Sitka spruce constitutes ~88%.

See **Map 3c - Existing Forest Stock**

Table 2 – Current Whitelee Forest Species by Area

Species	Site - Area (Ha)
Sitka spruce	2978
Norway spruce	23
Larches	49
Lodgepole pine	169
Other conifers	8
Broadleaves	139

Figure 1 – Current Whitelee Forest Species Composition

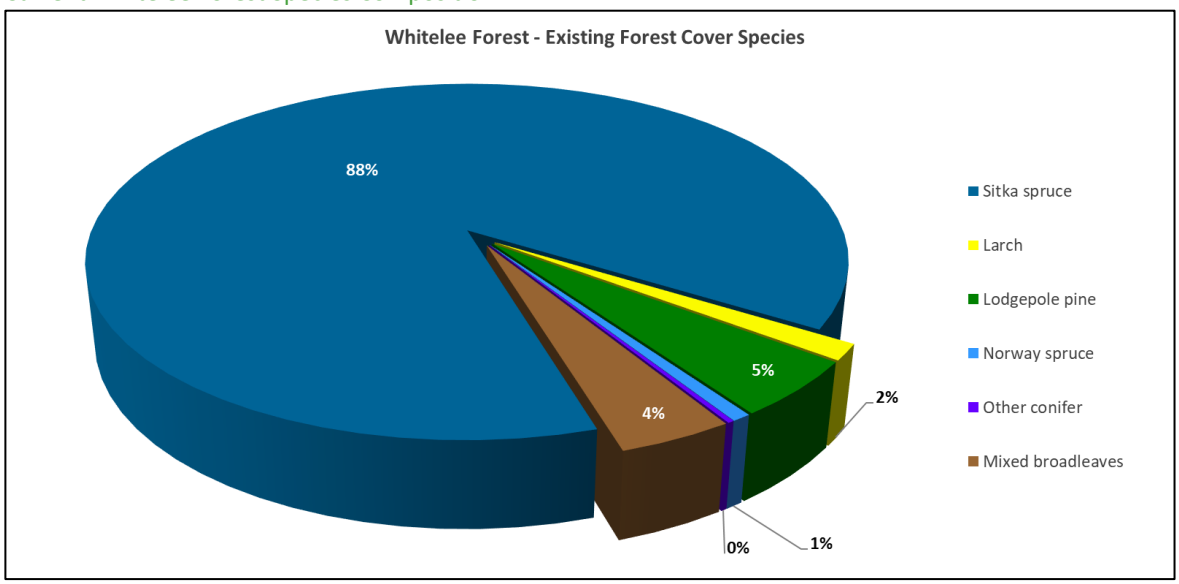
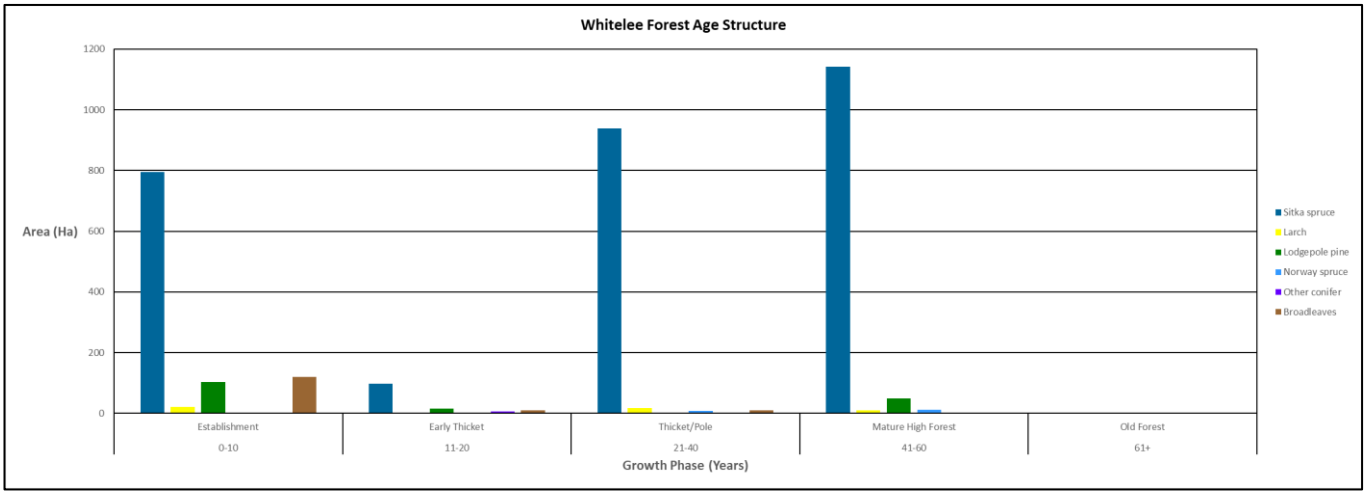


Figure 3a below illustrates that the general picture across the forest is much of the forest is predominantly made up of relatively mature crops which should rightly be felled during the life of this plan. This is no surprise given the relatively even aged nature of the forest, generally planted during the 1960's, 70's and 1980's, and presents a challenge to diversify the age structure and thus avoiding creating a similar problem at the end of the next rotation. The establishment column of the chart illustrates some of the restructuring work that has already occurred.

Figure 2 – Current Whitelee Forest Age Structure by Species



Based on the information we hold in our sub-compartment database (SCDB), yield classes for Sitka spruce range from 0 – 24 across the sites with the largest proportion being around YC 16. Much of the first rotation crop benefitted from fertilizer application and therefore with fertilizer application no longer generally practiced we presume a general reduction in yield class of the 2nd rotation spruce crops by 1 or 2 grades. We can mitigate against this reduction somewhat by the use of improved stock and the use of nurse crops such as Alaskan Lodgepole pine however we expect even this will not fully mitigate the absence of fertiliser in many situations. There are however various swathes of the forest on areas of deep peat where the quality of the crop is suspected to be lower than that held in the SCDB. In order to validate the SCDB information some extra analysis of the crop will be necessary.

3.2.2 Renewable energy - Wind

Whitelee Forest has 137 wind turbines within FLS's ownership boundary contributing to the wider 215 turbine network comprising Whitelee Windfarm. As part of the associated lease agreements with the developer, Scottish Power Renewables (UK) Ltd. (formerly CRE Energy Ltd.), FES has agreed to reduce the mean height of the forest during the 30 years from construction to final removal. Initially this covers early felling of existing crops, however is followed by a commitment to fell subsequently restocked areas as they approach a mean height of 12m before the windfarm is decommissioned. This is to benefit wind flow and minimise turbulence around the turbines.

Table 3 - Area by species

Area by species						
Species	**Current***		**Year 10***		**Year 20***	
(Add relevant species groups, or OG/OL)	**Area (ha)**	**%**	**Area (ha)**	**%**	**Area (ha)**	**%**
Sitka spruce	2978	51	2739	47	2582	44
Lodgepole pine	169	3	408	6	505	8
Other conifer	80	1	65	1	62	1
Broadleaves	139	2	228	4	286	5
Open/Other	2518	43	2444	42	2449	42
Total	**5884**	**100**	**5884**	**100**	**5884**	**100**

Table 4 – Area by age

Age class (years)	**Current**	**Year 20**
	Area (ha)	**Area (ha)**
0-10	1042	517
11-20	131	873
21-40	976	996
41-60	1214	474
61+	3	249
Total	3366	3109

3.2.3 Operational access

Currently Whitelee Forest is served by an extensive network of forest roads, predominantly established or upgraded as part of the construction of the windfarm. The current network has generally been adequate however further enhancements will be required to access certain areas needing felled in the next 10 years.

3.2.4 Alternative to Clearfell Systems (CCF/LISS) potential

With the highly exposed nature of the site along with the poor, wet soils the site is not deemed as suitable for ATC methods.

3.2.5 Pathogens

3.2.5.1 Dothistroma Needle Blight (DNB)

DNB (also known as Red Band Needle Blight because of the colourful symptoms it shows on pine) causes premature needle defoliation, resulting in loss of yield and, in severe cases, tree death. Recent surveys have shown outbreaks of DNB across Central Region and within Whitelee it is

present on both mature south coastal Lodgepole pine crops. This is of concern as the previous plan proposed increased use of Scots pine to diversify the forest.

3.2.5.2 *Phytophthora ramorum* (*P. ramorum*)

P. ramorum is a fungus-like pathogen of plants that is causing extensive damage and mortality to trees and other plants in parts of the United Kingdom. Larch in particular is extremely vulnerable, and high infection and mortality levels are currently causing significant issues in South Region. Several isolated instances of *P. ramorum* have been detected within Central Region forest blocks at the time of writing, although these were isolated trees rather than large-scale infections. One of these instances was at Whitelee in 2015 where a Statutory Plant Health Notice was issued to remove all other larch within both the affected stand as well as a 250m buffer surrounding the affected stand. This is of concern as the previous plan proposed increased use of larch species to diversify the forest.

3.3 Landscape & Land use

3.3.1 Landscape character

Whitelee Forest is situated within two landscape character types described in SNH's National Landscape Character Assessment, key elements of which are reproduced below:

Table 5 – Landscape character assessment

Landscape Type	79 PLATEAU MOORLAND WITH WINDFARMS - AYRSHIRE	214 PLATEAU MOORLAND WITH WINDFARMS – GLASGOW & CLYDE VALLEY
Key characteristics	• Comparatively level topography with extensive plateau rising to soft contoured ridges and flatter basins. • Heather and grass moorland, with moss and lochs. • Extensive areas of conifer forest. • Sparse network of minor roads. • Infrequent farms and houses in valleys and on lower hill slopes on outer fringes. • Extensive operational wind farm development, with associated infrastructure, reducing wild character and sense of remoteness. • Visible as largely horizontal backdrop skyline with wind turbines from the Ayrshire Basin, parts of the Irvine Valley and Glasgow.	• Large scale landform. • Distinctive upland character created by the combination of elevation, exposure, smooth, plateau landform, moorland vegetation. • Extensive wind turbine development, including the largest wind farm in Scotland at Whitelee. • Sense of apparent naturalness and remoteness which contrasts with the farmed and settled lowlands, although this has been reduced by wind energy development.
Previous LCA Relevant landscape guidelines	• Cultural features, particularly mining relics, should not be obscured by forestry. • Implement a phased programme of felling, redesign and replanting of existing plantations to reduce the adverse impact on the environment. • Forest design should seek to introduce diversity into currently afforested areas in the form of open space patterns, age and species mixes and coupes patterns. • Forest restructuring should also seek to 'expose' and preserve cultural features such as walls and archaeological ruins. • General presumption against large scale extension of existing forest blocks. • Maintain present 'untamed' nature of unforested parts of this landscape. • New forestry proposals should, if possible, be targeted to areas of more bland topography of lesser scenic and geomorphological interest. • New planting should conform to the Forestry Authority's design guidelines. In particular, it should respond to the large scale nature of the landscape, the importance of views within and out of the hills, and historic and ecological values. • Consider opportunities for new woodland planting in terms of: – the overall balance of woodland and open space; – the relative importance of different areas of existing woodland (e.g. commercial – plantation versus semi-natural woodland) and how this would be influenced by – an increase in woodland cover; – the importance of key views and features within the landscape; – opportunities to provide screening and shelter; – opportunities to link isolated areas of woodland; • Take proactive steps to extend woodlands around future open cast and quarry sites.	• Encourage the management of existing coniferous plantations in the plateau Moorlands with the aim of developing more natural shapes and achieving more varied age and species composition. • Discourage significant expansion of existing conifer plantations in order that the balance between planted and unplanted land remains broadly constant. • Where new planting does occur, encourage designs which reflect and articulate local variations in topography and avoid the obscuring of local features such as burns, gullies, walls or archaeological sites. • Encourage forest developments to retain broad open space corridors which respect areas of historic occupation and cultivation where these occur. • Encourage the regeneration or expansion of broadleaf woodland and scrub along burnsides and in gullies creating a closer integration of lowland woodland and the moorland landscape. • Support new woodland planting where appropriate to provide screening around land uses such as mineral extraction and along the principle transport corridors.

3.3.3 Visibility

Due to the topography of the land the forests are generally only viewed at the small to medium scale, either from minor public roads or nearby settlements and generally horizonal due to the relatively flat topography.

3.3.4 Neighbouring land use

The surrounding land use predominantly consists of a matrix of upland plateau moor/farm land. There are no clustered settlements such as a village, only individual dispersed rural properties as well as the windfarm and other neighbouring commercial forestry blocks. The most notable forest blocks include: 'Cleughearn' & 'Ardochrig' to the north east and 'Cowans Law' & 'Clanfin' to the west.

3.4 Biodiversity & Environment

3.4.1 Priority Habitat & Species

Priority Habitat & Species are protected under the UK Biodiversity Action Plan, and FLS policy is to protect, enhance and expand these habitats where appropriate. There are a broad range of habitat and species types within the plan area which are listed in the table below.

Table 6 – Whitelee Priority Habitats and Species

Category	Associated Scottish Biodiversity List Habitat
UKBAP - Upland Flushes, Fens and Swamps	
LBAP Habitat – Wet woodland, Upland oakwood	Upland birchwood, Upland oakwood,
UKBAP & LBAP Habitat - Blanket bog	Blanket bog
UKBAP & LBAP Species – Soprano Pipistrelle Bat, water vole	
UKBAP & LBAP Species - Black grouse	
LBAP Species - Juniper, Whitebeam	

During the last 10 years FLS has carried out various works to improve Blanket Bog habitat. In 2008/2009 FLS cleared plantation trees within the Habitat Management Plan area followed by 5 years of monitoring. In 2010/2011 the former coupe 29 was clearfelled adjacent to open blanket bog at Brocklees/Pley Moss and deforested former coupe 35 strip next to field west of Laigh Overmuir. In 2014/2015 FLS surveyed areas of peat and crop. In 2016/17 SPR organised tree mulching to restore Wallace Gill Muir Bog. Between 2017 to 2019 SPR have been carrying out ground smoothing and drain blocking as follow up to the trees cleared in 2008/2009.

There are no national designations e.g. (SSSI, SAC, SPA) associated with Whitelee Forest however there are several Local Nature Conservation Sites (LNCS) which directly cover areas of the site. The LNCS relevant to Whitelee are:

- Glen Water
- Queenseat Hill to Dumduff Hill
- Pley Moss

3.4.2 Ancient Woodland

Whitelee Forest has one area of long-established woodland of plantation origin (LEPO) 1860 (~22 Ha) located around Ardochrig hill. This area is predominantly non-native Sitka spruce with no evidence of any former native composition.

3.4.3 Native Woodland

The Native Woodland Survey Scotland identifies three tiny patches of native woodland, one upland birch and two upland oak woodland. However, the natural regeneration on the site of a variety of native willows and downy birch will increase the native woodland area in the future.

3.4.4 Other notable species

A variety of important species have been observed across the various sites and recorded in our Conservation layer with various sites used by some also recorded. Examples of significant species include:

Table 7 – Whitelee Priority other notable species

Species
Pine martin, badger, otter
Lichens
Merlin , Kestrel,

3.4.5 Invasive Non-Native Species

Whitelee Forest supports Grey squirrel (*Sciurus carolinensis*) which in high numbers can be extremely destructive in woodlands, stripping bark from the main stem and branches of trees over late spring and summer. Scots pine and Norway spruce are species within the site which are particularly vulnerable to stem breakage caused by bark stripping.

3.4.6 Wildlife (Deer Management)

Whitelee Forest has healthy populations of Roe deer which are maintained by the culling of, on average, approximately 200 each year across the sites on a deer management lease.

3.5 Heritage

FLS maintains extensive archaeological records for the NFE within our heritage database. Important historic environment features are surveyed, recorded, mapped and monitored by Central Region to ensure and demonstrate Forestry and Land Scotland compliance with the UK Forestry Standard. This ensures that undiscovered historic environment features are mapped and recorded prior to forestry management operations and ensures the continued comprehensive protection of the known archaeological resource. In the case of this plan area, whilst not identifying what each feature is, the **Key Features Opportunities and Constraints Map (4a)** show the various heritage feature locations within the block. There are various features within the plan area most of which are unscheduled and generally already afforested.

3.5.1 Non-scheduled Archaeology

There are scores of features of local significance such as remnant kilns, shielings, mounds and dykes and a dozen regionally important features such as a potential hut circle, a cup marked stone and cairns etc. Of these features three are of particular note; a monument, a gravestone and a Covenanters' cairn.

3.5.1 Cultural Heritage

Bordering As part of a series of publications highlighting the story of forestry in different areas of Scotland in the twentieth century, in 2011 Forestry Commission Scotland *published* *'The forgotten forest' - The story of Whitelee Forest in the 20th century*. The booklet tells the story of forestry in and around Whitelee Forest, based on the memory of those who lived and worked in forestry, knitted together the personal recollections.

3.6 Social factors

3.6.1 Recreation

Whitelee Visitor Access is predominantly managed by the Whitelee Countryside Ranger Service (WCRS) with some input from FES to manage specific permissions involving vehicle access. WCRS Rangers are based at the popular Windfarm Visitor Centre, near Lochgoin reservoir, run by the Glasgow Science Centre.

WCRS is part of the joint East Renfrewshire, South Lanarkshire and East Ayrshire councils Whitelee Access Project. SLFD have been working with the three local authorities to agree a public access lease in Whitelee since autumn 2010. This agreement was stimulated by the Section 75 which sought to develop a public recreation access network in Whitelee Forest as a public benefit in compensation for the development of the large windfarm. The details have taken some time to agree but should be concluded in the next few months.

The windfarm site is getting busier with the visitor centre getting an estimated >90,000 visitors per annum most of whom, anecdotally, are visiting the forest.

Increasing interest in the site has led to increasing number of permissions issued by FES for access for a variety of recreation activities at Whitelee a including:

- Husky training and events
- Running and Cycling Events
- Duke of Edinburgh/ BB/ Group camping expedition and events
- Horse riding events

Increased public use of the forest has also increased the number of issues experienced such as members of the public getting lost, damage to sections of the public rights of way, and a lack of car parking provision.

3.6.2 Community

Whitelee Forest is relatively isolated, neighboured primarily by a small number of farm properties. Our FES Ranger responsible for Whitelee has good relationships with neighbouring local residents.

Some antisocial activity, mainly fly-tipping can be a problem at the Ardochrig road entrances, with some evidence of theft from cars at these entrance locations. Commercial Dog walking operators have become more prevalent also at the entrances off Ardochrig road.

3.7 Statutory requirements and key external policies

In addition to those already referenced within the main text the following key policy or guidance documents which have influenced this plan are listed here:

- UK Woodland Assurance Standard 4, 2018
- Scottish Lowlands Forest District Strategic Plan 2014 – 2017
- Central Scotland Forest Strategy 1995
- Central Scotland Green Network Vision
- Glasgow and Clyde Valley Forestry and Woodland Strategy 2012
- The Glasgow and the Clyde Valley Strategic Development Plan (SDP) 2017
- East Dunbartonshire Local Development Plan (LDP) 2017
- East Dunbartonshire Green Network Strategy 2017
- SNH Landscape Character Assessments for 'Glasgow and Clyde Valley' 1999
- Natural Environment Planning Guidance 2017
- Scottish Lowlands Forest District – Black Grouse Strategy 2015-2019
- Black Grouse and Forestry: Habitat Requirements and Management
- The Vincent Wildlife Trust - Managing forest and woodlands for pine martens
- SEPA Flood Risk Management Maps
- Forestry Commission Bulletin 62 – Silviculture of Broadleaved Woodland
- Forestry Commission Bulletin 119 – Cultivation of Soils for Forestry
- Forestry Commission Practice Guide – Deciding Future Management Options for Afforested Deep Peatland.
- Forestry Commission Practice Guide – Managing Open Habitats in Upland Forests
- Forestry Commission Practice Guide 3 – The management of semi-natural upland mixed ashwoods.
- Forestry Commission Practice Guide 8 – The management of semi-natural wet woodlands
- Forestry Commission Practice Guide 14 – Restoration of Native Woodland on Ancient Woodland Sites
- Forestry Commission Practice Guide 21 – Choosing stand management methods for restoring planted ancient woodland sites
- Natural Reserves - Guidance for their selection and management on the NFE in Scotland
- Minimum Intervention Areas - Guidance for their selection and management on the NFE in Scotland
- Long-Term Retentions - Guidance for their selection and management on the NFE in Scotland
- FLS – Larch Strategy

Appendix II: Land Management Plan Brief

Contents

Significant Background Information

Introduction

- Whitelee Forest covers an area of approximately 5884 hectares located on the Eaglesham Plateau and falls within three different local authorities; East Ayrshire, South Lanarkshire and East Renfrewshire with the nearest large settlements being Eaglesham to the north, Stathaven to the east and Darvel to the south.

- This land management plan will replace the previous Forest Design Plan (FC File Ref: 032/07/02) which has approval for the period 28/03/2008 – 27/03/2018. This new plan will set out the renewed management proposals over the next 10 year approval period and beyond.

Silvicultural Potential

- Elevation rises from ~230m above sea level (asl) to 376m asl at Corse Hill. The soils generally consist of blanket bogs [FC soil codes 9b,c,d,e & 11b,c,d] Unflushed raised upland bogs [FC soil code: 10b] and typical peaty surface water gleys [FC soil code: 6]. Generally the soils are wet and poor in nutrients.

- The prevailing cool, wet climate is conducive to good conifer tree growth although the soils and highly-severely exposed topography limits the choice of tree species suitable for continued productive conifer crops. Climate change predictions suggest that the climate will become generally warmer, with drier summers and winters more wet.

Current Management Approach

- Currently approximately 58% of the total managed area is under forest cover with a further 8% felled awaiting restocking; the remaining 34% consisting of disparate elements such as roads, utility wayleaves and areas of environmental importance amongst other features. 96% of the forests are conifer and 4% broadleaves with approximately 88% of the conifer element given over to Sitka spruce.

- Of the current forest cover across the sites the growth stages of the trees are split as follows approx. 31% establishment (0-10 years), 4% thicket (11-20 years), 29% pole stage (21-40 years), 36% mature (41-60 years) and 0% old forest (over 61 years).

- Due to the exposed nature of its location the patch clear-fell system of silviculture has been employed thus far and will remain the case going forward with most of the forest also being managed under shorter rotation in accordance with the lease agreement with the windfarm developer.

- Operational access across the sites is generally very good with forest road access greatly improved as part of the creation of the windfarm however timber access to the public road network is limited to the eastern Ardochrig entrance and the access from Loch Goin.

Main Considerations

- The Whitelee plateau is dominated by the 215 turbines of Whitelee Windfarm, of which 137 turbines are located within the Whitelee Forest management area.

- There is an area of ~ 22 Ha of Ancient Woodland, Long Established of plantation origin (LEPO) around the Ardochrig entrance.

- Over 40 watercourses run through the site and are either waterbodies monitored by SEPA: (Craufurdland Water/Dunton Water; Hareshawmuir Water/Gawkshaw Burn; White Cart Water; Glen Water; Rotten Calder Water; River Irvine; Calder Water) or are tributaries feeding these waterbodies. There is significant potential to enhance the Forest Habitat Networks along the most principle among these riparian corridors.

- Whitelee Forest site is getting busier. The Whitelee Visitor Centre gets an estimated 90,000+ visitors per annum with anecdotally a similar number visiting the forest. Whitelee Visitor Access is predominantly managed by the Whitelee Countryside Ranger Service, WCRS, with some input from FES to manage specific permissions involving vehicle access. The Rangers are based at the Popular Windfarm Visitor Centre, near Lochgoin reservoir which is run by the Glasgow Science Centre. The WCRS currently coordinate event delivery on and off FES land. Some involvement from our Ranger is usually required for a number of annual walking events.

- Our FES Ranger responsible for Whitelee has good relationships with local residents neighbouring the Forest. Some antisocial activity, mainly fly-tipping can be a problem at the Ardochrig road entrances, with some evidence of theft from cars at these entrance locations. Commercial Dog walking operators have become more prevalent also at the entrances off Ardochrig road.

- Landscape design is most significant at the small scale e.g. along minor public roads and from surrounding residences as the forest being on the Whitelee plateau is not particularly visible at the medium to large scale from the surrounding areas and generally therefore felling coupes shapes and sizes don't have an great effect on the wider landscape.

- Whitelee has no Scheduled Monuments associated with it however there are various non- scheduled

features such as cairns.

- The site has no environmental designations associated with it however there are important habitats such as wet woodland, blanket bog, upland flushes, fens and swamps. There are also some important priority species which may use Whitelee Forest area such as Black Grouse, Soprano Pipistrelle bats and Pine Martin.

- Deer impact level on the commercial crop is, on the whole, below the national target of 10% leader browsing damage. Roe are the only species of deer present within these woodland blocks but there is a healthy and viable population in and around the woodland meaning that sustained deer management is required to keep the background population at an acceptable level.

- The region has recently acquired an additional 50 hectares at High Carlingcraig Farm which will be incorporated into the wider Whitelee Block.

2. Strategic Drivers

To succeed in realising the vision as set out in the Scottish Forestry Strategy 2019-2029, 6 priorities for action been identified for implementation:

- ***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***
- ***Engaging more people, communities and businesses in the creation, management and use of forests and woodlands***

Allied to these priorities Forestry and Land Scotland have six aspirations: that the land we manage is:

- ***Healthy*** - achieving good environmental and silvicultural condition in a changing climate
- ***Productive*** - providing sustainable economic benefits from the land
- ***Treasured***- as a multi-purpose resource that sustains livelihoods, improves quality of life, and offers involvement and enjoyment
- ***Accessible*** - local woodlands and national treasures that are well promoted, welcoming and open for all
- ***Cared for*** - working with nature and respecting landscapes, natural and cultural heritage
- ***Good value*** - exemplary, effective and efficient delivery of public benefits

In lieu of a future Regional Strategic Plan the former Scottish Lowlands Forest District Strategic Plan (2014-2017), drew on the six aspirations and set out the key national commitments and what district specific actions are to be taken to achieve them.

In preparing the Brief and Objectives for this Land Management Plan (LMP), issues were considered against these 'Key Commitments' and assessed for their importance. Those most relevant to Whitelee Forest are set out below.

Relevant National & District Considerations

Aspiration	Relevant National Commitment	Relevant District Priorities	Relevant District Strategic Plan Actions
Healthy	• We are committed to high quality silviculture and to increasingly using alternatives to clear-felling • We will help the Estate to adapt to climate change and become more resilient to pressure • We are committed to dealing with invasive plants and animals that threaten habitats and biodiversity	• The climate and soils in the District will facilitate greater use of lower impact silvicultural systems, providing opportunities for a wider choice of tree species (including productive broadleaves) as well as a wider choice of silvicultural practices. • We have seen an increasing impact from pests and disease in the trees we manage and the District has a particular issue with *Chalara fraxinea*, and with Dothistroma Needle Blight (DNB) affecting our new planting and restock sites.	• Where local climate and soils allow, we will maximise the area under lower impact silvicultural regimes. • We will increase where practical the diversity of species choices, including productive broadleaves and minor conifer species. • We will improve our silvicultural practices, including the planting of productive broadleaves. • We will ensure that national and research guidance, Ecological Site Classification (ESC) and Establishment Management Information System (EMIS) decision support tools will be used to inform our selection of new planting and restocking species. • In response to an increasing threat from pests and diseases we will alter felling programmes and vary our choice of new planting and restocking species to more tolerant species. • We will produce and implement a District plan to combat invasive species, based on existing data and work underway.
Productive	• We aim to increase the contribution of the NFE to the economy of Scotland and its regions and recognise the potential of the Estate to assist transition to a low carbon economy • We aim to provide at least three million cubic metres of softwood timber every year on a sustainable basis • We will market timber in ways that encourage value adding and additional jobs in manufacturing	• Timber transport time and 'costs to market' are low in the central belt due to many timber using industries and good road networks. Because of a generally milder climate than other parts of Scotland, there are also fewer winter interruptions to supply.	• Central Region will maintain a harvesting output of 150,00m^3 annually. • We will increase the volume of wood going to niche markets

Aspiration	Relevant National Commitment	Relevant District Priorities	Relevant District Strategic Plan Actions
	and processing.		
Treasured	• We are committed to creating more uniquely special places across the Estate and to delivering benefits to an increasingly diverse range of Scotland's people • We want to encourage local people to get involved in using and managing local Estate woodlands, so we will actively engage with local communities and be open to work in partnership.	• All our staff, particularly the Communities Recreation & Tourism team, have a vital, visible and empowered woodland presence and one of our priorities in working with communities is to encourage people to value their local green place. We aim to make our woodlands attractive and accessible visitor locations to a diverse range of people of all ages and all abilities and our outreach work actively encourages and facilitates communities to use the NFE.	• Through Land Management Plans and careful implementation of our work programmes in visitor zones we will deliver improvements for peoples' aesthetic appreciation and security, especially in the most visited parts of the Estate in the Central Scotland Green Network (CSGN.) • We will continue our lead role in delivering Woods in and Around Towns (WIAT) and place making to high standards within the CSGN. • We will continue to deliver improvements for people and the environment in the woodlands we manage within the WIAT programme, and seek to extend and add value where resources allow. • We will deliver the WIAT Central Scotland Engagement Programme, with continued outreach by community rangers.
Accessible	• Through our WIAT programme we aim to provide more opportunities for more of Scotland's people to enjoy high-quality countryside and find health, education, skills and community involvement benefits. • We will continue to encourage the use of the Estate for health benefits and outdoor learning.	• We have a lead role encouraging greater use of the Estate, through developing accessible paths and track networks, making people feel welcome, and our staff providing a local presence and generating community engagement, especially near to where people live and work and delivery of the 'visitor zone' work. • We are involved in outreach activity and host a range of events designed to highlight the relevance and the appeal of the Estate to a diverse audience. The District area includes the largest communities and most of Scotland's	• We will seek to continue to improve the standard of visitor experience at all Woods In and Around Towns we manage within the Central Scotland Green Network, so they meet the WIAT standard determined by Scottish Forestry by 2020. • We will continue to engage with Scottish Government, local authorities and other partners to champion the Estate's contribution to the CSGN.

Aspiration	Relevant National Commitment	Relevant District Priorities	Relevant District Strategic Plan Actions
		health deprived council wards. Therefore, we have the greatest potential to communicate the benefits of the Estate to the biggest and most relevant audiences, and to be a lead provider of health improving programmes.	
Cared for	• Across Scotland, we plan to increase broadleaved tree cover from the current 8% woodland cover to around 20% • Across Scotland, we are committed to maintaining the best open habitats in good ecological condition • Across Scotland, we will identify particularly vulnerable species for which the National Forest Estate is important and take specific conservation action • We safeguard archaeological sites through our planning and management and recognise special places and features with local cultural meaning	• The larger community base means we have a lead role engaging the public in natural, cultural, and historical values of the NFE, providing opportunities for better understanding and volunteering in the natural environment. •	• We will be more proactive in engaging with communities on the natural, cultural and historic values of the NFE, informing them of local things of note and encouraging involvement through volunteering. • We will use the Native Woodland Survey of Scotland (NWSS) to inform our Land Management Plan work, which will result in expanding native woodland creating where possible habitat links between land ownerships in the CSGN area. • We will ensure the continuity of our open habitats by moving an increasing area into monitored and managed status.

Key Drivers & Management Objectives

On the basis of the background information, and given the considerations outlined above, a series of drivers have been identified in order to produce the management objectives proposed for Whitelee Forest.

Key Aspiration – Healthy

The potential impacts of climate change and the potential threat from current and/or future pests and disease such as Great spruce bark beetle, Phytophthora ramorum and Dothistroma Needle Blight means uncertainty to the future make-up of the forest. Changes in storm frequency and intensity may increase the risk of windblow, while drier and warmer summers might increase the risk of drought. Increasing trade importation from across the world, facilitating pest and disease movement, is likely to lead to more risk of new threats arriving on our shores.

The current narrow range of tree species is generally site suited which should reduce tree stress and the chances of infection or infestation however some alterations in future restock species choice to more site suited species will improve this situation further.

The forests have been managed under a patch clearfell system as the exposure and soils are not conducive for successful alternatives to clearfell methods such as CCF or LISS. Due to the conditions this is not a site conducive to producing high quality timber.

There has been some increase in age diversity within the forest, and the process of broadening the diversity of age ranges continues.

There has been little development of semi-natural Forest Habitat Networks across the sites - currently the majority of watercourses have been left unplanted or have conifers planted close to their edges where their regeneration can inhibit the transition to broadleaved species.

Management Objectives:

- *Manage the conifer plantations using the patch clearfell system.*
- *When restocking, diversify where appropriate the planted species to enhance the resilience of the woodlands to the impacts of predicted climate change and the threat from pests and diseases.*
- *Redesign coupes to enhance opportunity to further diversify the age structure in future, e.g. smaller coupes and increased number of wind firm green edges.*
- *Establish native broadleaf forest habitat networks along the principle riparian corridors.*
- *Where restocking will not lock up enough carbon to outweigh that lost from the soil, consider bog restoration or conversion to peat edge woodland deferring to the guidance set out in the FC Practice Guide for 'Deciding future management options for afforested deep peatland'.*
- *Use appropriate methods of herbivore protection to minimise leader browsing on establishing or regenerating trees.*

Key Aspiration – Productive

Climate and soils generally across the forest limits the range of species choice for both conifers and broadleaves with only a few conifer species suited for productive growth. Generally poor nutrient levels suggest nursing mixtures will be necessary to promote good growth in various areas.

In some areas the yield classes being achieved in the current crops suggest that restocking again with commercial conifer is not a viable option and alternative land uses should be considered.

As this site has an existing renewable development with associated lease agreement this plan will consider and factor in any potential impacts our management proposals may have.

The acquisition of High Carlingcraig Farm will provides new opportunity to expand the forest and help achieve national new planting targets.

Management Objectives:

- *Maintain sustainable volumes of timber for local and national markets determined by appropriate coupe management within the forests as well as volume production forecasts across the region.*
- *With timber quality generally low at Whitelee we will concentrate on maximising volume output which will predominantly consist of small round wood as well as pallet and red logs.*
- *Continue practice of short rotation forestry around wind turbines within agreed areas.*
- *Design management coupes considerate of the wind farm agreement.*
- *Expand the commercial conifer forest using considered design to create new woodland at High Carlingcraig Farm.*
- *Consider where any new road access is required for future operations and design and implement accordingly to site constraints.*

Key Aspirations – Accessible

In recent years improvements have been made across the site to access, signage and interpretation; these improvements along with greater onsite staff presence has led to a decline in antisocial use of the forest and increased recreational usage. FLS recently met with the CSGNT and Glasgow and Clyde Valley Green network and they did not suggest more paths or visitor access works at Whitelee as they now consider it well provisioned.

Management Objectives:

- *Continue to work with the three local authorities and partners to develop Whitelee Forest as an open access recreation experience.*
- *Engage with local communities and partners to provide a quality visitor experience.*

Key Aspiration – Cared for

Manage sites of archaeological interest in accordance with guidelines on Forestry and the Historic Environment.

Management Objectives:

- *Preserve and enhance the diversity of open space and native woodland to benefit important habitats on and around land we manage in accordance with the UK Forestry Standard (UKFS)*
- *Maintain Black Grouse habitat taking advantage of additional broadleaves as well as low density conifer regeneration.*
- *Protect known historic features, including archaeological remnants in accordance with UKFS guidelines on Forests and historic environment.*
- *Continue to work with partners toward the development of an Access Plan to improve facilities and make the most of the windfarm infrastructure.*

Appendix III: Land Management Plan Consultation Record

Consultee	Date contacted	Date response received	Consultee Comment/Issue Raised	Region Response
Scottish Power Renewables	22/06/2018		*"we have been working towards prioritising forestry stands that if felled should result in the highest benefit to the wind farm in relation to increasing performance and reducing stress loading and associated downtime….Priority Areas map indicates the identified priority areas that would ideally be felled sooner rather than later, from the perspective of the wind farm"*	*"many of the priority 1 areas are already proposed for the first phase of felling….Most of the priority 2 areas fall within the retention areas…we might be able..to bring forward the priority areas and for the most part we will be able to tweak fell years to accommodate you."*

Appendix IV: Objective Appraisal, Monitoring & Evaluation

Key Aspiration	Objective	Assessable Criteria	Appraisal Method	Monitoring Method	Monitor Where	Monitor When	Monitor Who	Record Monitoring Where	**Evaluation.** *How does the Appraisal and Monitoring method inform current & future proposals? If you cannot answer this question then the methods may not be appropriate.*
Healthy	Manage the conifer plantations using the clearfell system.	Silvicultural system	Production Forecast	Forester Web Land Management Plan Tool query	Forester Design Plan Module	After operations and at appropriate intervals e.g. mid-term and 10 year reviews	Planning Forester / Programme Manager	Against the LMP	Monitoring the volumes and quality of timber produced and levels of income received will allow the Planning Forester to gauge the quality of conditions and whether future crops might fetch improved revenues if managed differently.
Healthy	When restocking, diversify where appropriate the planted species to enhance the resilience of the woodlands to the impacts of predicted climate change and the threat from pests and diseases.	Species mix	Species types, proportions & distributions	Site survey SCDB query	Onsite SCDB	After operations and at appropriate intervals e.g. mid-term and 10 year reviews	FM Forester / Planning Forester	Against the LMP	Monitoring species proportions and distributions will inform the planning forester as to whether the plan is working and whether adjustments are required allowing the region to adjust expectations and business plan for alternative management methods.
Healthy	Redesign coupes to enhance opportunity to further diversify the age structure in future, e.g. smaller coupes and increased number of wind firm green edges.	Coupe design	Evaluate future management coupes against LMP	Forester Web Land Management Plan Tool query	Forester Web	After operations and at appropriate intervals e.g. mid-term and 10 year reviews	FM Forester / Planning Forester	Against the LMP	Monitoring will allow us to evaluate crop variability and whether suitable gaps exist within crops to enable intended future coupe redesign.

Key Aspiration	Objective	Assessable Criteria	Appraisal Method	Monitoring Method	Monitor Where	Monitor When	Monitor Who	Record Monitoring Where	**Evaluation.** *How does the Appraisal and Monitoring method inform current & future proposals? If you cannot answer this question then the methods may not be appropriate.*
Healthy	Establish native broadleaf forest habitat networks along the principle riparian corridors.	Tree species	Changes in species types, ages, proportions & distributions	Site survey SCDB query	Onsite SCDB	After operations and at appropriate intervals e.g. mid-term and 10 year reviews	FM Forester / Planning Forester	Against the LMP	Monitoring the diversity of species and structure of the canopy will allow for comparisons to be made overtime which will inform the planning forester as to whether the plan is working and whether adjustments are required allowing the region to adjust expectations and business plan for alternative management methods.
Healthy	Where restocking will not lock up enough carbon to outweigh that lost from the soil, consider bog restoration or conversion to peat edge woodland deferring to the guidance set out in the FC Practice Guide for 'Deciding future management options for afforested deep peatland'.	Species, Open Space & Habitat	Changes in land use over time	Site survey SCDB query Forester Conservation Layer query	Onsite Aerial photos	At mid-term and 10 year review	Environment Advisor	Forester Conservation Module	By monitoring any changes in land use it can be determined whether there have been any unforeseen impacts from implementation of the plan.
Healthy	Use appropriate methods of herbivore protection to minimise leader browsing on establishing or regenerating trees.	Establishment Deer Population	Leader Browsing	Site survey SCDB query Deer Pop Survey Thermal Imaging Survey	Onsite SCDB Impact monitoring form	After operations and at appropriate intervals e.g. mid-term and 10 year reviews	FM Forester / Wildlife Manager	SLFD Deer Overview Map Thermal Imaging Po Spread-sheet NNR Survey by SCL Impact monitoring form	Monitoring leader browsing by deer allows the FM Forester and Wildlife Manager to establish whether establishment is likely to be successful or whether further methods of protection are required and therefore factored in to business planning.

Key Aspiration	Objective	Assessable Criteria	Appraisal Method	Monitoring Method	Monitor Where	Monitor When	Monitor Who	Record Monitoring Where	**Evaluation.** *How does the Appraisal and Monitoring method inform current & future proposals? If you cannot answer this question then the methods may not be appropriate.*
Productive	Maintain sustainable volumes of timber for local and national markets determined by appropriate coupe management within the forests as well as volume production forecasts across the region.	Timber volumes	Production Forecast	Forester Web Land Management Plan Tool query	Forester Web Land Management Plan Tool	After operations and at appropriate intervals e.g. mid-term and 10 year reviews	Programme Manager / Harvesting Forester	Against the LMP	Monitoring the volumes and quality of timber produced and levels of income received will allow the Programme Manager & Harvesting Manager to gauge what returns might be expected from future interventions and which customers would most likely be interested. This monitoring also allows the Planning Forester to gauge the quality of conditions and whether future crops might fetch improved revenues if managed differently.
Productive	With timber quality generally low at Whitelee we will concentrate on maximising volume output which will predominantly consist of small round wood as well as pallet and red logs.	Timber volumes	Production Forecast	Forester Web Land Management Plan Tool query	Forester Web Land Management Plan Tool	After operations and at appropriate intervals e.g. mid-term and 10 year reviews	Programme Manager / Harvesting Forester	Against the LMP	Monitoring the volumes and quality of timber produced and levels of income received will allow the Programme Manager & Harvesting Manager to gauge what returns might be expected from future interventions and which customers would most likely be interested. This monitoring also allows the Planning Forester to gauge the quality of conditions and whether future crops might fetch improved revenues if managed differently.
Productive	Continue practice of short rotation forestry around wind turbines within agreed areas.	Yield Class	Production Forecast	Year 10 survey U18 Survey	Production survey folder	Age 10 crops Before operations	Programme Manager / Harvesting Forester	Sales Recording Package	Monitoring the YC coupled with the crop age and species allows for an estimate of when the crop will average 12m in height.
Productive	Design management coupes considerate of the wind farm agreement.	Coupe design	Evaluate renewable footprint against management coupes	Forester Web Land Management Plan Tool query	Forester Web Land Management Plan Tool	After operations and at appropriate intervals e.g. mid-term and 10 year reviews	FM Forester / Planning Forester	Against the LMP	Evaluating the impact of windfarm will allow the planning forester to determine how much flexibility has been gained by the proposed design by how little or much disruption it may cause.

Key Aspiration	Objective	Assessable Criteria	Appraisal Method	Monitoring Method	Monitor Where	Monitor When	Monitor Who	Record Monitoring Where	**Evaluation.** *How does the Appraisal and Monitoring method inform current & future proposals? If you cannot answer this question then the methods may not be appropriate.*
Productive	Expand the commercial conifer forest using considered design to create new woodland at High Carlingcraig Farm.	Tree species & Landuse	Changes in species types, ages, proportions & distributions	Stocking Density Assessment SCDB query	Onsite SCDB	After SDA and at appropriate intervals e.g. mid-term and 10 year reviews	New Planting Forester / Planning Forester	Against the LMP	Monitoring as described will determine whether crop has been successfully established as per LMP.
Productive	Consider where any new road access is required for future operations and design and implement accordingly to site constraints	Forest roads	Do planned coupes have adequate accessible roading within 500m	Forester Web Management Coupes & Roads layers	Planned roads layer	At LMP, before operations and at appropriate intervals e.g. mid-term and 10 year reviews	Planning Forester / Programme Manager / Civil Engineer	Against the LMP	Monitoring as described will determine whether required roading has been constructed as per LMP.
Accessible	Continue to work with the three local authorities and partners to develop Whitelee Forest as an open access recreation experience.	Roads and paths use	Condition of roads and paths	Site survey	Onsite	After operations and at appropriate intervals e.g. mid-term and 10 year reviews	Area Visitor Services Manager / Civil Engineer	Against open access criteria	Monitoring as described will determine whether required access has been constructed or upgraded as per LMP.
Accessible	Engage with local communities and partners to provide a quality visitor experience.	Local community involvement	Contact lists numbers. Event & Project activity	Contact list check, number of events/projects progressing	Within the local community	On-going engagement with local stakeholders	Area Visitor Services Manager	Against the LMP & Site contact list	By monitoring when and who we have contacted as well as what events and projects are being progressed the VS Manager can evaluate how active we have been in engaging with local community as well as being better able to plan budgets for upcoming events/projects.

Key Aspiration	Objective	Assessable Criteria	Appraisal Method	Monitoring Method	Monitor Where	Monitor When	Monitor Who	Record Monitoring Where	**Evaluation.** *How does the Appraisal and Monitoring method inform current & future proposals? If you cannot answer this question then the methods may not be appropriate.*
Cared for	Preserve and enhance the diversity of open space and native woodland to benefit important habitats on and around land we manage in accordance with the UK Forestry Standard (UKFS)	Tree species & Landuse	Changes in species types, ages, proportions & distributions	Site survey SCDB query	Onsite SCDB	After operations and at appropriate intervals e.g. mid-term and 10 year reviews	Planning Forester	Against the LMP	Monitoring the diversity of species, structure of the canopy and land use will allow for comparisons to be made overtime which will inform the planning forester as to whether the plan is working and whether adjustments are required allowing the region to adjust expectations and business plan for alternative management methods.
Cared for	Maintain Black Grouse habitat taking advantage of additional broadleaves as well as low density conifer regeneration.	Tree species & Landuse	Changes in species types, ages, proportions & distributions	Site survey SCDB query	Onsite SCDB	After operations and at appropriate intervals e.g. mid-term and 10 year reviews	Environment Advisor	Against the LMP	Monitoring the diversity of species, structure of the canopy and land use will allow for comparisons to be made overtime which will inform the Environment Advisor as to whether the plan is working and whether adjustments are required allowing the region to adjust expectations and business plan for alternative management methods.
Cared for	Protect known historic features, including archaeological remnants in accordance with UKFS guidelines on Forests and historic environment.	Historic features	Changes in condition	Site survey	Onsite Aerial photos	At mid-term and 10 year review	Environment Advisor	Forester Web Heritage Layer	Monitoring the condition of heritage features allows the Environment & Heritage Manager and Recreation Manager to evaluate whether implementation of the plan has adversely affected any features e.g. has increased visitor numbers increased pressure on features or have operations damaged features? Any issues can be captured and mitigated against in future.
Cared for	Continue to work with partners toward the development of an Access Plan to improve facilities and make the most of the windfarm infrastructure.	Access Plan	Publishing of agreed plan	Liaison with partners	Communications with partners	On-going engagement with partners	Regional Visitor Services Manager / Area Visitor Services Manager	Visitor Services folder in Management Units folder	Distribution of agreed plan will allow teams to respond accordingly.

Appendix V: High Carlingcraig Conservation & Heritage Scoping

1) Block Name: High Carlingcraig - Whitelee Area (ha): 50ha

2) Briefing Information: 4th July 2018 full walk over by Yvonne grieve, Stewart Towers and Emma Stewart. No breeding birds of concern (one family of meadow pipit and one single skylark), the fields are farmed - generally sheep grazing ongoing, recently flailed and grazed or recently mown). No habitats found that could not be identified and need further survey. No sign of upstanding archaeological/heritage features that indicate a further survey is required, farm boundaries enclosed since at least 1860 (HLA notes 18-19th century rectilinear fields and farming.

3) GIS Review	Comments
Bogs Layer	The area is not covered by any of the national peat and BGS peatland areas,
FC nearby sightings:	4th July 2018 – sky lark, reed bunting and jay -1 each plus meadow pipit family
Native Woodland (NWSS)	No native woodlands on site but nearby upland mixed ashwood and wet woodland
Ancient Woodland	None on site nearby Ancient semi-natural woodland. 1860s maps show two lines of woodland with a circular feature but there is no sign of these now or noted designed landscapes
FHN	Will expand existing FHN
SOIL	Old maps form NLS note mixed till from igneous and sedimentary rocks – see map below
SSSI/SAC/SPA	none

SINC	none
LNR	none
LWS	none
Other designation	none
Plant/Animal records	Orchids spotted plus (see photograph below) 4th July 2018 survey found small areas of ragged robin, sharp flowered rush, birdsfoot trefoil, knapweed, and cotton grass see map below. No EPS, raptors or EPS type habitat identified.
Archaeology & Heritage	None noted for the site or nearby in national databases. No features on old maps prior to OS first edition 1860. See map below one feature on the 10K map used to be woodland. The remaining area is the farm field lay out as now. One small area across a field about 10m wide of rig and furrow (straight)
Waterbodies	Ditches generally blocked, underground water pipeline and no other water features
Black grouse 25km zone	No
Bean Geese Slammanan 7km zone from roost	No
Deadwood (inc GIS anlyss)	Lines of beech between field boundaries

4) Contract survey	Completed
phase 2 habitats, NVC & UKBAP, Invasive spp	Contract not required – see above
birds	Contract not required – see above
other spp group if highlighted to us as present or could be present eg amphibians, mammals, invertebrates	Contract not required – see above

Red data list species (check red data list website if necessary	

5) Contract other organisations for records	Comments re Red Squirrel, Black grouse, GC Newts, Nesting birds and any other SAP species.	Completed
SNH Local Authority – LBAP Officer / Ecologist and Ranger Service		
Record Centre	admin@wildlifeinformation.co.uk	
SWT		
NBN Gateway	A 2km search around the location did not locate any black grouse, curlew or other sensitive species for woodland (note kestrel and merlin). Large heath notes within Whitelee block on edge of 2km outwith boundry (unlikely suitable habitat due to agricultural improvement). 1995 butterfly records on one corner of the site all common types. See below. Greater butterfly orchid off of site	
Other?		

6) FD staff visit	Comments (including dates &habitat quality information)	Completed

Additional Species found		
Additional habitat information		
Quality of bat roost features (high/medium/low)	Are new boxes etc worthwhile? No	
Calculate deadwood	None on site currently – field boundary trees	
Assess seminatural woodlands	None on site currently	
Is there invasive spp?	No invasives found or particularly suitable habitat for these	

7) Habitat Priorities	List (including hectares, numbers &quality information)	Completed
UKBAP Priority Habitats		
LBAP Habitats		
SBS Species		
FC Priority Species	None	
LBAP Species		
Other?		

8) Heritage	List ()	Completed
Designed Landscape	None noted for the site or nearby	
Scheduled Monuments	None noted for the site or nearby	
Listed buildings	None noted for the site or nearby	

Unscheduled Monuments (incl NMRS)	None noted for the site or nearby	

Map 1 – Walkover Survey 4th July 2018 Map

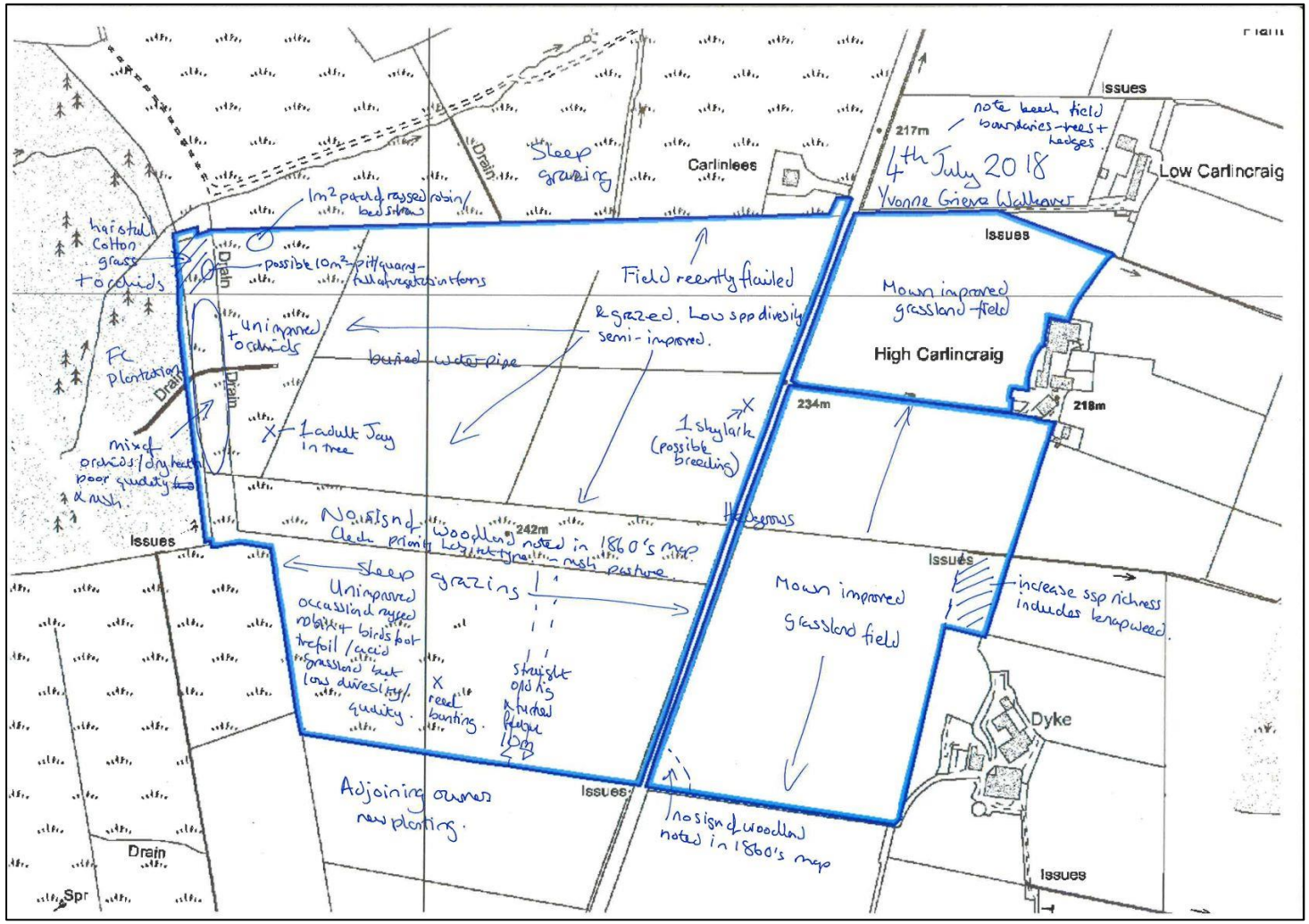


Figure 1 – NBN Atlas Export

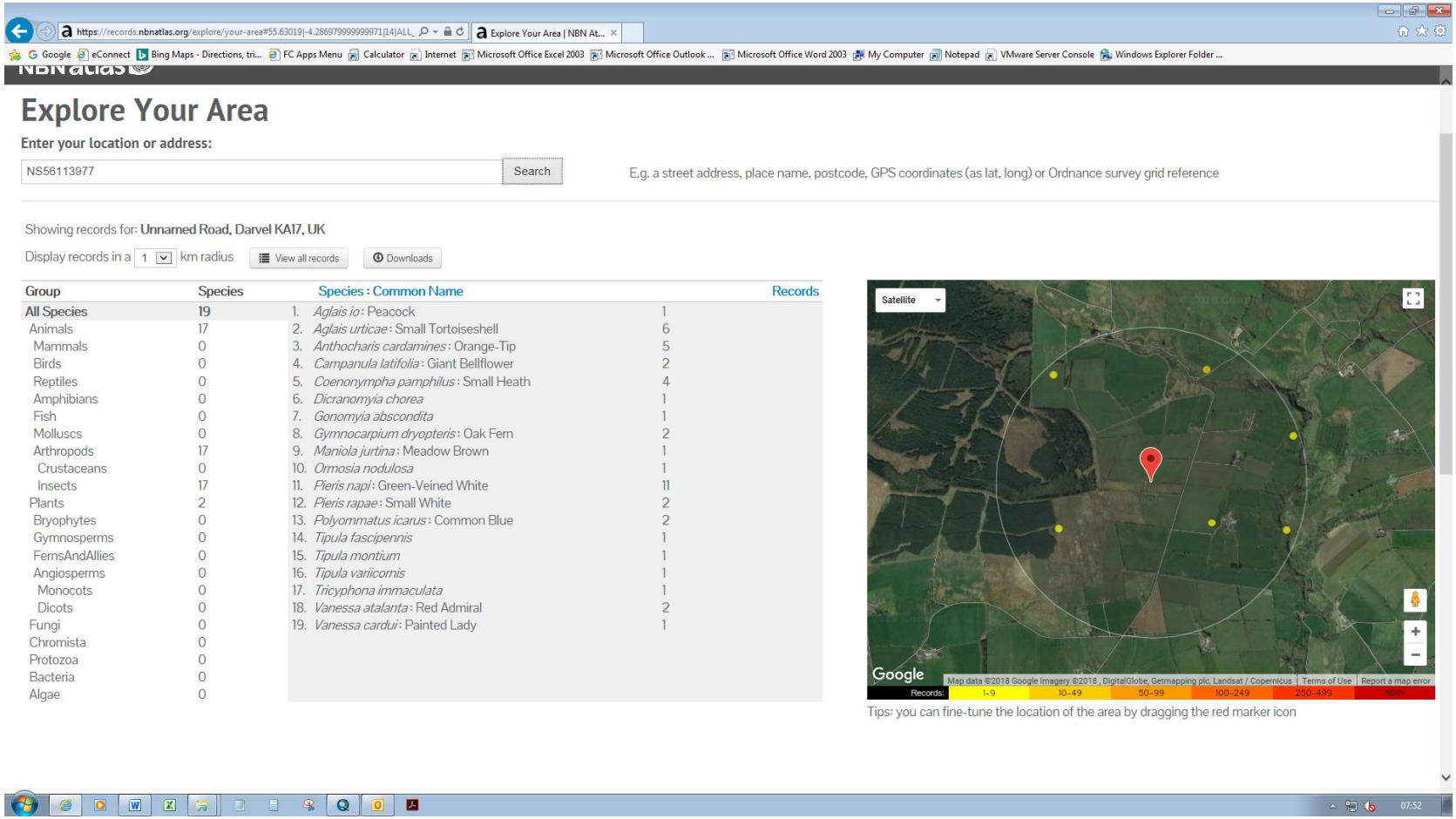


Figure 2 – OS 1860 1st edition map

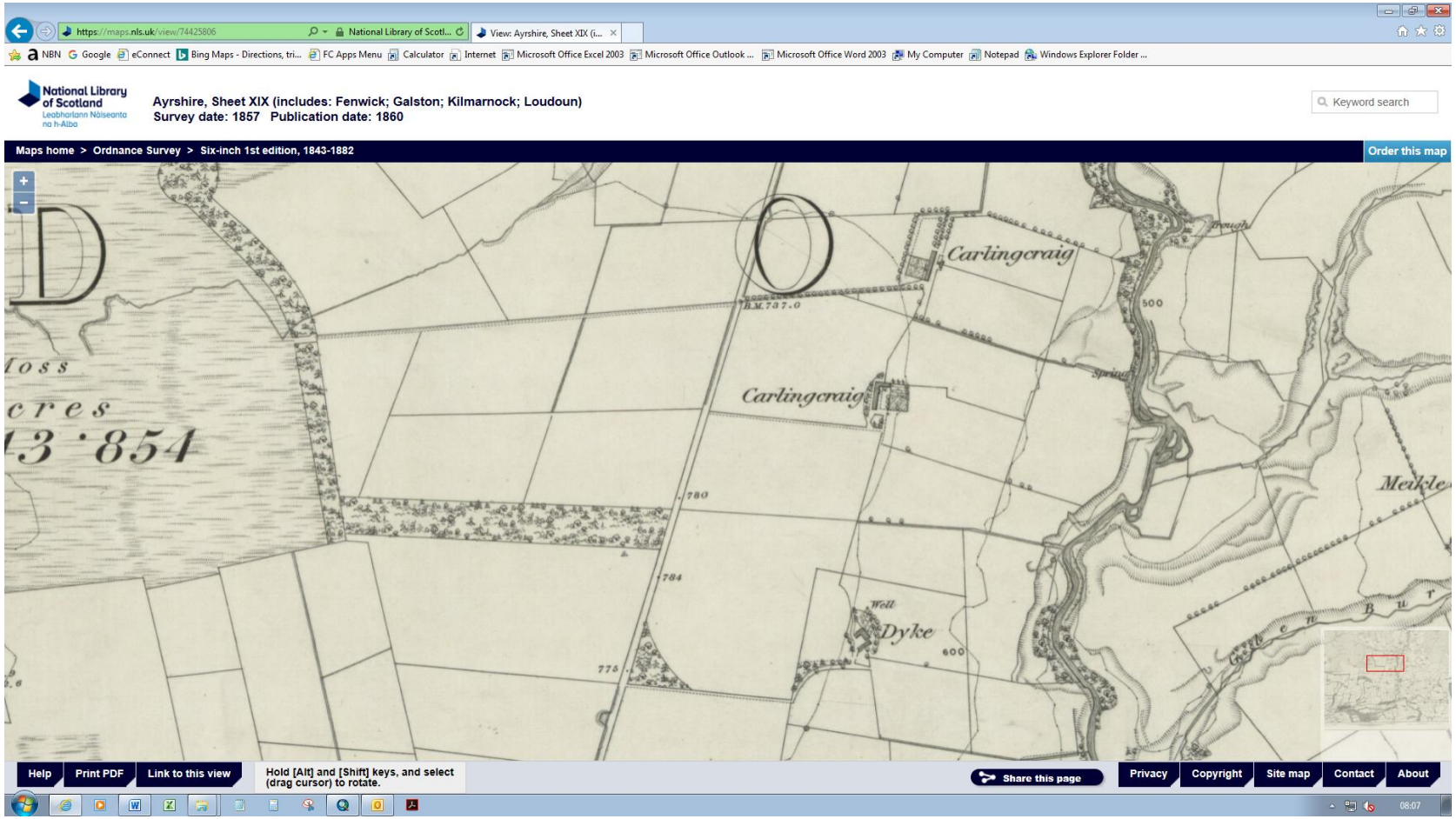
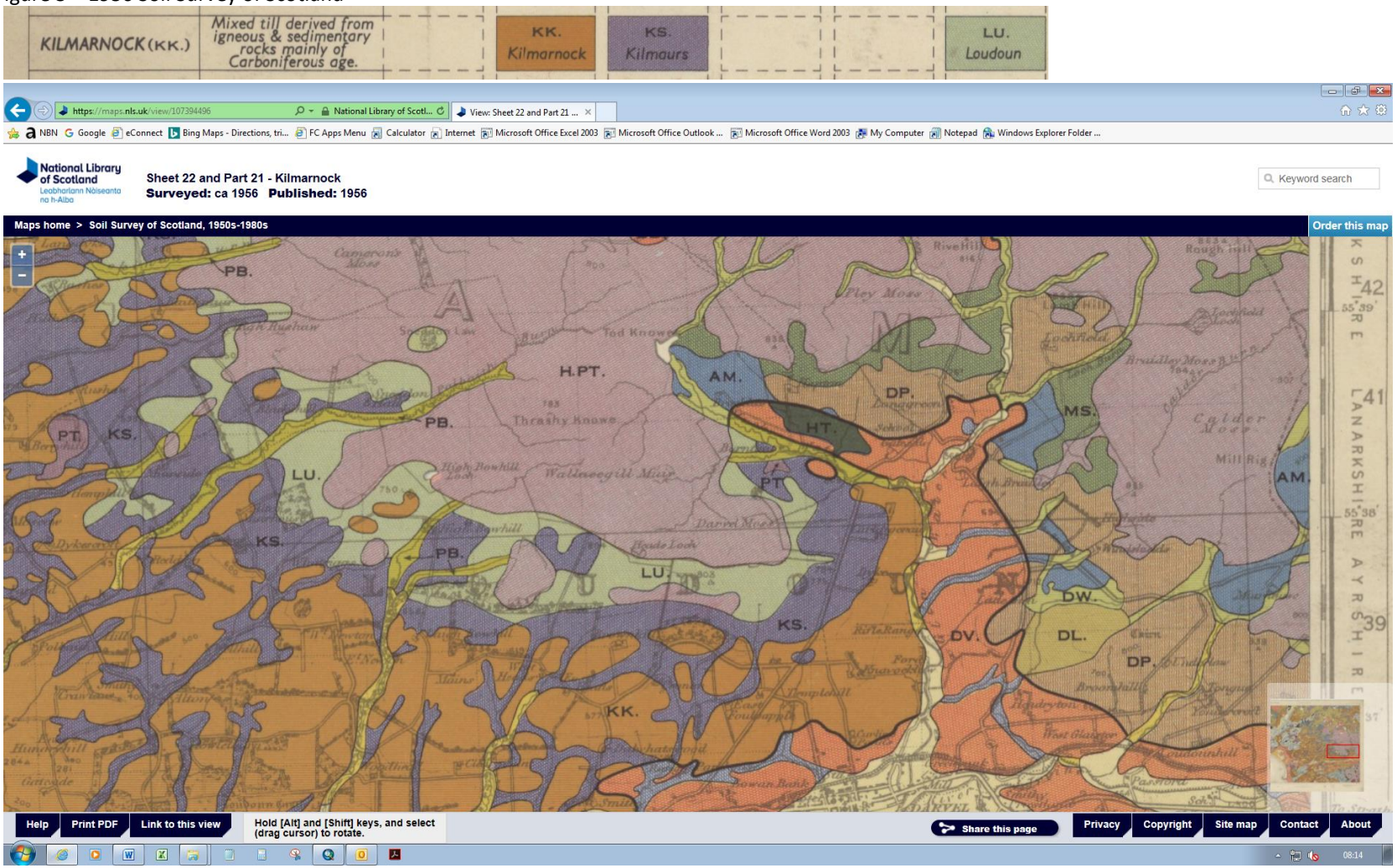


Figure 3 – 1956 Soil Survey of Scotland



Appendix VI: Quarry Design Review

Quarry Name: Quarry X **Date:** 30 April 2019.

Location: Whitelee Forest

NGR: NS 6073 4490 **Date of Last Appraisal:** 04/04/17

Current working Plan: extension of existing quarry to link with X Extension

Variation from Design: Not Applicable

Future Design Plan: Not Applicable.

The area between the existing Quarry X and Quarry X Extension, located in Whitelee Forest has been identified as a potential source of usable stone for the construction and maintenance of the forest and windfarm road network in Whitelee Forest.

The intention is to extend this site to produce a variety of usable aggregate sizes for upgrading and general repair & maintenance of forest roads in the area. A source of suitable stone in this forest is critical for maintenance in this forest. This design review attempts to cover the initial issues associated with this proposed quarry development.

The proposed quarry extension amounts to an area of approximately 1.34ha.
The existing working area of Quarry X is 1.49ha.
The existing working area of Quarry X Extension is 1.60ha
The associated tip site is 2.14ha.
1.00ha of X Extension and the 2.14ha tip site will be returned to forestry use.

After development, the total quarry area will be 3.55ha.

A site walk-over was carried out on 26 April 2019 to estimate the probable depth of the overburden. The overburden appears to be between 1.0m and 3.0m in depth, however the area is populated with mature trees which need to be removed.

The overburden covering the site is mainly mineral soil overlaid with 0.4m of peat. This material will be used to remediate the area of X Extension being returned to forestry.

Stone crushing requirements will be dealt with separately on a case by case basis.

The stone type is Basalt Porphyry.
The extension extends to 1.46ha.

Further development, extending the quarry footprint, may be considered at a later date. This will be dependent on purchasing adjacent land.

Please note that the positions shown on the development site plans are only indicative for the purposes of this design review.

In general the preliminary sequence of events will be as follows:

a) Cut and remove trees
b) Mobilise earthmoving plant to site.
c) Remove over burden from entire new development area. Some will be used to create a perimeter bund, the balance will be transported an average 125m to the remediation site.
d) Form edge protection bunds along quarry access routes to top of quarry.
e) As blasting & crushing operation progress install edge protection on all internal access tracks and haul routes.
f) Extend safety fence and signs around extended quarry perimeter.
g) Erect gates and quarry signage at new quarry access.
h) Carry out drill & blast operation to produce initial stockpiles of “As-Blasted” stone as required.

The items above show the probable sequence of events, though some such as forming access track and forming edge protection bunds may be virtually simultaneous. However, other considerations must be taken into account if the development works are to be conducted in a logical manner.
As is common in this type of scenario the works to clear the overburden should leave behind a clean rock surface.
The drill and blast operation will use X Extension as access with the working face being at the east side of the existing Quarry X and worked eastwards during subsequent blasts until all the recoverable rock has been extracted.
Drainage management will consist of cambering track profiles to direct water to the track edges.
Where necessary the flows will be directed into the existing quarry drainage, installed by SPR during the windfarm construction work. A series of silt sediment traps and vegetation in the invert of the ditch will filter out any sediment and particles. As per all FLS quarrying operations, vibrations, noise and dust will be kept to a minimum.
As work proceeds through subsequent blasting operations, the area of the quarry floor will be enlarged helping to create product stockpiling space.
As previously discussed, all internal and external haul roads and access tracks will have adequate edge protection as per Quarries Regulations put in place. Also note that edge protection shall be put in place along the crest of the face, and an adequate rock trap put in place 3m in front of the foot of the face.
In line with regional policy any fuel brought on site should be held in double skinned bunded tanks or bowsers. Any refuse should be collected and taken off-site at the end of the works.

The expectation is that the site will produce approximately 250,000T of usable stone over the next 8 to 10 years.

Final Disposition of the quarry:

When the quarry has reached the end of it's useful life it will be re-instated by drilling a final shot pattern to collapse the free faces into a "Glacis" of rubble that will be landscaped using edge protection bunds to re-soil as much of the raw exposed rock as possible.
As a further consideration it may be advantageous to "Hydro-seed" the rock faces to encourage plant regeneration.
Since there is still likely to be a vertical face even after backfill and restoration, a staged approach should be implemented whereby a 1.5m high bund is formed behind the face, an area of "Dead Ground" behind that, and finally a "Stock-proof" fence around the entire perimeter.

Possible Environmental Impact

Landscape.

The site is visible from the forest road. The development will not significantly change the appearance of the existing quarry.
X Extension currently has a 170m long existing face to the quarry.
Quarry X currently has a 70m long existing face to the quarry - the development of the quarry will extend this to approximately 95m. This will be worked in a generally northeasterly direction towards X Extension.
The quarry is low lying and is not very visible from the surrounding landscape, above or to the sides.

Watercourses and Catchments.

The distance from the Quarry X drainage outlet to the water course is approximately 560m.
The distance from the X Extension drainage outlet to the water course is approximately 580m.
Both are well vegetated forest drains.

The drain will be assessed for filtration capability and mitigation measures will be in place prior to any works taking place. The natural down slope of the hillside should ensure that there is little chance of siltation or sedimentation affecting this water course.

Construction

The machinery used to strip the site would be at the discretion of the Contractor. For the overburden removal, the most efficient type of machine to use would be an excavator in the 30 to 40 tonne class range, complete with rock breaking hydraulic hammer in conjunction with 20 tonne all-wheel drive dump trucks.

An excavator in the 20 to 25 tonne class range would be used to spread and shape the overburden tip, to a profile agreed with the FM Forester.
The access track would only be metalled with enough stone to allow an explosive pump truck access. The stone for this operation would be won on site.

The attached Quarry Development Plan details the position of the new access.

Archaeology

Nearest recorded in GIS is a sheep fank, 405m to the southwest of the quarry boundary. The quarry development will not impact on this.

Biodiversity

None recorded on site

Soils:

There should be no impact on surrounding soils as such.
The overburden will be used to return 3.14ha of current quarry area to productive forestry.

Recreation

The location of the new development is not on any promoted routes and is quite remote from the usual walking paths, trails or waymarked routes.

Designations:

The site is not within a designated area.

Habitat:

The works will have minimal impact on the existing habitat, being within a Sitka Spruce plantation.

Signed

Approved

Appendix VII: ESC Report on broadleaf suitability

Ecological Site Classification Report

Eastings(m)	*Northings(m)*	*Grid Reference*	*Climate Scenario*	*Site Class*	*Filter*	*Brash*	*Drainage*	*Fertiliser/Nurse*
259398	642832	NS593428	Baseline climate 1961•1990	Cool • Highly exposed • Wet	Broadleaves only	Brash older than 18 months	Drainage installed	No fertiliser

Site Description and Variables

The site has a cool, highly exposed and wet climate. Exposure constraints may limit species options and the ability to thin woodlands without significant risk of windthrow. The soils are wet moisture status and vp2 very poor nutrient status. Wet soils may cause flotation problems for heavy machinery on establishment, and on harvesting, if only lightly crowned species are present (e.g. birch). To remove excess water, drainage and appropriate cultivation will be undertaken; on wet soils avoid creating linear features that may increase the risk of erosion on steeper slopes.

Modifications	*AT*	*CT*	*DAMS*	*MD*	*SMR*	*SNR*
Default	1130.0	6.0	18.0	75.0	2.0(Wet)	0.5(VP2 Very poor)
Drainage					1.0	0.5
Final	1130.0	6.0	18.0	75.0	3.0(Very moist)	1.0(VP3 Very poor)

Species	*Abbr.*	*Suit(Ecol)*	*Suit(Timber)*	*Yield*	*Limiting*	*AT*	*CT*	*DAMS*	*MD*	*SMR*	*SNR*	*Version*
Downy birch	PBI	●	▲	4	DAMS	●	●	●	●	●	●	3.2(A)
Silver birch	SBI	●	●	3	DAMS	●	●	●	●	●	●	3.2(A)
Big leaf maple	AMA	●	●	0	DAMS	●	●	●	▲	●	●	3.1(C)
Norway maple	NOM	●	●	0	DAMS	●	●	●	●	●	●	3(B)
Sycamore	SY	●	●	0	SNR	●	●	●	●	●	●	3.3(A)
Beech	BE	●	●	2	DAMS	●	●	●	●	▲	●	3.1(A)
Roble beech	RON	●	●	0	SNR	▲	●	●	●	▲	●	3.1(B)
Ash	AH	●	●	0	DAMS	●	●	●	●	●	●	3(A)
Pedunculate oak	POK	●	●	0	SNR	●	●	●	●	●	●	3.1(A)
Red oak	ROK	●	●	1	SNR	●	●	▲	●	●	●	3(B)
Sessile oak	SOK	●	●	2	DAMS	●	●	●	●	▲	●	3.2(A)
Aspen	ASP	●	●	0	SNR	●	●	▲	●	●	●	3.2(A)
Black poplar	BPO	●	●	0	SNR	●	●	▲	●	●	●	3.1(A)
Rauli beech	RAN	●	●	0	DAMS	●	●	●	●	●	●	3.1(B)
Common alder	CAR	●	●	3	SNR	●	●	▲	●	●	●	3.2(A)

Red alder	RAR			0	SNR							3(B)
Grey alder	GAR			7	SNR							3.1(B)
Italian alder	IAR			0	DAMS							3.2(B)
Shining gum	ENI			12	DAMS							3(C)
Cider gum	EGU			5	DAMS							3(C)
Rowan	ROW			2	SNR							3.3(A)
True service tree	TST			0	DAMS							3(A)

Appendix VIII: List of maps

The table below lists the maps which support and form part of this Land Management Plan.

Whole Plan Maps

1 – Location
2 – Context
3a – Soils
3b – Climate
3c – Existing Forest Stock
3d – Yield class heat map
4a – Key Feature Opportunities & Constraints
4b – Initial Concept
5a – Management
5b – Future Habitats & Species

High Carlingcraig Woodland Creation Maps

5c i – Location
5c ii – Surveyed Soils
5c iii – Land Capability for Forestry
5c iii – Key Features Opportunities and Constraints
5c iv – Planting Design

Quarry X Expansion Maps

5d i – Quarry location
5d ii – Quarry expansion area
5d iii – Quarry remediation

Habitat Restoration Maps

5e i – Restoration area locations
5e ii – Restoration felling
5e iii – Restoration restock