Forestry Commission Scotland
Coimisean na Coilltearachd Alba

Scottish Lowlands FD

Dean & Carnock

Location

Scale: 25,000 @ A3

11 Jul 2018

CARNOCK

DEAN

DUNFERMLINE

Kilometers
0 0.25 0.5 1 1.5 2

N
W E
S

Legend

- Carnock
- Dean

Forestry Commission Scotland
Coimisean na Coillteareachd Alba

Scottish Lowlands FD

Dean Plantation & Carnock Context map

Scale: 15,000 @ A3

11 Jul 2018

CARNOCK

DEAN PLANTATION

N
W
E
S

0 0.25 0.5 1 1.5 2 Kilometers

Legend

- Local authority core paths
- Road Segments
- Dean Plantation & Carnock
- Non FCS woodland
- Districts

Forestry Commission Scotland
Coimisean na Coilltearachd Alba

Scottish Lowlands FD

Carnock

Soils map

Scale: 5,000 @ A3

11 Jul 2018

N
W E
S

Legend

- 1. Brown earth
- 2. Man-made soils
- 3. Podzols
- 4. Ironpan soils
- 5. Ground-water gley
- 6. Peaty gley
- 7. Surface-water gley
- 8. Juncus bog
- 9. Molinia bog
- 10. Sphagnum bog
- 11. Calluna bog
- 13. Rankers & skeletal soil
- 14. Eroded bog
- Valley Complex

Kilometers
0 0.05 0.1 0.2 0.3 0.4

Forestry Commission Scotland
Coimisean na Coilltearachd Alba

Scottish Lowlands FD

Dean

Soils map

Scale: 7,000 @ A3

11 Jul 2018

N
W E
S

Legend

- 1. Brown earth
- 2. Man-made soils
- 3. Podzols
- 4. Ironpan soils
- 5. Ground-water gley
- 6. Peaty gley
- 7. Surface-water gley
- 8. Juncus bog
- 9. Molinia bog
- 10. Sphagnum bog
- 11. Calluna bog
- 13. Rankers & skeletal soil
- 14. Eroded bog
- Valley Complex

Kilometers
0 0.05 0.1 0.2 0.3 0.4

Forestry Commission Scotland
Coimisean na Coilltearachd Alba

Scottish Lowlands FD

Carnock

Climatic Zones

Scale: 5,000 @ A3

11 Jul 2018

N
W E
S

Midfield
Blather Burn
Track
Rhynd House
Issues
Track
150m
Rhynd Farm
Drain
Lodge
125m
142m
Issues
Drain
Cowstrand
Rhynd Cottages
Lodge
Tk
Chicken Breeding Farm
Cowstrandburn Plantation
122m
128m
Lynallan
Mayfield House
Kirian
Cowstrand Burn
Cowstrandburn
Track
Quarries (disused)
Quarries (disused)
Track
Tk
Carnock Moor
Quarry (disused)
117m
Issues
179m
Loanhead Farm
Loanhead Farm Cottage
Loanhe Hirta
186m
W
Bonhard Cottage
124m
188m
Quarry Wood
Kilometers
0 0.05 0.1 0.2 0.3 0.4

Legend

- Warm, Moist, Moderately exposed
- Warm, Moist, Sheltered
- Carnock

Forestry Commission Scotland
Coimisean na Coilltearachd Alba

Scottish Lowlands FD

Dean

Climatic Zones

Scale: 7,000 @ A3

11 Jul 2018

N
W E
S

Kilometers
0 0.050.1 0.2 0.3 0.4

Legend

- Warm, Moist, Moderately exposed
- Warm, Moist, Sheltered
- Dean Plantation

Forestry Commission Scotland
Coimisean na Coilltearachd Alba

Scottish Lowlands FD

Carnock

Hydrology

Scale: 5,000 @ A3

11 Jul 2018

N
W E
S

Legend

- Bluther burn
- Grange burn
- Carnock

Kilometers
0 0.05 0.1 0.2 0.3 0.4

Forestry Commission Scotland
Coimisean na Coillearachd Alba

Scottish Lowlands FD

Dean

Hydrology

Scale: 7,000 @ A3

11 Jul 2018

N
W E
S

Legend

- Crossford burn
- Carnock

Kilometers
0 0.050.1 0.2 0.3 0.4

Forestry Commission Scotland
Coimisean na Coillearachd Alba

Scottish Lowlands FD

CARNOCK
Existing woodland

Scale: 5,000 @ A3

11 Jul 2018

N
W E
S

Legend

- Blocks
- Pines
- Spruces
- Larches
- Other Conifer
- Oak
- Beech
- Other Broadleaves

0 0.05 0.1 0.2 0.3 0.4 Miles

Forestry Commission Scotland
Coimisean na Coillearachd Alba

Scottish Lowlands FD

DEAN
Existing woodland

Scale: 7,000 @ A3

11 Jul 2018

N
W E
S

Legend

- Blocks
- Pines
- Spruces
- Larches
- Other Conifer
- Oak
- Beech
- Other Broadleaves

0 0.05 0.1 0.2 0.3 0.4 Miles

Forestry Commission Scotland
Coimisean na Coillteareachd Alba

Scottish Lowlands FD

Carnock

Access

Scale: 5,000 @ A3

11 Jul 2018

N
W E
S

Legend

- Forest Block
- FC Road
- CORE_PATHS
- Desire line

Kilometers
0 0.05 0.1 0.2 0.3 0.4

Forestry Commission Scotland
Coimisean na Coilltearachd Alba

Scottish Lowlands FD

Dean

Access

Scale: 7,500 @ A3

11 Jul 2018

N
W E
S

Legend

- Forest Block
- FC Road
- CORE_PATHS
- Desire line

Kilometers
0 0.05 0.1 0.2 0.3 0.4

Forestry Commission Scotland
Coimisean na Coilltearachd Alba

Scottish Lowlands FD

Carnock

Entrance locations

Scale: 5,000 @ A3

11 Jul 2018

B913 access
NT03749063

Kilometers
0 0.05 0.1 0.2 0.3 0.4

Legend

Forest Block

Forestry Commission Scotland
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Scottish Lowlands FD

Dean

Entrance locations

Scale: 7,000 @ A3

11 Jul 2018

N
W E
S

Lundin Road entrance NT06198802

Pitdinnie road entrance NT04418782

Kilometers
0 0.05 0.1 0.2 0.3 0.4

Legend

Forest Block

Forestry Commission Scotland
Coimisean na Coilltearachd Alba

Existing Woodland
- Existing broadleaved areas provide options for developing amenity/biodiversity potential within the forest.
- Some pockets of veteran trees across the site, providing good opportunities to develop biodiversity potential.
- Larch and cypress in NW corner are both regenerating freely, offering opportunities for developing future stands through natural regeneration.
- Extensive birch understorey developing under main pine stand, providing potential successor crop. Some small pockets of Sitka spruce regeneration also present.

- Nearly 25% of forest is comprised of areas of mixed broadleaves which would be difficult to bring into commercial production
- Approx. 60% of site is single aged pine crops, limiting age class diversity within the forest.
- Little pine regeneration evident within main stands, limiting potential for achieving successor crops without restocking

Forest Habitat Networks
- Woodland on adjacent ground to E + NW provides opportunity to develop forest habitat network links to surrounding area.

- Existing broadleaves are largely concentrated in discrete blocks, providing little in the way of internal semi natural forest habitat network linage.

Climate
- Current favourable climate (Warm, Moist) allows broad range of silvicultural options in terms of species choice.
- Site is generally low lying and reasonably sheltered, with DAMS scores and previous thinning history suggesting that future crops should also be thinnable.

- Future climate projections suggesting increasingly dry summers may mean some species are less suitable in the longer term.

Watercourses
- Minor watercourses on forest boundary provides potential for developing riparian woodland

- Minor watercourses on forest boundary potentially restricts productive conifer options in immediate vicinity.

Recreation
- Core path running through northern half of forest offers potential to develop recreational links with surrounding area.

- Site is fairly well used by local population, with a network of informal desire lines though the forest which will need to be taken into account during any forest operations.
- Open ground at NW edge of the site is currently under review as a possible site for developing a hutting project, potentially restricting management options.

Conservation + Heritage
- Potential to benefit red squirrel through suitable species choice.
- One or two minor archaeological features of local significance present, with potential to retain unplanted buffers to increase amenity/biodiversity value.

- Red squirrel in local area may impose limitations on species choice
- 9 ha in SW corner classed as Long Established of Plantation Origin (LEPO).

Utilities
- Utilise mandatory open space to increase habitat quality/variety
- Potential to reduce visual impact of overhead powerline through careful design

- Overhead powerline bisects the site, potentially restricting operational access routes and complicating potential for achieving naturalistic woodland shapes when designing felling/restocking areas.

Landscape
- Potential to move away from uniform main conifer crop to develop a more naturalistic design that sits better within the wider landscape.

- Site falls within Cleish Hills SLA, potentially impacting on decisions regarding future species choice and forest shape.
- Site is reasonably prominent within the wider landscape, visible from both the B913 + B914, and will require careful design to ensure a sympathetic fit.

Forest Operations
- Existing forest road and tracks provide good access into majority of the forest, and the more remote areas in the SE are still within commercially viable range (under 500m) for forwarder access.
- Existing network of racks within well thinned pine stands provides good access into main productive crop.

- Limited brash availability during last thinning operation, combined with wet ground conditions, suggests that further thinning of main pine crop would be difficult.

Ground Conditions
- Some pockets of more fertile soil offers a broader range of species choice.

- Majority of the site is peaty or surface water gley, often poorly drained, potentially restricting species choice

Wildlife Management
- When restocking with soft conifers or broadleaves, design of suitably sized/shaped areas can maximise opportunities for deer control.

- Roe deer present on site and in surrounding area, posing risk to newly established crops.

Scottish Lowlands FD

Carnock & Dean LMP

Carnock Opportunities and Constraints

Scale: 5,000 @ A2

0 75 150 300 Metres

Jun 2016

N W E S

Legend

- Forest Block
- Pine
- Broadleaves
- Larch
- Other Conifer
- FC Road
- Surfaced track
- Desire line
- Overhead powerline
- Core path
- Special Landscape Area

Forestry Commission Scotland
Coimisean na Coilltearachd Alba

Scottish Lowlands FD

Carnock & Dean LMP

Dean Opportunities and Constraints

Scale: 5,000 @ A2

0 75 150 300 Metres

Jun 2016

N
W E
S

Legend

- Forest Block
- Broadleaves
- Pine
- Larch
- Norway spruce
- Serbian spruce
- Sitka spruce
- Douglas fir
- Other Conifer
- FC Road
- Desire line
- Core path
- Gas main
- Overhead powerline

Existing Woodland
- Existing broadleaved woodland provides options for developing the amenity/biodiversity potential within the forest.
- Some areas of veteran trees provide good opportunities to develop biodiversity potential.
- Wide range of species, both broadleaf and conifer, currently growing well and natural regeneration is present in various locations across the forest. Observed natural regeneration includes Pine, Larch, Sitka spruce, Douglas fir, Western hemlock, Oak, Birch, Ash, Sycamore, Beech and Birch suggesting the site is very well suited to grow a wide range of species.

- Over 1/3rd of the site is comprised of mixed broadleaves, often concentrated in relatively small areas or in mixture with other species, that may be difficult to bring into commercial production
- Pine comprises ~20% of the forest, and is likely to be vulnerable to DNB.
- Larch comprises ~10% of the forest, and might be vulnerable to *P. ramorum* in future.

Forest Habitat Networks
- Extensive broadleaf component within existing stands provides good basis for developing internal semi-natural forest habitat networks.
- A few small areas of woodland on adjacent ground provide opportunity to develop forest habitat network links to surrounding area.

- Surrounding area is predominantly open, limiting opportunities for developing network links with woodland in the wider landscape.

Conservation + Heritage
- Potential to benefit red squirrel through suitable species choice.
- Several minor archaeological features of local significance present, with potential to retain unplanted buffers to increase amenity/biodiversity value.

- Red squirrel in local area may impose limitations on species choice
- Virtually all the forest is classed as Long Established of Plantation Origin (LEPO).
- Historic features and woodland character may impose limitations on species choices and/or management objectives.

Forest Operations
- Existing forest road provides reasonable access into majority of the forest
- Existing network of racks within well thinned pine stands in the centre of the site.
- Potential access from Pitdinnie road to the west gives alternative option for accessing more remote western stands.

- Some areas to the west and south east are more than 500m from the forest road, making economically viable operations more difficult.
- Steep slopes around watercourses restrict operational access.

Recreation
- Core path running along southern edge of forest offers potential to develop recreational links with surrounding area.

- Site is fairly well used by local population, with a network of informal desire lines though the forest which will need to be taken into account during any forest operations.

Ground Conditions
- Majority of the site is good quality brown earths or surface water gley, where the fertile soil offers a broad range of species choice.

- Some pockets of poorer quality soils, often poorly drained, potentially restricting species choice

Watercourses
- Watercourses provide potential for developing riparian woodland

- Minor watercourses flowing through gulleys in the eastern half of the site potentially restricts productive conifer options in immediate vicinity.
- Western hemlock regeneration on steep slopes above Pitfirane Dean burn may come to dominate riparian zone if allowed to develop

Utilities
- Utilise mandatory open space to increase habitat quality/variety
- Potential to reduce visual impact of overhead powerline through careful design

- Gas main bisects the site, potentially restricting operational access routes and complicating potential for achieving naturalistic woodland shapes when designing felling/restocking areas.

Climate
- Current favourable climate (Warm, Moist) allows broad range of silvicultural options in terms of species choice.
- Site is generally low lying and reasonably sheltered, with DAMS scores and previous thinning history suggesting that future crops should also be thinnable.

- Future climate projections suggesting increasingly dry summers may mean some species are less suitable in the longer term.

Landscape
- Diverse species makeup of existing woodland helps forest sit more naturally in the surrounding area.

- Stark boundary edges on some sides provides stark contrast with open ground beyond, as site is reasonably prominent within the wider landscape and visible from both the A907 and A994.

Wildlife Management
- When restocking with soft conifers or broadleaves, design of suitably sized/shaped areas can maximise opportunities for deer control.

- Roe deer present on site and in surrounding area, posing risk to newly established crops.

Forestry Commission Scotland
Coimisean na Coilltearachd Alba

Productive Woodland
- Prefer a Low Impact Silvicultural Systems (LISS) approach to management, utilising a uniform shelterwood initially, then later moving towards a group selection after shade-tolerant species are introduced.
- Aim to move away from Scots pine as the main productive species due to the risk of *Dothistroma Needle Blight* and the relatively low levels of natural regeneration present.
- Accept existing areas of natural regeneration (predominately birch) where present and manage for firewood crop.
- Aim to introduce a mix of shade-tolerant and intermediate light demanders in order to increase biodiversity and therefore enhance the resilience of the forest to future threats from climate change or pests/diseases.

Riparian Woodland
- Maintain open character of existing mature, mixed woodland along watercourses.

Predominantly heathlike ground vegetation on rocky slopes above track suggests soils are relatively poor.

Naturally regenerating birch to be developed as a firewood crop before restocking with Macedonian pine in order to retain some pine character within the woodland.

Japanese larch regenerating freely.

Respace appropriately in order to develop successor crop.

Varied ground vegetation suggests more fertile soils.

A Birch understorey with pockets of Sitka spruce is currently developing, and could form the basis of a successor crop managed for biomass.

Existing stand of cypress is regenerating freely, and is an unusual component within FES woodlands.

Respace appropriately with a view to developing niche crop.

Core path runs inside boundary.

Manage existing trees to maintain route.

Site of potential hutting project.

Leave as open space until outcome of project proposals are known.

Naturally regenerating birch to be developed as a firewood crop before restocking with more shade tolerant conifer species.

Mature birch woodland with several well used desire lines.

Manage with amenity as main focus, whilst minimising management interventions wherever possible. Thin when necessary to allow natural regeneration.

Flatter ground below surfaced track is a combination of mature Scots pine and a relatively young mix of broadleaves, larch, pine and spruce.

Favour more productive species during future thinning operations, with birch being selected for firewood crop. When restocking, introduce shade tolerant species in manageablle blocks.

Ground vegetation is predominantly grasses, indicating more fertile soils.

Allow naturally regenerating birch to develop into firewood crop. Follow this by restocking with shade tolerant conifer species.

Stand of veteran broadleaves on knoll has good biodiversity potential. Neighbouring area of recently restocked ground has mixture of pine, broadleaves and open ground which has the potential to develop into a good transitional area between the knoll and the productive stands.

Managed for amenity/biodiversity
- Retaining veteran trees in areas to develop in perpetuity according to natural processes.
- Utilise existing broadleaved woodland to soften the landscape impact of the productive conifer stands.
- Develop semi-natural forest habitat networks within the site
- Continue to clear isolated pockets of Rhododendron

Open ground
- Maintain open ground wayleave under overhead powerline.
- Retain open ground along NW edge to soften landscape impact of forest and allow flexibility if the

0 0.125 0.25 0.5 0.75 1 Kilometers

Scottish Lowlands FD

Carnock & Dean LMP

Carnock Concept Map

Scale: 5,000 @ A2

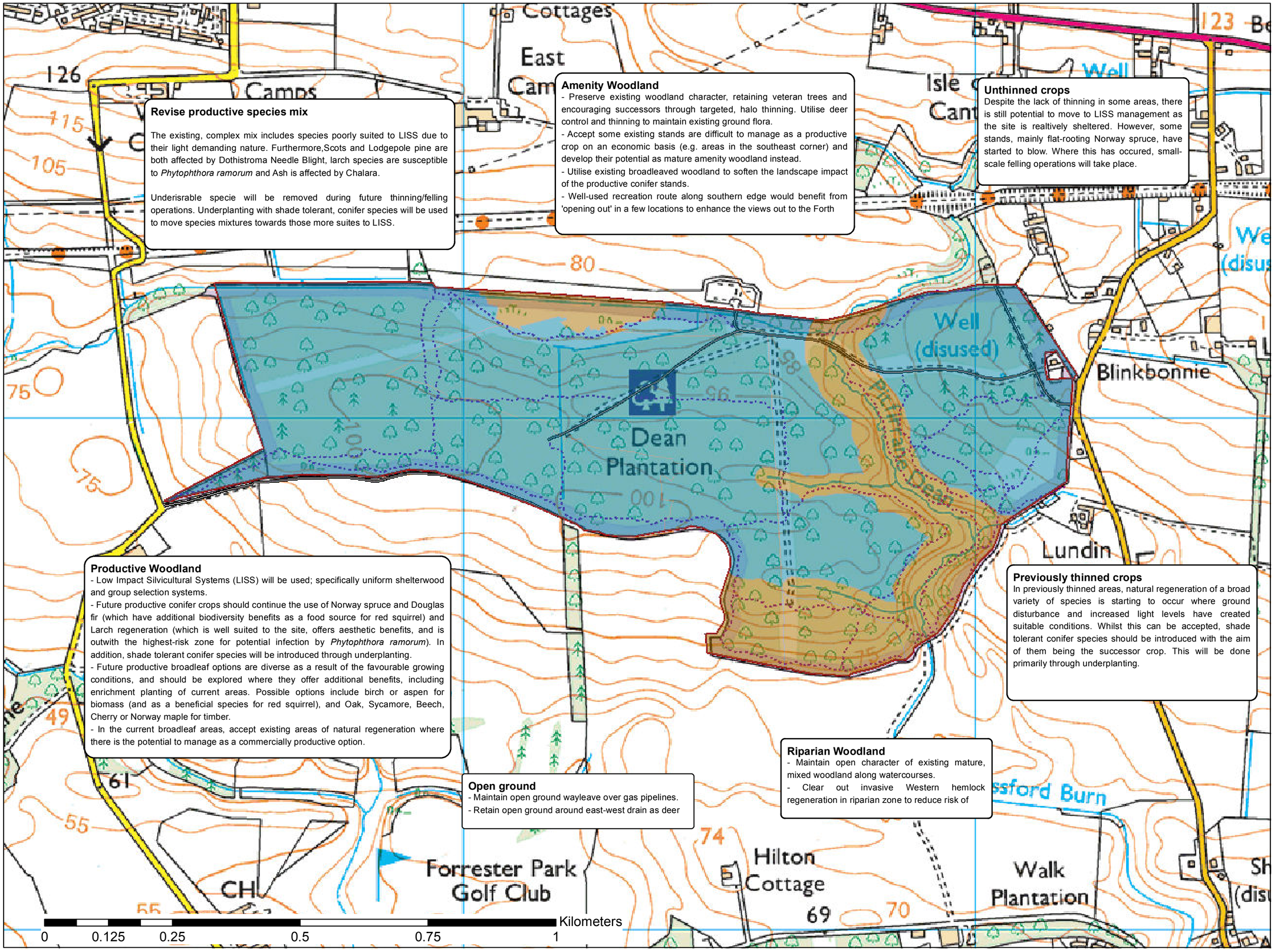
Sep 2018

N W E S

Legend

- Amenity
- Hutting area
- Open
- Productive
- Forest Block
- FC Road

Forestry Commission Scotland
Coimisean na Coilltearachd Alba



Revise productive species mix

The existing, complex mix includes species poorly suited to LISS due to their light demanding nature. Furthermore,Scots and Lodgepole pine are both affected by Dothistroma Needle Blight, larch species are susceptible to *Phytophthora ramorum* and Ash is affected by Chalara.

Underisrable specie will be removed during future thinning/felling operations. Underplanting with shade tolerant, conifer species will be used to move species mixtures towards those more suites to LISS.

Amenity Woodland

- Preserve existing woodland character, retaining veteran trees and encouraging successors through targeted, halo thinning. Utilise deer control and thinning to maintain existing ground flora.
- Accept some existing stands are difficult to manage as a productive crop on an economic basis (e.g. areas in the southeast corner) and develop their potential as mature amenity woodland instead.
- Utilise existing broadleaved woodland to soften the landscape impact of the productive conifer stands.
- Well-used recreation route along southern edge would benefit from 'opening out' in a few locations to enhance the views out to the Forth

Unthinned crops

Despite the lack of thinning in some areas, there is still potential to move to LISS management as the site is realtively sheltered. However, some stands, mainly flat-rooting Norway spruce, have started to blow. Where this has occured, small-scale felling operations will take place.

Productive Woodland

- Low Impact Silvicultural Systems (LISS) will be used; specifically uniform shelterwood and group selection systems.
- Future productive conifer crops should continue the use of Norway spruce and Douglas fir (which have additional biodiversity benefits as a food source for red squirrel) and Larch regeneration (which is well suited to the site, offers aesthetic benefits, and is outwith the highest-risk zone for potential infection by *Phytophthora ramorum*). In addition, shade tolerant conifer species will be introduced through underplanting.
- Future productive broadleaf options are diverse as a result of the favourable growing conditions, and should be explored where they offer additional benefits, including enrichment planting of current areas. Possible options include birch or aspen for biomass (and as a beneficial species for red squirrel), and Oak, Sycamore, Beech, Cherry or Norway maple for timber.
- In the current broadleaf areas, accept existing areas of natural regeneration where there is the potential to manage as a commercially productive option.

Previously thinned crops

In previously thinned areas, natural regeneration of a broad variety of species is starting to occur where ground disturbance and increased light levels have created suitable conditions. Whilst this can be accepted, shade tolerant conifer species should be introduced with the aim of them being the successor crop. This will be done primarily through underplanting.

Open ground

- Maintain open ground wayleave over gas pipelines.
- Retain open ground around east-west drain as deer

Riparian Woodland

- Maintain open character of existing mature, mixed woodland along watercourses.
- Clear out invasive Western hemlock regeneration in riparian zone to reduce risk of

Scottish Lowlands FD

Carnock & Dean LMP

Dean Concept Map

Scale: 5,000 @ A2

Aug 2018

N
W
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S

Legend

- Amenity
- Productive
- Forest Block
- FC Road
- Desire line

Forestry Commission Scotland
Coimisean na Coillearachd Alba

Forest Enterprise Scotland
Land Management Plan

Map relevant to:- Dean & Carnock Forests LMP

Ref. No:-

Map:- 19 of 22

Owner/Lessee

Signature .....

Date .....

On behalf of The Forestry Commission

Signature .....

Date .....

These areas will be left to develop naturally. Any interventions envisaged would be to remove unwanted, naturally regenarating conifers.

Uniform shelterwood

The current SP overtsorey is infected with DNB and is therefore very slow growing. Only one or two thinning interventions are likely to be needed prior to the removal of the BI understorey . Following removal, a permanent rack infrastructure will be put in place and planted with shade tolerant species such as DF, ESF, PSF and NS. This area will likely progress to a single tree/group selection system as the shadetolerant conifers mature.

Group selection system

This area is currently low-quality birch that is starting to regenerate beneath it's own canopy. As birch is a light-demanding species, groups should be opened around developing regeneration.

Natural reserve

To the north there is a riparian corridor. This area will be kept relatively open. Occasional CAR and Willow sp (as per W7) will be planted, where necessary, to provide dappled shade.

The south east of the management area is fairly open with veteran BE, ROW and SP present.

0 0.05 0.1 0.2 0.3 0.4 Miles

Forestry Commission Scotland
Coimisean na Coillearachd Alba

Scottish Lowlands FD

CARNOCK Management

Scale: 5,000 @ A3

14 Jan 2019

N
W E
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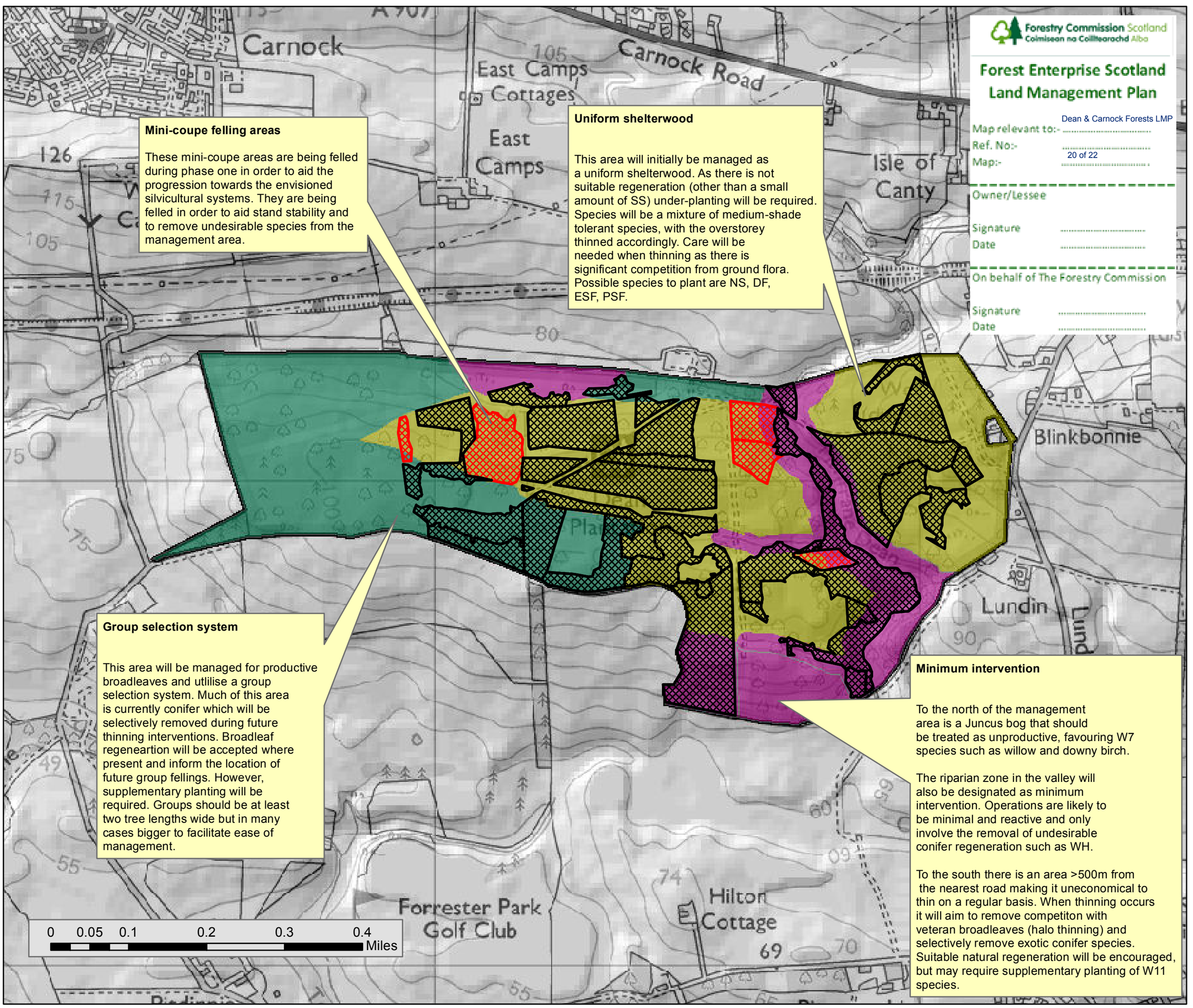
There is no felling or thinning planned at Carnock for the duration of the LMP.

Legend

Silvsystem

- Group selection
- Minimum intervention
- Natural reserve
- Open
- Uniform shelterwood
- Blocks



Forestry Commission Scotland
Coimisean na Coillearachd Alba

Forest Enterprise Scotland
Land Management Plan

Dean & Carnock Forests LMP

Map relevant to:- .....

Ref. No:- .....

Map:- 20 of 22

Owner/Lessee

Signature .....

Date .....

On behalf of The Forestry Commission

Signature .....

Date .....

Forestry Commission Scotland
Coimisean na Coillearachd Alba

Scottish Lowlands FD

DEAN
Management map

Scale: 7,000 @ A3

14 Jan 2019

N
W E
S

Legend

- Phase 1: Thinning
- Phase 1: Felling
- Group selection
- Minimum intervention
- Uniform shelterwood
- Blocks

Forestry Commission Scotland
Coimisean na Coillearachd Alba

Forest Enterprise Scotland
Land Management Plan

Dean & Carnock Forests LMP

Map relevant to:- .....

Ref. No:- .....

Map:- 21 of 22

Owner/Lessee

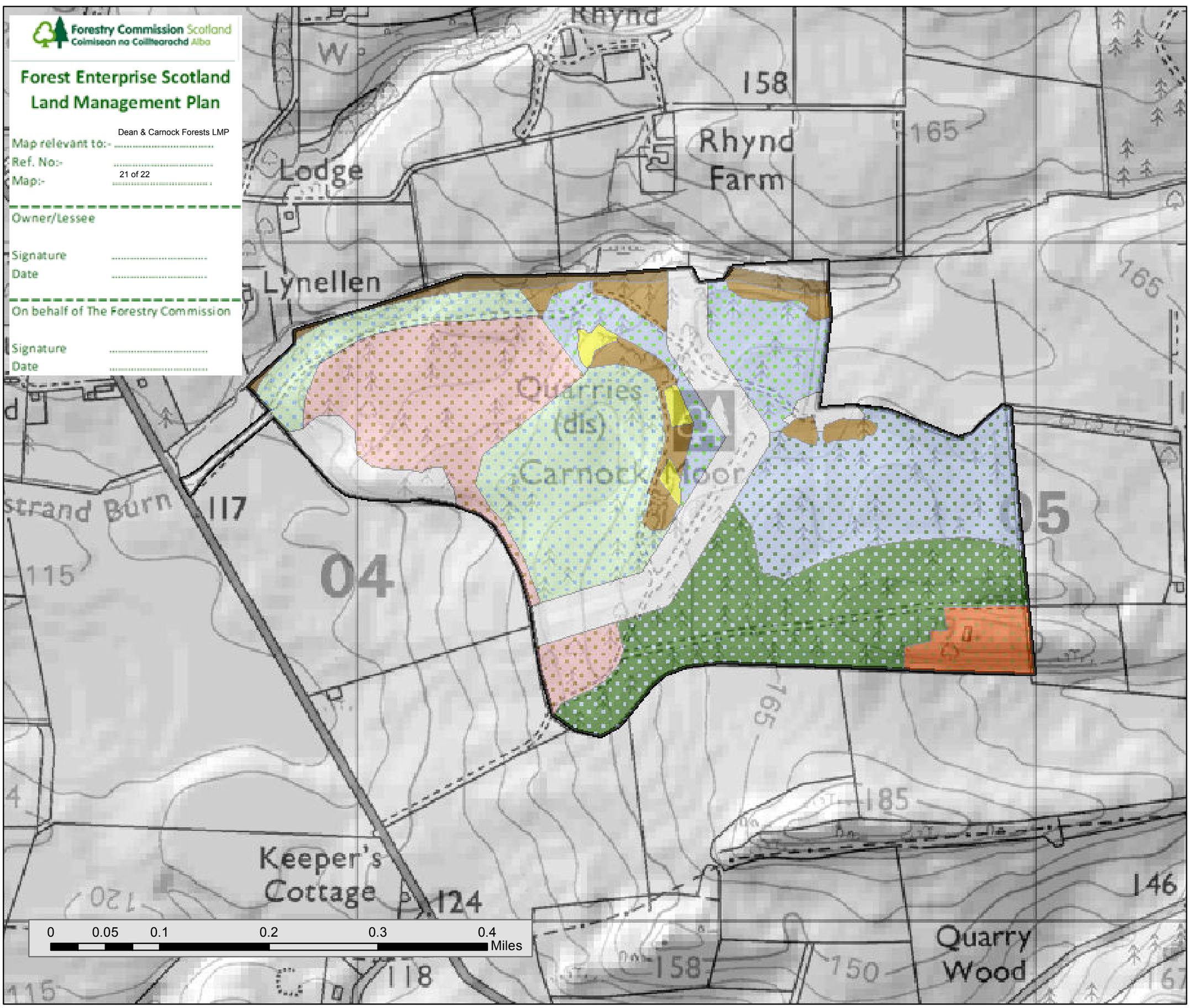
Signature .....

Date .....

On behalf of The Forestry Commission

Signature .....

Date .....



Forestry Commission Scotland
Coimisean na Coillearachd Alba

Scottish Lowlands FD

CARNOCK
Future Species & restock

Scale: 5,000 @ A3

14 Jan 2019

N
W E
S

There is no restock planned at Carnock for the duration of the LMP.

Legend

Species

- BE/SP/ROW
- BI/MB
- DF/NS
- MB
- MCP
- NS/ESF
- NS/PSF
- OPEN
- PSF/NS
- RMB
- SUCC
- Blocks
- Scottish Lowlands

Forestry Commission Scotland
Coimisean na Coilltearachd Alba

Forest Enterprise Scotland Land Management Plan

Map relevant to:- Dean & Carnock Forests LMP

Ref. No:-

Map:- 22 of 22

Owner/Lessee

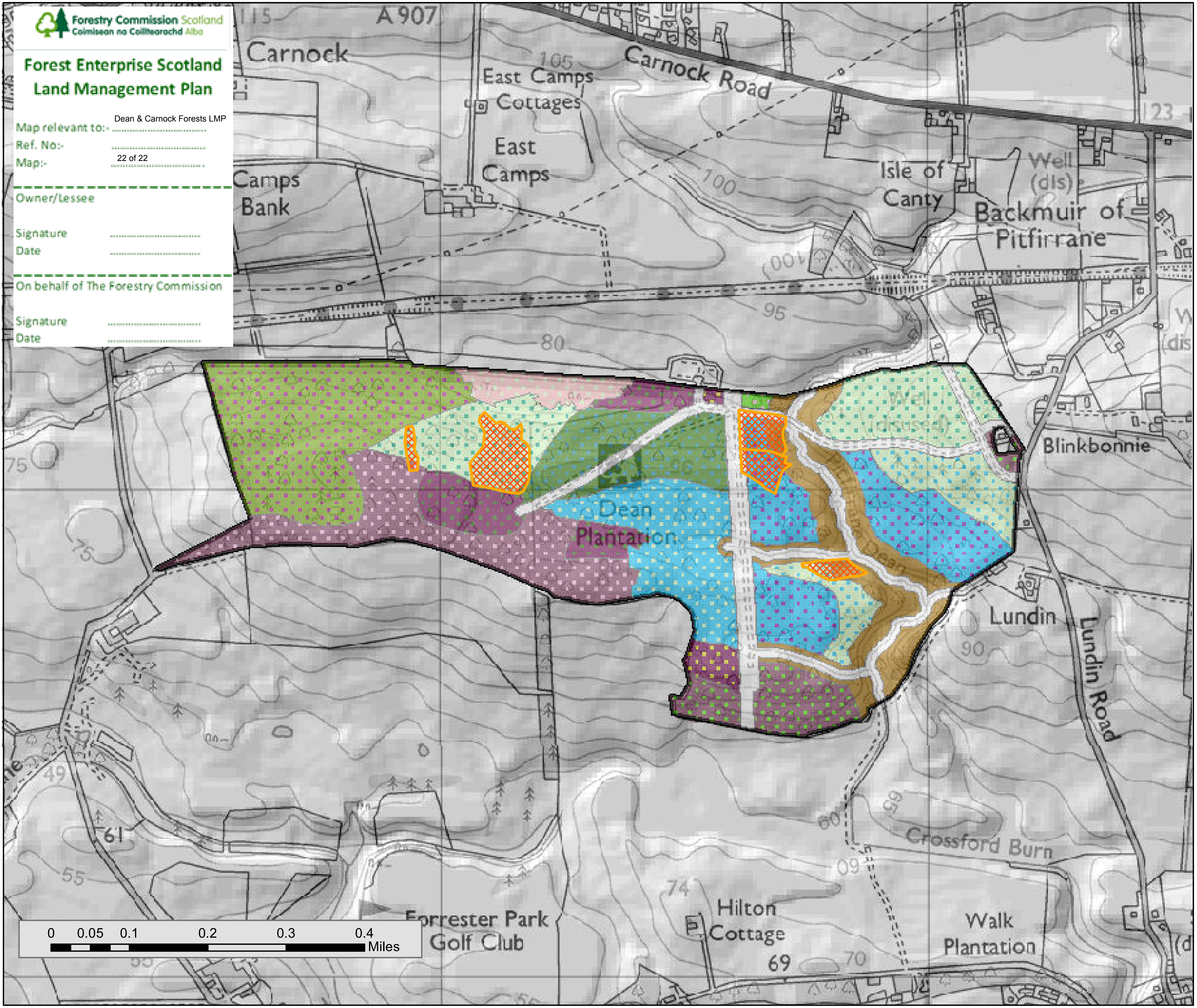
Signature

Date

On behalf of The Forestry Commission

Signature

Date



Forestry Commission Scotland
Coimisean na Coilltearachd Alba

Scottish Lowlands FD

DEAN
Future Species

Scale: 7,000 @ A3

14 Jan 2019

N
W E
S

Legend

Phase 1: Restock

species

- CAR/POK/BI
- DBI/XWL
- DF/ESF
- DF/NS
- MCP/ESF
- NS/DF
- NS/PSF
- POK/AR/DBI
- POK/SY/DBI
- RMB
- SOK/SBI/SY
- SOK/SY/WCH
- SUCC
- SYC/DBI
- Blocks