Forestry Commission England

Yorkshire Forest District

Broxa Forest Design Plan

FDP 06

November 2012

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Broxa

730 Ha

Period of Plan: 2012 - 2021

1. Background

Broxa is located in the south east of the North York Moors National Park less than 10 kilometres from Scarborough. It lies on a broad, former moorland plateau, which is deeply incised to the south by the head waters of Whisper Dales and High Dales Becks, and terminated to the west by the River Derwent channel.

Although a predominantly freehold property, the land at Suffield Moor and Noddle End is leasehold.

2. Describing the Site

2.1 Geology and Soils (FDP Map 01)

Lower Calcareous Grit is the predominant geology over most of the higher moorland area. As the land falls away to the Derwent and its tributaries, other related Oolitic rocks form bands round the grit: Oxford Clay, then Kellaway Rock and finally Cornbrash shale beds. There is little or no drift geology in the forest area.

Soils at Broxa follow similar patterns to the geology, with a predominance of iron pan soils over the grit on the moors, brown earths and humic-iron podsols on the mid slopes and surface-water gleys on the lower slopes.

On steeper ground in Broxa there are physical limitations to machine working imposed by steep slopes when considering the options for forest operations.

2.2 Tree Species (FDP Map 02)

Larch and Pine are the dominant species groups at 26% and 25 % respectively, comprised primarily of Japanese larch and Scots pine, with Hybrid larch, Corsican and Lodgepole pine as lesser components. Spruce accounts for 9%, fir 4% and mixed/other conifer species 5%.

Broadleaves account for 19% of woodland cover, dominated by birch and beech with ash, oak, sycamore and alder also present.

No one species dominates any particular soil type.

Open Ground, felled and unplanted land accounts for 12% of the forest area, concentrated primarily on the plateaux.

2.3 Wind Damage (FDP Map 03)

Windthrow hazard measurements indicate the majority of the wood is predominantly windfirm, although on exposed scarp tops as well as on badly gleyed soils tree stability is less certain.

In light of this, management options are relatively unrestricted across the majority of the property with regard to practising Continuous Cover Forestry and extending the rotation age of crops for a wide range of objectives.

2.4 Landscape

Broxa is situated in the 'Langdale Forest' landscape character area[1] in the south-east of the North York Moors National Park, on gradually rising former upland moor. Elevation ranges from 80 metres in Lang Dale valley bottom up to 218 metes on the forest plateaux.

At the start of the previous plan (2002), the forest was largely coniferous in nature, with significant areas planted in the 1940's and 50's (65% by area). Although still predominantly coniferous (69 %), the structure has changed with almost 13% (100 hectares) of the 1940 – 50 age-range having been felled and restocked, creating a more structurally diverse woodland.

2.5 People and Community (FDP Map 06)

The wood is very well used by local people and visiting tourists for walking, horse riding and cycling.

Although the leasehold status across part of the woods means not all has been dedicated as open access under CROW legislation, Reasty Top car park provides a popular starting point for a large network of public rights of way and informal paths and tracks.

[1] North York Moors National Park Landscape Character Assessment - 2003

2.6 Natural Heritage (FDP Map 06)

Although the woods at Broxa are predominantly secondary plantation conifer woods, almost 25% are designated as Ancient Woodland Site (AWS), located in the deeply incised valleys of Lang Dale, High Dales, Whisper Dales and Bready Gill. Of this, over 70% is classed as conifer Plantation on Ancient Woodland Sites (PAWS). Native woodland types range from W6 – Alder woodland with stinging nettles, W8 – Lowland mixed broad-leaved woodland with dogs mercury, W10 – Lowland mixed broad-leaved woodland with bluebell and W16 - Lowland oak-birch woodland with bilberry. The quality of semi-natural ground flora associated with woodland types is variable and strongly influenced by the existing over-storey of conifer, mixed conifer/broadleaf and broadleaf stands.

The coniferous habitat across the plateaux is home to a wide range of international, national and regionally important species including Schedule 1 birds of prey, Nightjar, Northern wood ant and ground flora such as Common and Intermediate wintergreen, Twinflower and Lesser twayblade.

Wet and dry heathland habitat support populations of Green hairstreak butterfly.

The River Derwent corridor through Lang Dale is important for White-clawed crayfish, Otter and Kingfisher, with the river providing a natural boundary between Broxa and Langdale Forest units.

Broxa Forest is also the site of Pleistocene Ice Wedges that are of regional and national significance, creating distinctive polygonal patterns in the vegetation.

2.7 Cultural Heritage (FDP Map 06)

Broxa forest contains a rich and regionally important resource of historic features with 30 scheduled monuments, several of which are of significant importance at a landscape scale, and nearly 200 unscheduled monuments including Barns Cliff House and its associated banks and walls.

Historic features include Prehistoric linear boundaries, Iron and Bronze Age tumuli, medieval quarries and 18th century boundary stone markers amongst others.

3. Describing the Project

3.1 Project Brief

- increase the proportion of native broadleaf cover, particularly across areas of PAWS, riparian zones and along steep-sided scarp slopes

- manage designated sites in accordance with statutory requirements as per agreed management plans

- consider the selection of alternative main tree species that will contribute toward a greater range of species diversity to maintain or increase timber productivity

- increase the diversity of the age structure by adjusting current felling patterns throughout the wood and enhance external and internal edges

3.2 Objectives

- Conserve ancient and veteran trees and continue the restoration of PAWS to native dominant woodland, to be measured by the sub-compartment database.

- Ensure SAM's are maintained in target condition, to be monitored through liaison with English Heritage.

- Ensure scheduled and unscheduled ecological and historic features are maintained in target condition and improved where opportunities arise, to be measured by FC systems accordingly.

- Maximise and maintain a sustainable supply of timber from site-appropriate conifer and broadleaf species, to be measured by the Production Forecast and Sales Recording Package.

- Increase the woodlands contribution to the Langdale Forest landscape character area, particularly where margins appear geometric and blocky. To be measured by fixed-point photography.

3.3 Constraints

- Difficult access and topography present operational challenges whilst harvesting scarp slopes, gills and valley sides

- projected climate change scenarios and forest pest and diseases are likely to challenge future tree species choice, particularly on the plateau where the nutrient and water regimes are low

- terms of the lease restrict the development for public recreation across parts of the forest area

3.4 Implementation

3.4.1 Conservation

Protect and, where appropriate, enhance all known sites of archaeological and ecological importance:

Archaeological sites

All sites, regardless of their designation, will receive the same level of care during the planning and execution of forest operations. The operational planning system will ensure they are recognised and the proper measures for their protection are in place before work begins. This planning system also ensures that, where possible, opportunities to enhance the condition of archaeological interest are taken during routine forest work. For Broxa this will include:

- Maintain designated sites (Scheduled Ancient Monuments) in favourable condition. Reference will be made to site-specific management plans where these identify particular management issues that need to be addressed.
- Along the top of the gently sloping plateaux overlooking the Limestone Dales there are a significant number of scheduled tumuli and a public footpath that provides a link with the forest and the wider historic landscape. This may present future opportunities to develop on-site interpretation in partnership with stakeholders.
- Where linear archaeological features exist in continuous cover compartments, forest operations should take special care in crossing these feature to avoid damaging them. In some instances it may be appropriate to create fixed crossing points with adequate protection measures for the archaeological features.

Ecological sites

All work sites are surveyed prior to any operations both to audit the accuracy of information already held on record and to identify opportunities to further improve the ecological value of the woodlands. For Broxa this will include:

- Managing Veteran trees and PAWS as set out in – Ancient Woodland on the Forestry Commission Estate in England (March 2002) and FEE Operations Instructions No. 3 (rev.2012), Ancient Woodlands.

- Increase the diversity of tree species and age structure that will maintain and improve favourable habitats for target species and identified habitats. This is particularly beneficial for the range of priority woodland bird species recorded close to Broxa, including Marsh tit, Woodcock and Tree pipit (Appendix 3).

3.4.2 Timber Harvesting

We will continue to sustainably harvest timber both from clearfell and thinnings, and where appropriate develop broadleaf stands to increase their contribution to timber production. These operations will be planned and controlled to ensure due regard for all other objectives of management at Broxa.

3.4.3 Landscape

The woods at Broxa lie within the North York Moors National Park, a designated landscape. Views are varied as the woodland sits on a gently sloping plateau between the Limestone Hills to the south and the Limestone Dales to the north.

Near views are experienced from vehicles travelling along Reasty Road and by walkers, cyclists and horse riders using the numerous rights of way and forest roads and rides.

Longer views of the north-facing scarp slope are prominent from nearby minor council roads to the north.

The plateau is dominated by larch and pine conifer species, ranging from the early 1940's afforestation to present day restocking, where recent felling is increasing stand structure and diversity. The scarp slope and gill woodlands are comprised of mixed conifer and broadleaf species, creating a more intimate and small-scale structure.

On a scale of low/medium/high, landscape sensitivity is considered medium.

The adoption of Continuous Cover Forestry (CCF) across the plateaux areas of Broxa, avoiding the more difficult and steep terrain along the scarp slope and deeply incised gills in Lang Dale, will contribute toward the creation of more species and structurally diverse woodlands within the landscape.

The remaining areas will be managed on a high forest-clearfell system where the coupe size and shape are in keeping with the scale of the woodland blocks and the surrounding landscape. The resulting diversity in age and height that the clearfell system produces will enhance both external and internal views of the woodlands.

3.5 Plan (FDP Map 07)

The design concept map shows the key factors we need to address. These are taken forward and used to form the basis of a practical plan in the fell and restock maps.

3.6 Areas (FDP Maps 08 and 09)

3.6.1 Breakdown of felling areas within the period of the plan.

A map showing the location of felling sites can be found in the A1 Forest Design Plan folder.

Felling	Area - hectares	% of total area	Projected volume (m^3)
2012 – 2016 Clearfell	**63.4**	**9**	**14 180**
2017 – 2021 Clearfell	**39.6**	**5**	**12 130**
Continuous Cover	**8.0**	**1**	**2 000**
Minimum Intervention	**111.5**	**15**	

3.6.2 Breakdown of constituent areas.

A Future Habitat and Species map showing the location and detail of the constituent areas can be found in the Forest Design Plan folder.

Habitat type (based on principal species established)	**Area – hectares**	**% age of total area**
Conifer	**397.7**	**54**
Broadleaf	**307.3**	**42**
Heathland, and planned open areas	**25.0**	**4**

3.7 Methods / Forest Operations

3.7.1 Planning

Before any major forest operations are undertaken an “Operational Site Assessment” is completed. This document details the proposed work and outlines all known environmental, social and operational considerations. The “Operational Site Assessment” then becomes an important reference document during the planning phase, at the pre commencement meeting before scheduled works begin and for supervisory visits during the operation. The “Operational Site Assessment” is kept along with other documents relating to the operation in the main office.

For routine maintenance operations (e.g. fencing, ride mowing, survey work etc.) the Yorkshire District policy on timing of operations to minimise wildlife disturbance will be followed.

3.7.2 Standards

All operations within the forest will be carried out in accordance with the certification standard for the U.K. Woodland Assurance Scheme and according to guidance contained in the U.K Forestry Standard. Operations will also adhere to the guidance given in the Forestry Commission General Forestry Practice Guidelines (Forests and biodiversity, Forests and climate change, Forests and historic environments, Forests and landscape, Forests and people, Forests and soils, Forests and Water).

3.7.3 Harvesting

The majority of the timber is likely to be sold standing and contractors will be employed by the purchaser to carry out the work. Staff from both the timber buyer and the Forestry Commission will monitor work through regular site visits to ensure all guidelines and contract conditions are adhered to.

Clearfell V’s Continuous Cover Forestry

All plans are required to consider lower impact silvicultural systems (LISS) in windfirm conifer plantations as opposed to traditional clearfell systems. This decision is based upon the methodology provided in FC Information Note 40 – ‘Transforming Even-aged Conifer Stands to Continuous Cover Management’. Where first rotation coupes are not identified for CCF management, we will manage on an extended rotation basis to be thinned and monitored for future consideration for conversion to CCF.

At Broxa, using the FC Forest Research Agency, Ecological Site Classification system (ESC), a range of conifer species are considered 'optimum' to 'unsuitable' for CCF where timber production is considered as an objective. We will only use species identified as 'unsuitable' where local conditions minimise site limiting factors i.e. Douglas fir will be planted on free draining, brown earth locations to reduce the limiting factor of winter soil moisture regime (water logging); Norway spruce on north facing, water receiving sites to reduce the limiting factor of summer soil moisture regime (drought).

Steep sided, irregularly thinned sites with poor access and difficult harvesting terrain will be clear felled with a view to retaining mature, windfirm broadleaf specimens where possible. Physical and economic constraints may require certain sites to be left and allowed to develop through to biological rotation, where no felling is carried out.

See Appendix 2 – CCF justification.

3.7.4 Haulage

As in our other woodland blocks we will continue discussions with the relevant Highways Authority to agree haulage routes and discuss annual tonnages.

All timber traffic will be managed in line with the Road Haulage of Round Timber Code of Practice (Fourth edition, 2012), which aims to improve the safety and environmental standards of the timber haulage industry.

3.7.5 Restocking

Conifer

The areas of clearfell in the design plan will be replanted to diversify species and age structure and to continue to provide a sustainable timber resource, whilst mindful of the projected impacts of climate change. The FC Forest Research Agency, Ecological Site Classification system (ESC) will aid species choice and selection. At Broxa this will include the introduction of Douglas fir across the deeper brown earth soil types.

Although identified as suitable by ESC, Corsican pine is no longer considered appropriate for restocking due to forest health issues and there are concerns regarding the long term sustainability of larch. Consequently larch will no longer be restocked in pure stands, it will however still be planted in mixture with other conifers at no more than 25%.

Norway spruce is considered unsuitable by ESC at the 2080 high scenario, however it will continue to be grown across locally gleyed and brown earth soil types. It is felt that

localised conditions that reduce the impact of moisture deficit values will allow the retention of this species.

Unless restocking conifer sites with single species, reference to Mixed Conifer on the Future Habitat & Species Map will be used to describe those areas where a range of species will be planted across the site as follows:

Plateau sites - SP, LP, HL (iron pan/podsols), NS (gleys), DF/HL (brown earths)

Mid to upper slope - SP, LP, HL

As indicated at 3.7.1 Planning, the Operational Site Assessment will provide site-specific data on soils and other site factors that will help inform the correct choice of species on a site-by-site basis.

The continuous cover areas will be managed to encourage natural regeneration, although it is accepted that replanting will be required to further maintain and diversify the current range of species.

With ESC projections at the 2080 high scenario indicating a reduction in the suitability of current main crop species being available for restocking, drought-tolerant alternative species such as Macedonian pine, Oriental and Serbian spruce, European silver fir and Coast redwood will also be considered.

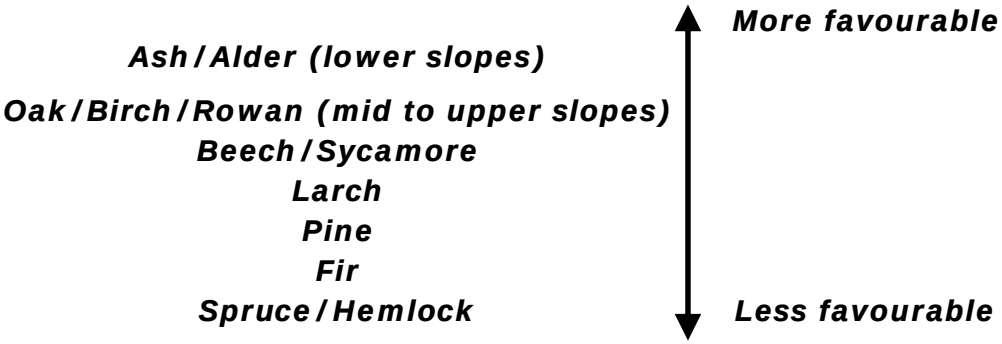
Natural regeneration across clearfell areas will be assessed in terms of species suitability and the risk it poses to the objectives of the plan considered as to its retention or removal.

Broadleaf

The areas of PAWS at Broxa will be restored to the appropriate range of native woodland types where this is influenced by underlying soil nutrient and moisture regimes. Delayed thinning or no-thinning across the majority of these sites reduces the option for gradual restoration through CCF due to the increased risks of windthrow. Consequently, appropriate scale clear felling phased over a range of felling periods, and restocking by natural regeneration will secure the eventual conversion from conifer to native dominant, mixed broadleaf woodland.

On non-PAWS sites planned for conversion to broadleaf woodland, we will accept natural regeneration of both native and non-native species i.e beech, sycamore.

Species regeneration on PAWS areas



Natural regeneration in PAWS woodland will be assessed and the risk it poses to the objectives of the plan considered. Where dense shade or invasive species (i.e conifer, rhododendron) threatens the native woodland community, it will be removed as soon as practicable. Where the risk is lower it will be allowed to reach a harvestable size and removed as part of a routine felling or thinning operation.

Heathland/Wooded heath

It is proposed to develop a mosaic of upland heath and native broadleaf/mixed woodland habitat through natural regeneration across conifer sites that lie adjacent to existing heathland habitats. The development of these sites will be beneficial for a range of species i.e. Green hairstreak butterfly, Nightjar, Northern wood ant etc. We do not intend to manage these sites for future timber production.

4. Monitoring

4.1 Clearfells

All clearfell areas are managed spatially using the Sub Compartment Database to ensure the boundaries and designs are accurately reproduced on the ground. Significant variances in the areas to be felled may require a formal amendment of the plan plus the agreement of and approval by FC regional staff, as per CSM 6.

4.2 Restock

All restock areas where timber production is an objective will be planted/naturally regenerated and monitored to ensure that the number of established trees per hectare fully meets the requirements of OGB*4. This document has mandatory requirements on the monitoring of the crop in Year 5 to ensure the establishment of at least 2500 trees / ha.

4.3 Continuous Cover

Continuous cover areas will be monitored using the methods and procedures contained in OGB*7. Similar in scope to the methods employed for restock areas, where timber production is the aim we need to have at least 2000 saplings per hectare after 10 – 15 years, these should be evenly spread over 90% of the site.

4.4 Design Plan

All design plans are formally reviewed "mid term" and the plan's aims and objectives and its success at achieving those aims and objectives will be formally reviewed in 2017. This time period can be shortened if circumstances change significantly or if parts of the plan prove detrimental to the overall aims and objectives.

*Operational Guidance Booklet

5. Determination of Impact Significance and Mitigation

5.1 Ancient and Native Woodland

*Threats to our ancient and native woodlands can be immediate and absolute (e.g. loss to infrastructure or development) or slower and more subtle (e.g. shading from conifer species or invasive species such as Rhododendron). There are also more widespread environmental changes, such as diffuse pollution and climate change, which may threaten in the long term. (*www.forestry.gov.uk/keepersoftime*)*

Major threats to ancient and native woodland are:

- *Climate change and fragmentation*
- *Excessive browsing and grazing by deer & livestock*
- *Inadequate or inappropriate management*
- *Invasive and problem species*
- *Diffuse pollution*
- *Loss*

Through this plan, we will continue to apply local and national policy and best practice guidance for the restoration of PAWS.

5.2 Flora

Heathland is a UKBAP Priority Habitat

Within woods, concentrate on open space habitat expansion and management, developing heathland, neutral grassland and acid mires.

(G. Peterken – Native Woodland Development in the North York Moors and Howardian Hills)

This plan will continue the management and development of heathland where this will improve habitat networks within Broxa Forest.

5.3 Other Objectives

Concentrate on developing habitat–rich riparian corridors with marshes, meadows, woodlands, trees in farmlands. These would pass through both woodland and farmland.
(G. Peterken – Native Woodland Development in the North York Moors and Howardian Hills)

We will continue to apply local and national policy and best practice guidance to the management of riparian corridors across Broxa Forest. This will improve and enhance the habitat network within the woodlands and benefit protected species.

Continuing development of both species and structural diversity will benefit habitats for priority woodland bird species throughout the woodland. Maintaining a resource of clear fell and heathland sites will provide suitable habitat for Nightjar within the forest area.

Appendix 2 – CCF justification

Site Factor	Suitability Score	Comment
WHC: range 1to 3	1	Tree stability is not a site-limiting factor
Soil fertility: Very Poor to medium	1	Isolated areas of medium fertility support a wider range of competing vegetation
Species suitability: (LP), (SP,CP,EL), (DF,NS,SS)	(1), (2), (3) 1 – Optimal 2 – Suitable 3 – Unsuitable	Corsican pine is not considered suitable due to RBNB and Larch will only be utilised within a mixture due to phytophthora.

With a combined score ranging from 3 to 5, initial analysis indicates significant areas of Broxa achieve a good to moderate suitability score for transformation to CCF. Further analysis of stand structure is considered to help inform whether transformation should be considered.

- Stand form – Form is average and of a reasonable quality.
- Thinning history – Thinning operations have been carried out over a regular cycle, developing crowns that can act as potential seed bearing trees.
- There is little or no sign of early or advanced regeneration of any of the target species, although Sitka spruce (unsuitable) is evident below a range of compartments supporting mature SP/CP.

On the basis of the above information, we will consider CCF across even-aged conifer stands using a range of conifer species (mainly pine, larch, but also fir and spruce where conditions allow), aiming for a simple stand structure. Currently, there is little evidence of a developing naturally regeneration resource other than SS.

We will adopt a Group Shelterwood system through a combination of thinning, group felling (0.25 to 0.50 ha) and replanting with suitable species.

Significant areas of high forest/clearfell coupes will be managed on an extended rotation basis and will be monitored for there development of natural regeneration. Where appropriate these will be considered for developing toward CCF management as set out above.

Forest Research Ecological Site Classification

Species	Baseline			2080 Lo			2080 Hi		
	Lim Factor	Suitability	Yield	Lim Factor	Suitability	Yield	Lim Factor	Suitability	Yield
Scots Pine	SMRW	Very suitable	10	SMRW	Suitable	10	SMRW	Suitable	8
Corsican Pine	SMRW	Suitable	12	SMRW	Suitable	14	SMRW	Suitable	12
Lodgepole Pine	AT5	Very suitable	16	AT5	Very suitable	16	AT5	Very suitable	12
Sitka Spruce	MD	Suitable	14	MD	Suitable	14	MD	Unsuitable	6
Norway Spruce	CT	Suitable	14	CT	Suitable	16	SMRS	Unsuitable	10
European Larch	AT5	Very suitable	10	SMRW	Suitable	10	MD	Suitable	8
Japanese Larch	MD	Suitable	8	MD	Suitable	8	MD	Unsuitable	0
Douglas Fir	SMRW	Suitable	14	SMRW	Unsuitable	14	SMRW	Unsuitable	10
Grand Fir	MD	Suitable	14	MD	Suitable	18	MD	Unsuitable	2
Noble Fir	MD	Unsuitable	10	MD	Unsuitable	8	SMRS	Unsuitable	6
Western Hemlock	SMRW	Very suitable	18	SMRW	Suitable	20	MD	Unsuitable	8
Red Cedar	MD	Suitable	14	MD	Suitable	14	MD	Unsuitable	4
Silver Birch	AT5	Very suitable	10	SMRS	Suitable	8	SMRS	Suitable	6
Downy Birch	MD	Suitable	8	SMRS	Unsuitable	4	SMRS	Unsuitable	4
Sessile oak	SMRW	Suitable	6	SMRS	Suitable	8	MD	Suitable	4
Pedunculate oak	CT	Suitable	6	SMRS	Suitable	8	SMRS	Unsuitable	4
Beech	SMRW	Very suitable	8	SMRW	Unsuitable	6	SMRW	Unsuitable	6
Ash	SNR	Suitable	8	SNR	Suitable	8	SMRS	Unsuitable	6
Aspen	AT5	Very suitable	10	SMRS	Suitable	10	SMRS	Unsuitable	6
Sycamore	SNR	Suitable	8	SNR	Suitable	8	MD	Suitable	6
Alder	SMRS	Suitable	6	SMRS	Unsuitable	4	SMRS	Unsuitable	4
Rauli New	SMRW	Suitable	12	SMRW	Unsuitable	8	MD	Unsuitable	8
Poplar	SNR	Suitable	6	SMRS	Unsuitable	4	SMRS	Unsuitable	4
Wild cherry	SNR	Suitable	6	SNR	Suitable	8	SMRS	Unsuitable	4

Appendix 3 – RSPB Priority woodland bird species

Broxa Forest	Y&H	N of records in 10km	Nearest Km distance
Marsh tit		10	<1
Nightjar		3	2
Redstart		1	6
Spotted flycatcher		2	4
Tree pipit		9	<1
Willow tit		4	6
Woodcock		18	<1
Wood warbler		1	2.5
Garden warbler		✓	
Willow warbler		✓	

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Forestry Commission woodlands have been certified in accordance with the rules of the Forest Stewardship Council

SGS-FM/COC-000358

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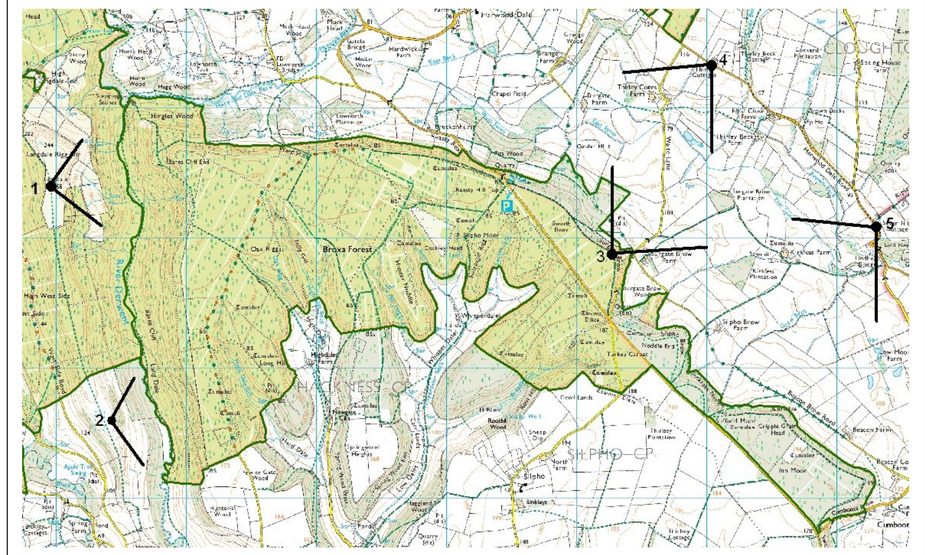
BROXA

FDP 6

YORKSHIRE FOREST DISTRICT



Location Map & View Points

Views 1 & 2:- View from Langdale Rigg (north and south) to Barns Cliff—The onset of spring highlights the different species within the Barnscliff—Langdale valley. These are comprised of dark evergreen conifers (pine, spruce and fir), bright green deciduous larch and deciduous broadleaves not yet flushed. Proposed felling will see the overall reduction of conifers and the regeneration of predominantly site native broadleaves.

View 3:- View from round barrow on Surgate Brow—When viewed along the public rights of way along the escarpment edge, felling of mature crops create opportunities to look across the Limestone Dales to the north.

Views 4 & 5:- Cinder Hills to Cumboots Brow from Thirley Cottages and Surgate Brow to Flockrake Noddle from Severn Hills Cottage—Species boundaries are masked to some extent by the back-lit conditions; however, recent felling shapes are evident where native broadleaves are now regenerating. Proposed felling of dark evergreen conifers (mainly pine) will further improve the landscape by removing hard species boundaries.

Forestry Commission England

Broxa Location Map

FSC

N

BROXA

NORTH SEA

NORTH SEA

NORTH YORK MOORS NATIONAL PARK

YORKSHIRE DALES NATIONAL PARK

SUNDERLAND · WASHINGTON · STANLEY · CHESTER-LE-STREET · DURHAM · SEAHAM · PETERLEE · HARTLEPOOL · BISHOP AUCKLAND · CROOK · SPENNYMOOR · SEDGEFIELD · NEWTON AYCLIFFE · DARLINGTON · BARNARD CASTLE · STOCKTON-ON-TEES · BILLINGHAM · REDCAR · SALTBURN-BY-THE-SEA · MIDDLESBROUGH · GUISBOROUGH · WHITBY · RICHMOND · NORTHALLERTON · SCARBOROUGH · FILEY · BRIDLINGTON · HORNSEA · BEVERLEY · KINGSTON UPON HULL · WITHERNSEA · HESSLE · RIPON · HARROGATE · KNARESBOROUGH · YORK · SKIPTON · KEIGHLEY · BRADFORD · LEEDS · HALIFAX · PICKERING · MALTON · NORTON-ON-DERWENT

1:250,000 | Printed Date: 04/12

20 10 0 20 Kilometers

Broxa - Soils Map

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FSC

SGS-FM/COC-005158

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Map 01 - Geology & Soils

- Brown Earths
- Podzols
- Iron Pans
- Gleys

1:10,000 Printed Date: 04/12

0 250 500 1,000 1,500 2,000 Meters

Broxa - Current Species

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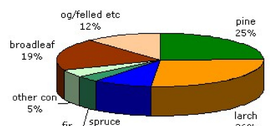
FSC

N

Pie Chart to show the planted area in % in Broxa



Map 02 - Current Species

- Open/Felled etc
- Broadleaves
- Lodgepole Pine
- Mixed Conifer
- Other Conifer
- Corsican Pine
- Norway Spruce
- Scots Pine
- Sitka Spruce
- Larches
- Douglas Fir

0 250 500 1,000 1,500 2,000 Meters

1:10,000

Printed Date: 04/12

Broxa- Wind Hazard Map

Forestry Commission England

Forestry Commission woodlands have been certified in accordance with the rules of the Forest Stewardship Council

FSC

N

Map 03 - Wind Hazard Class

- 1
- 2
- 3
- 4

0 250 500 1,000 1,500 2,000 Meters

1:10,000

Printed Date: 04/12

Broxa
Age Class Map
Forestry Commission England
Forestry Commission woodlands have been certified in accordance with the rules of the Forest Stewardship Council.
FSC
N
HA
300
250
200
150
100
50
0
Open/Felled etc
1850-1890
1900-1940
1941-1950
1951-1960
1961-1970
1971-1980
1981-1990
1991-2000
2001-2011
Map 04 - Age Class
Open/Felled etc
1850 - 1890
1900 - 1940
1941 - 1950
1951 - 1960
1961 - 1970
1971 - 1980
1981 - 1990
1991 - 2000
2001 - 2011
CLOUGHTON CP
SILPHO CP
HACKNESS CP
Harwood Dale
Broxa
Silpho
Langdale End
1:10,000
Printed Date: 04/12
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Broxa
Current Felling Map
Forestry Commission England
FSC
N
Map 05 - Current Felling
2012-2016
2017-2021
2022-2026
2027-2031
2032-2036
2037-2041
2042-2046
2047-2051
2052-2056
2057-2062
Felling Beyond Plan Period
Continuous Cover
Minimum Intervention
0 250 500 1,000 1,500 2,000
Meters
1:10,000
Printed Date: 04/12
CLOUGHTON CP
SILPHO CP
HACKNESS CP
Harwood Dale
Broxa
Silpho
Cloughton
Langdale End
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Broxa - Management Plan

Forestry Commission England

Map 06 - Management Information

- Management Area
- SSSI
- Scheduled Ancient Monument
- ASNW
- PAWS
- Archaeological Feature
- Archaeological Feature
- Conservation Site Point
- Conservation Line
- Conservation Area
- Public bridleway
- Public footpath
- Public by way
- FC Roads

N

0 250 500 1,000 1,500 2,000 Meters

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Broxa Forest Design Plan
Yorkshire Forest District
Analysis and Concept

Map 07 - Analysis and Concept

- Restore Ancient Woodland
- Convert conifer to broadleaf
- Productive conifer sites
- Scheduled monument
- Footpath linking historic features

Visually improve the woods within the landscape, particularly along the prominent scarp slope.

* Allow current conifer stands along the scarp slope to be restored to broadleaf and mixed species woodland.
* Accept areas of open ground across these sites that will allow a mosaic of habitats to develop.

Consider opportunities to improve the visitor experience and understanding of the wider forest environment

* Linear linkages exist along the scarp slope where plantations, public rights of way and scheduled monuments offer views from and across an ancient landscape.

Sustainable timber production remains a priority objective across the more accessible parts of the forest

* Alternative conifer species i.e. Macedonian pine, Oriental spruce and European silver fir will be considered where conditions are suitable.
* Develop continuous cover silvicultural systems and extended rotations to allow natural regeneration and underplanting with alternative species to become established.

Restoration of ancient woodland to native dominant species remains a priority objective

* Felled conifer stands will be restored to native species by natural regeneration and enrichment planting if required.

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Broxa - Proposed Felling Map

Forestry Commission England

FSC

N

Map 08 - Proposed Felling

Felling Year

- 2012-2016
- 2017-2021
- 2022-2026
- 2027-2031
- 2032-2036
- 2037-2041
- 2042-2046
- 2047-2051
- 2052-2056
- 2057-2062
- Felling Beyond Plan Period
- Continuous Cover
- Minimum Intervention

Proposed Harvesting Map

This map shows how we intend to manage tree felling in Broxa in order to meet the multiple objectives of management there.

Clearfells
Clearfells remove all or the majority of trees from the site. They allow significant changes in landscape, species and age class diversity to be achieved in a short space of time. They provide temporary open space followed by a slow succession of different habitat types each exploited by different flora and fauna.

Continuous Cover
In a continuous cover system change is managed more slowly using a combination of heavier thinnings and small group fellings (normally no greater than 0.25Ha). The purpose of the thinning / felling operations is to produce timber and to allow enough light to reach the forest floor for replanting / regeneration to take place. The majority of the site has tree cover at all times and at one or more levels.

Minimum Intervention
Managed for conservation and landscape. Management will be very low key where areas will be considered as an ecological refuge. In exceptional cases some areas may continue to be thinned but only when, and for as long as, thinning can be clearly demonstrated to have a higher conservation or biodiversity value than not thinning.

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0 250 500 1,000 1,500 2,000 Meters

Broxa - Restock Map

Forestry Commission England

FSC

Forestry Commission woodlands have been certified in accordance with the rules of the Forest Stewardship Council.

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Restock Species

This map shows the main species groups that are to be used when restocking felled areas. Because of the constraints of map scale, unplanted areas are not shown unless they are greater than 0.5ha in size. This means that unplanted corridors such as those alongside roads and rides are not represented on this map.

Mixed broadleaf areas will be restocked by natural regeneration primarily using site-native broadleaf's. This will be predominantly birch, but other species such as oak, ash, alder and rowan are anticipated. We will also accept non native species such as beech and sycamore where these meet management objectives. Enrichment planting may be used where there is insufficient regeneration or where we want to further diversify the range of species present.

Mixed conifer areas will be regenerated through a combination of planting and natural regeneration with appropriate species dependant on the underlying site conditions such as soil and topography:

Plateau sites - SP, LP, HL (iron pan/podsols), NS (gleys), DF/HL (brown earths);

Mid to upper slope - SP, LP, HL.

In addition, climate change projections indicate a reduction in the suitability of current main crop species being available for restocking. Drought-tolerant alternative species such as Macedonian pine, Oriental and Serbian spruce, European silver fir and Coast redwood will also be considered.

Map 09 - Future Habitat Species

- Open/Felled/Agric etc
- Broadleaves
- Mixed Conifer
- Norway Spruce

0 250 500 1,000 1,500 2,000 Meters

1:10,000

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