Central Region
Cruach Tairbeirt
Strategic Larch Removal Plan

Approval date: 27/10/2023

Plan Reference No: LMP-01-2022

Plan Approval Date: 27/10/2023

Plan Expiry Date: 27/10/2028

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FORESTRY AND LAND SCOTLAND

Application for Land Management Plan Approval

Forestry and Land Scotland - Property

Region:	Central
Woodland or property name:	Cruach Tairbeirt
Nearest town, village or locality:	Tarbet (Argyll & Bute)
OS Grid reference:	NN 316 068
Local Authority district/unitary Authority:	Loch Lomond and Trossachs National Park

Areas for approval

	Conifer	Broadleaf
Clearfelling	222.7ha	3.1ha
Thinning	122.2ha	1.7ha
Restocking	90.2ha	120.3ha
New planting (complete appendix 4)	0ha	0ha

1. I apply for Land Management Plan approval for the property described above and in the enclosed Land Management Plan.

2. I apply for an opinion under the terms of the Forestry (Environmental Impact Assessment) (Scotland) Regulations 2017 for roads, tracks and quarries as detailed in my application.

3. I confirm that the proposals contained in this plan comply with the UK Forestry Standard.

4. I confirm that stakeholders have been advised of the departure from our normal consultation process, with their comments being invited as part of the “public register” stage. Any relevant issues highlighted during this stage (and agreed with Scottish Forestry) will be incorporated into the plan. These comments, and the FLS response, will be recorded in the consultation record.

5. I undertake to obtain any permissions necessary for the implementation of the approved Plan.

Signed …….. Signed……

Regional Manager Conservator

Region Central Conservancy Perth and Argyll……

Date 18/10/2023 **Date of Approval** 27/10/23……

Date approval ends 27/10/28……..

Contents

1.0 Summary

1.1 Introduction

The purpose of this forest plan is to address the significant spread of the tree disease *Phytophthora ramorum* affecting Larch spp. across woodlands on the Cowal Peninsula, west of Loch Lomond *(Map M01)*.

Forestry and Land Scotland *(FLS)* has seen a significant increase in the spread of *P. ramorum* in 2020 and 2021, with a subsequent increase of *Statutory Plant Health Notices (SPHN)* served across the Cowal area. In 2021, numerous SPHNs were served in the nearby FLS forests of Lochgoilhead and Ardgartan, and in Glen Croe Forest including above Succoth, only a few hundred metres from Cruach Tairbeirt forest. This spread has continued in 2022 and now includes Cruach Tairbeirt, providing a significant source from which the pathogen can reproduce and continue to spread. (SPHNs served in the area in and around Cruach Tairbeirt are shown on *Maps M02a & M02b*). A full current species map of Cruach Tairbeirt can be seen in *Map M03*. Cruach Tairbeirt is in the Priority Action Zone on Scottish Forestry's *Phytophthora ramorum on larch Action Plan*[1].

Approval is sought for a 5 year period only. The aim of creating this 5 year *Strategic Larch Removal Plan* is to establish the relevant approvals and a programme of work to remove all Larch spp. from Cruach Tairbeirt over the next 5 years. A number of clearfell coupes have been identified to achieve this, while leaving the remaining forest resilient and windfirm. This will allow FLS time to respond to infections more quickly and in an organised and timely manner, with the intention of slowing the spread of the disease. It will negate the need for amendments to 10-year Land Management Plans *(LMP)* which are frequently required when SPHNs are served, thus preserving the integrity of this plan during its lifetime. It should be noted that that any future SPHNs will still be prioritised and felled within the SPHN timescale.

Although this Strategic Larch Removal Plan covers a shorter period, it addresses the issues that would be described in a typical 10 year Land Management Plan. Restocking largely follows that described in the previous plan. A new, full 10 year plan for Cruach Tairbeirt will be produced within 5 years.

[1] https://forestry.gov.scot/publications/1024-scottish-forestry-phytophthora-ramorum-action-plan *[Accessed 1st Feb. 2022]*

1.2 Objectives

- Limit the spread of Phytophthora ramorum in the wider geographical context by felling the majority of Larch spp. in the Cruach Tairbeirt plan area
- Address any anticipated SPHNs in the Cruach Tairbeirt plan area
- Create a proactive felling plan that gives the public and stakeholders an honest and up-front indication of our proposals that would otherwise be delivered via SPHNs and amendments
- Provide Scottish Forestry with a robust 5-year management plan for Cruach Tairbeirt that minimises the need for individual amendments associated with SPHNs
- Restoration of native woodlands, enhancing and expanding the already existing native broadleaf woodlands of Glen Loin and Kenmore Woods
- Introduce greater species diversity at restocking, providing future structural diversity and management options

1.3 Key proposals

Total Plan Area	895ha
Planned operations	
Felling	225.8ha; 125717m^3
Thinning	123.9ha; 7768m^3
Restock	90.2ha of conifers; 120.3ha of broadleaves*
New planting	0ha
Roads and tracks	6.5km forest road (pre-approved) †
Public access	n/a

Table 1 – Key proposals

**Total clearfelled area includes area felled for the roadline. For this reason the total area to be restocked is lower*

† *Note that further roading and access tracks will be required for the successful delivery of some aspects of this plan; approval for these will be applied for via separate EIA-SOR*

2.0 Scottish Forestry Regulatory Requirements

2.1 Summary of planned operations

The operations proposed in this plan focus on the removal of Larch spp. from the plan area. This section describes in summary the operations FLS intend to undertake over the next 5 years in order to achieve this. Some of the operations described have already been submitted and approved under amendment from Scottish Forestry; for the purposes of transparency and to provide a whole picture, all operations are described in this plan.

A summary of planned operations is outlined in *Table 1* above; a fuller description and rationale for the proposed works can be found in *Section 5* of this plan; a detailed table of operations can be found in *Appendix II*.

Please note that areas and volumes quoted in this section are *Net* figures, and do not include areas within coupes such as internal open space and broadleaves that are to be retained.

2.2 Proposed felling in years 2023- 2028

Table 2 below summarises all felling operations, including thinning, proposed in this plan. This also includes coupes felled for the development of the roadline. A number of coupes in this plan area were submitted and approved for felling via Amendment in May 2022 to allow work planning to continue while this plan was still in development; these coupes are included in the totals in *Table 2* and are highlighted pink on *Map M04*; felling operations have been ongoing during the development of the reviewed plan. Those coupes yet to be approved for clearfelling, and for which approval is sought, are shown in red on *Map M04*. Specific coupes are identified in the *Table of Operations (Appendix II)* and illustrated in *Map M04*.

Felling Operation	**Area (ha)**	**Approx. Volume (m^3)**
Clearfell	225.8	125717
Thinning	123.9	7768

Table 2 - summary of proposed operations

Table 3 below outlines all species to be clearfelled. A significant volume of other species in addition to Larch spp. will have to be felled; this is due to the widespread occurrence of Larch spp. in mixed stands, the need to fell to windfirm edges for future resilience of the wider forest, and the need to design viable coupe shapes for operational practicalities.

Species	Area (ha)	Approx. Volume (m^3)
Larch spp. (all)	65.7	23595
Sitka spruce	141.7	93623
Noble fir	9.2	4102
Norway spruce	4.3	2688
Western Hemlock	1.8	1075
Broadleaves	3.1	634
Total	225.8	125717

Table 3 – Species to be clearfelled by area and volume

These proposals will have an effect on the age structure of the forest in the short to medium term. As can be seen in *Table 4* and *Figure 1*, there will be a considerable reduction in area of trees in age class 41-60 years, balanced by an increase in young stands in age class 0-10 years.

Age Class (years)	Area ha 2022	Area ha 2027	Area ha 2032	Area ha 2042
0-10	13.9	247.7	295.8	246.1
11-20	0	0	13.9	272.4
21-40	4	0	0	13.9
41-60	423.6	232.6	49.2	3.2
61+	214.9	186.3	313.5	127.3

Table 4 – Age structure of forest as percentage of woodland area

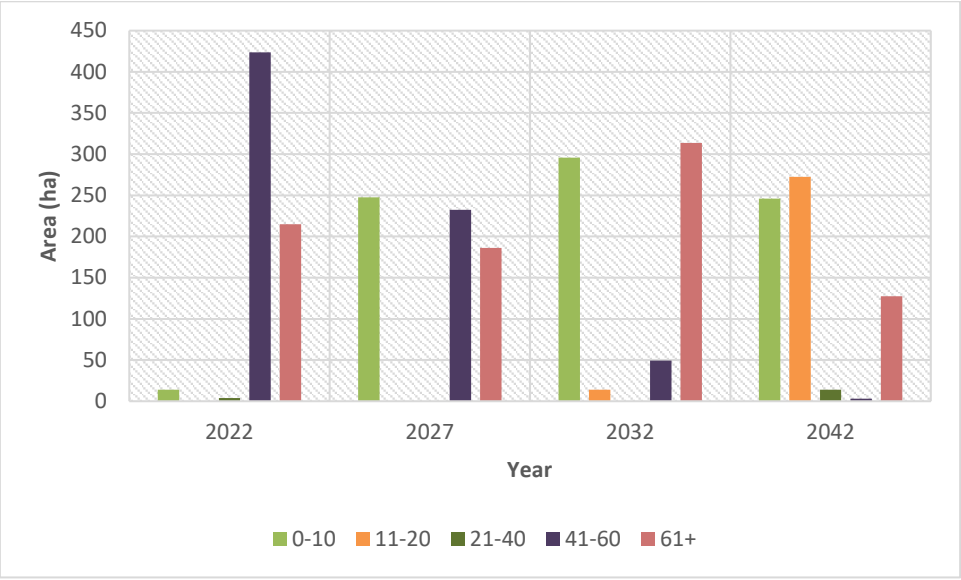

Figure 1 – Age structure of forest (as per Table 4 above)

Map M04 shows the coupes proposed for Cruach Tairbeirt forest in this plan period, including clearfelling, and thinning coupes where sub-compartments containing Larch spp. will be targeted for removal. *Map M04* also illustrates the context of Larch spp. distribution across the plan area. *Map M03* gives further context with detail of Larch spp. distribution within the current forest; *Maps M02a* and *M02b* show SPHNs issued in Cruach Tairbeirt forest and the wider area as at October 2022.

2.3 Proposed thinning in years 2023-2028

Species	Area (ha)	Approx. Volume (m^3)
Larch (all)	7.6	1993
Sitka spruce	113.8	5691
Noble fir	0.9	43
Mixed broadleaves	1.7	41
Total	123.9	7768

Table 5 – Summary of thinning proposals

Indicative thinning areas are shown on *Map M04* and summarised in *Table 5* above. The purpose of this work is targeted removal of isolated groups of Larch spp. from mixed stands of conifers and broadleaves, and is comparable to CCF management techniques of single and group selection. *These groups are highlighted in bright green on Map M04.* Where it is not be possible to extract this material, these will be *felled to recycle*, but every effort will be made to extract timber to roadside. Where stands are isolated from the roadside it will be necessary to cut access racks through the surrounding matrix. *This matrix has been defined as thinning coupes and is highlighted in dark green on Map M04.* The number of racks will be kept to the minimum operationally necessary and permission is sought for this.

Thinning that takes place in proximity to the railway line may introduce a requirement to clearfell a buffer of 2 tree lengths from railway infrastructure to avoid windblow hazard from any resultant exposed edges. Any tree felling work will be undertaken with prior consultation with Network Rail.

Other small groups and single trees are expected to exist throughout the forest, and permission is requested to selectively *fell to recycle* any Larch spp. found in the process or other operations throughout Cruach Tairbeirt forest. *Section 5* below gives a fuller description of the proposed thinning work.

2.4 Proposed restocking in years 2023-2028

For the purpose of this *Strategic Larch Removal Plan*, restocking proposals are largely unaltered from the previous plan. In brief, this will be a combination of native broadleaves, Sitka spruce and suitable alternative conifers. Areas can be seen in *Table 1*; note that the total area to be restocked is lower than the area clearfelled because the coupes felled for the development of the roadline will not be restocked, apart from two small areas. The effect this will have on future species composition can be seen in *Table 6* and *Figure 2* below.

Species	Area % 2022	Area % 2027	Area % 2032	Area % 2042
All Larch	9.9	0.1	0.1	0.1
Sitka spruce	61.8	48.6	47.5	34.0
All other conifers	3.4	10.4	10.3	15.5
All broadleaves	24.9	40.8	41.9	50.4

Table 6 – Change in species diversity over time as a percentage of woodland area (excludes areas of open space)

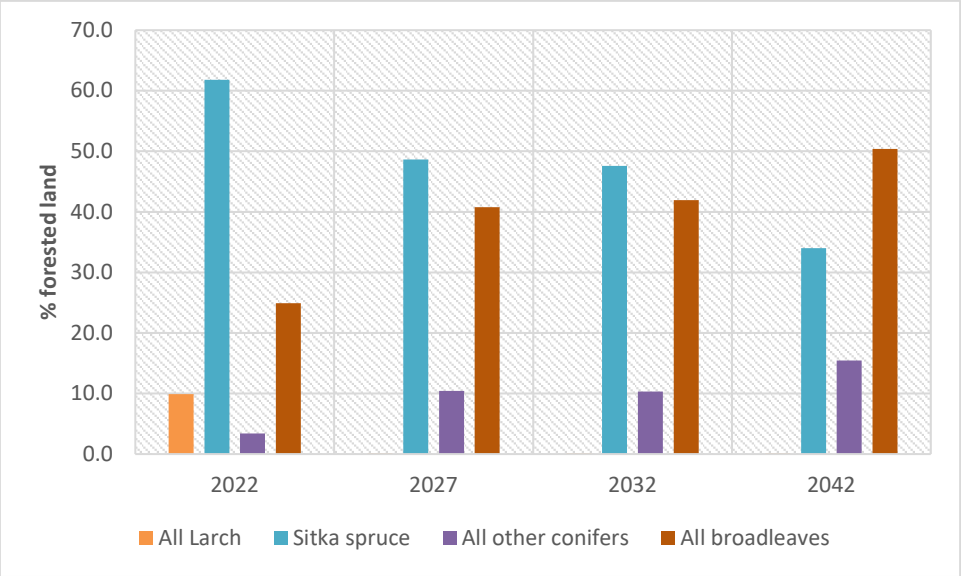

Figure 2 – Change in species diversity over time (as per Table 5 above)

Restocking across the whole plan area will be fully reviewed when the next full 10 year plan is produced to replace this *Strategic Larch Removal Plan*. The outline plan for restocking of the clearfell coupes proposed in this plan is illustrated on *Map M05*, and described on a coupe by coupe basis in the Table of Operations *(Appendix II)*.

Restocking would normally take place up to 3 planting seasons after felling. To mitigate the visual impact of the proposed felling and the road construction on the landscape, we would have an expectation that restocking will take

place either during the next planting season after felling or before felling the next coupe, whichever is sooner. Please note that due to the shorter period proposed for this *Strategic Larch Felling Plan*, and the extended harvesting time caused by steep terrain and environmental constraints, in general the majority of restocking will take place outwith this plan period. The totals quoted in the tables above reflect all restocking of these coupes, not just that confined to this 5-year period. Conifer restocking density will be to 2500 stems per ha and broadleaves to 1600 stems per ha.

In some areas, natural regeneration will be the preferred method of restock. A survey of natural regeneration will be conducted at year 5 to assess progress. Where this appears to be developing, a subsequent assessment will be made at year 7; where natural regeneration is not developing satisfactorily, enrichment planting will be conducted by year 10 with appropriate species.

Open areas will be allowed up to 20% tree cover. Sitka spruce regeneration will be kept within agreed tolerance limits on both open ground and in areas designated for broadleaved woodland. Large amounts of rhododendron are known to be present and appropriate measures to control this species will be put in place.

2.5 Access and roading

Construction	Length (m)	Area (ha)
New roads	6500	24.4
Tracks	Nil	Nil

Table 7 - Summary of roading and tracks

A new forest road network is under development, having been approved via *Environmental Impact Assessment* in 2015 *(Appendix V; Map M06)*. At the time of writing, approximately 6.5km is still to be constructed (*"Planned Forest Roads"* in the accompanying maps). It should be noted that the aforementioned *Environmental Impact Assessment* commits to additional measures to mitigate the visual impact of the roadline construction, and there is no intention to move away from these commitments in this plan. Roadline felling has been allocated its own set of felling coupes in this plan, a feature that is inherited from the current, approved plan; the area quoted in *Table 7* above refers to the area of these coupes. Full details can be found in the *Table of Operations (Appendix II)*.

Maps accompanying this plan make reference to *"Possible Additional Spur Roads"*. These are additional proposed spur roads in the eastern part of the forest that were not included in the aforementioned *Environmental Impact Assessment*. It is acknowledged that additional roading and associated

infrastructure will be required to fully deliver the objectives of this plan; approval for these features will be applied for via separate *Screening Opinion Request(s)* to Scottish Forestry for consideration.

No new ATV tracks are specified at this time; detailed site planning will take place after felling and separate *Screening Opinion Requests* will be submitted where required.

The forest road network will ultimately be linked with the neighbouring forest of Glen Croe. However, during the five years of this plan, the vast majority of the timber can be expected to be transported via the southern forest entrance between Arrochar and Tarbet onto the A83, with a smaller amount coming from Tarbet Isle onto the A82. Locations and estimated volumes are detailed on *Map M06*. It should be stated that the preferred order of felling will be influenced by the serving of SPHNs.

2.6 Standards and guidance on which this plan is based

This plan has been produced in accordance with a range of government and industry standards and guidance as well as recent research outputs. A full list of these standards and guidance can be found here:

https://forestryandland.gov.scot/what-we-do/planning/links

2.7 Public Consultation

During the development of this *Strategic Larch Felling Plan* and as part of wider communication over issues that *Phytophthora ramorum* presents, FLS has been proactively engaging with stakeholders and local community groups throughout Cowal. A public "drop in" event took place in May 2022 and key stakeholders have been consulted with in advance of this plan being published on the FLS website to inform and allow stakeholders to question any aspect of the plan with FLS staff. This is summarised in *Appendix I*. An update on PR will also be given as part of FLS' PR update programme.

The forests around Cruach Tairbeirt have been served with multiple SPHNs which, due to their mandatory nature, do not accommodate a consultation process. The proactive approach proposed in this *Strategic Larch Removal Plan* introduces an element of public consultation more akin to that of a full 10 year Land Management Plan, since felling coupes have been identified in advance. These plan proposals will be placed on the FLS website to allow stakeholders time to consider the proposals and comment accordingly. A letter to all stakeholders will be sent with a link to this plan, explaining the reasons for the new format and how to comment. The landscape impact of the felling will be highlighted, with replanting mitigating against the long term impact. This will allow the public and key stakeholders to be informed about

the proposed future work, while minimising any time delays associated with a full 10 year LMP process. In addition, ongoing stakeholder engagement will include communications on the FLS website and local newspaper, regular updates to community councils, and information boards at key points.

2.8 Tolerance table

	Adjustment to felling period	Adjustment to felling coupe boundaries	Timing of restocking	Change to restocking species	Changes to roadlines*	Designed open ground	Windblow clearance
SF Approval not normally required	Felling date can be moved within 5 year period where separation or other constraints are met	Up to 10% of coupe area (up to a maximum of 1ha)	Up to 3 planting seasons after felling Up to 10 planting seasons for natural regeneration	Change within species group i.e. diverse conifers; broadleaves; Sitka spruce Non-native conifers in native woodland areas and designated open space up to 400 stems/ha <20% increase in area of Sitka spruce	Up to 60m either side of the approved line if this has been appropriately assessed for landscape, visibility and visual amenity purposes and does not breach any other conditions	Increase by up to 5% of coupe area	
Approval by exchange of letters and map	First phase felling delayed into second or later period Second phase felling brought forward into first phase	Up to 15% of coupe area	Between 3 – 5 years after felling	>20% increase in area of Sitka spruce	Additional felling of trees not agreed in plan Departures of >60m in either direction from centre line of road	Increase by up to 10% Any reduction in open ground within coupe area	Up to 5ha
Approval by formal plan amendment	Felling date of third or later phase brought forward into first or second phase	More than 15% of coupe area	More than 5 planting seasons after felling	Change from specified native species Change between species groups	As above, depending on sensitivity	More than 10% of coupe area Colonisation of open areas agreed as critical	More than 5ha

**Note: construction of the forest road was approved subject to a separate Environmental Impact Assessment (Section 2.5).*

3.0 EIA Screening Determination for forestry projects

3.1 Proposed deforestation

There is no proposed deforestation within this plan area during the plan period.

3.2 Proposed forest road works

A new forest road network is under development, having been approved via *Environmental Impact Assessment* in 2015 *(Appendix V; Map M06)*; this is under revision to reflect the changes to felling proposed in this plan. At the time of writing, approximately 6.5km is still to be constructed. Should any of the roads not be completed by the *EIA* expiry date of 21st December 2025, further permission will be sought by resubmission of the *EIA* at that time.

Maps accompanying this plan make reference to *"Possible Additional Spur Roads"*. These are in the eastern part of the forest and were not included in the aforementioned *Environmental Impact Assessment*. It is acknowledged that additional roading and associated infrastructure will be required to fully achieve the objectives of this plan; permission for these will be requested in the revision of this *EIA* or via separate *Screening Opinion Requests*.
There may be a requirement to build access tracks and ramps for machine access. Ramps will be approximately 3m wide and up to about 15m long. They will not be treated as permanent features and will be either allowed to re-vegetate or removed following operations. The final number and location of the ramps will be determined at the time of operations but one ramp per 100m of road/coupe interface is believed to sufficient. A *Screening Opinion Request* will be submitted for such facilities where required.

For the purposes of restocking it will be necessary to establish a network of ATV routes; these will be temporary features formed from material found on site and it is expected that they will green over within 5 years and blend in to the landscape. No new ATV tracks are specified at this time; detailed site planning will take place after felling and separate *Screening Opinion Requests* will be submitted where required.

3.3 Proposed forest quarries

A suite of quarries was approved as part of the aforementioned 2015 *Environmental Impact Assessment* for the forest road network *(Appendix V; Map M06)*. It has become apparent that these may be insufficient to provide the material required to achieve the full construction of the road network. Any additional quarry developments required will be requested in the revision of this *EIA* or via separate *Screening Opinion Requests*.

3.4 Proposed afforestation

There is no proposed afforestation within this plan area.

4.0 Strategic Larch Removal Plan

4.1 Introduction

This is a 5-year plan developed to undertake a structured removal of Larch spp. from the Cruach Tairbeirt plan area to minimise the spread of *Phytophthora ramorum*. It succeeds the plan submitted in 2015. The nearby FLS forests of Ardgartan, Lochgoilhead and Glen Croe have been severely affected by *P.ramorum* infection in Larch spp., resulting in numerous Statutory Plant Health Notices necessitating widespread felling that was not originally planned. 2022 has seen the first SPHNs served in Cruach Tairbeirt forest *(Maps M02a & b)*. The intention is to create a robust plan and establish the permission to proactively remove Larch spp. from Cruach Tairbeirt. A revised 10 year plan will be produced to succeed this plan which will cover the future forest in greater detail.

4.2 Setting and context

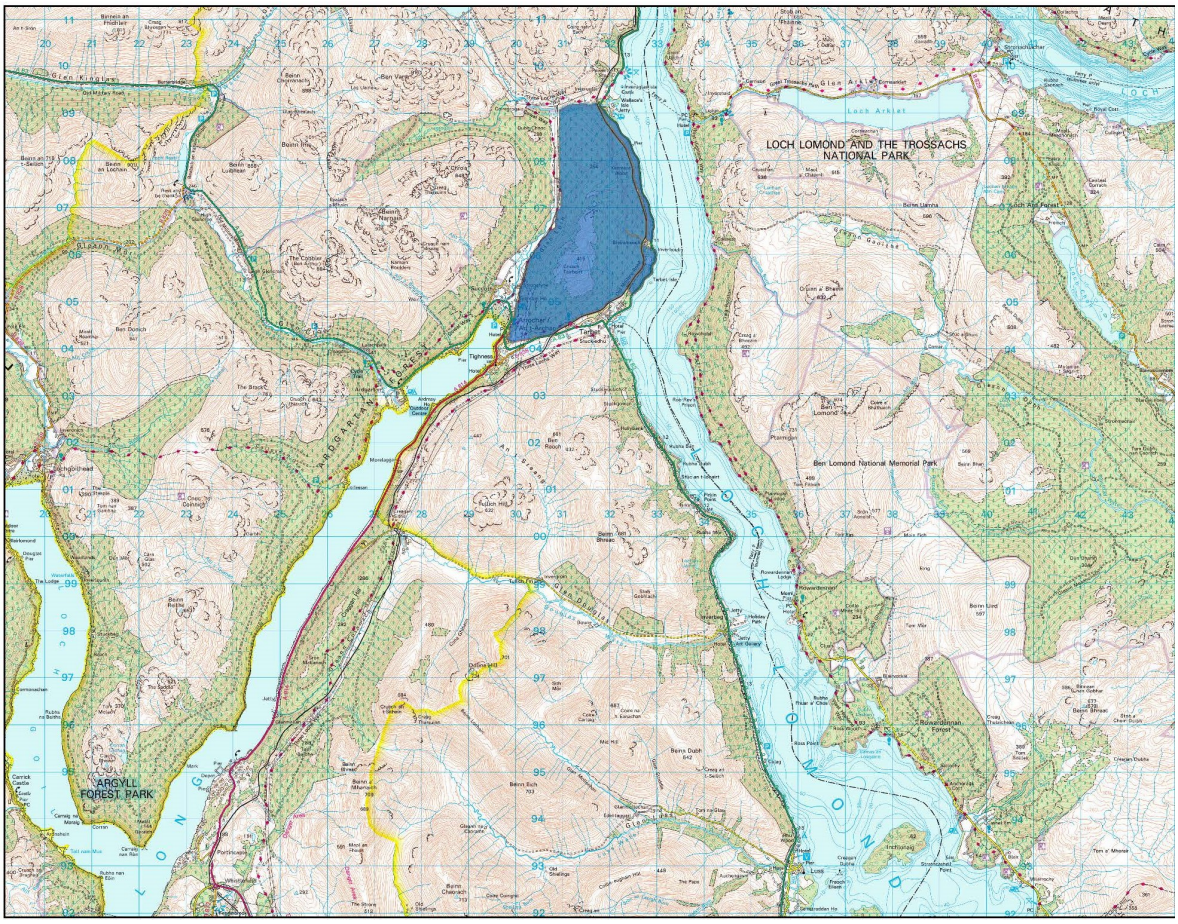

Figure 3 – Location of Cruach Tairbeirt forest

Cruach Tairbeirt Forest is located between Loch Lomond and Loch Long in the Loch Lomond and the Trossachs National Park *(Figure 3; Map M01)*, between Arrochar and Tarbet in the south and Inveruglas in the north. The total plan area occupies 895ha of mainly forested ground *(Map M03)*. The slopes are often steep, especially in the southern half of the forest, but characterised with areas of flatter ground around the summits which includes areas of open habitat and areas of lower growth productive forestry. The plan area is highly visual on the local landscape as it rises from near sea level to 415m elevation.

The southern part of the plan area backs on to private housing and businesses in the villages of Arrochar and Tarbet. To the west of the plan area across Glen Loin is the FLS Land Management Plan area of Glen Croe. To the south, land is managed by Luss Estates, and to the north by Inveruglas Estates.

The south and east of the plan area are flanked by the West Highland railway line, and the main roads of the A82 and A83.

Major overhead powerlines are routed through Glen Loin and over the shoulder of the southwest corner of Cruach Tairbeirt Forest.

The forest is visible from a number of viewpoints, although it is only visible as a whole from the area around the summit of Ben Lomond. Key viewpoints are annotated on *Map M01*:

- Ben Lomond summit
- From across Loch Lomond at Inversnaid and the West Highland Way
- From the north at Inveruglas, including the viewpoint and car park
- From the south, travelling north on the A82, including at Firkin Point
- The southern end can be seen close up from the Three Lochs Way at Stuckiedhu between Arrochar and Tarbet
- From the A83 travelling north from Ardgartan alongside Loch Long
- From various other summit viewpoints including The Cobbler

3D visualisations of key viewpoints are included in *Appendix IV*.

4.3 Analysis and key issues

Factors that have been taken in to account in developing this plan are –

- Large areas of widely distributed Larch spp.
- Limited forest road infrastructure
- Steep slopes above the railway line
- Large areas of even-aged, unthinned conifer forest

- Existing native woodland and PAWS
- High landscape visibility
- Recreation and public access

5.0 Management plan proposals

5.1 Management

5.1.1 Clearfelling

The plan described here is focused on the management of the spread of *Phytophthora ramorum* by the removal of Larch spp. over a five year period. Clearfelling is the dominant management system that will be used and is focussed on areas containing Larch spp.; felling proposals are illustrated in *Map M04*.

Clearfell coupes have been designed to allow felling to sensible and windfirm boundaries to maintain the stability of the remaining forest and to be operationally feasible, and will involve removal of non-Larch species. However, where local conditions allow, selection techniques will be used to reduce the need to remove non-Larch species, especially with regard to native species; this includes the Tarbet Isle area in the southeast of the plan area, coupe 01139, which will primarily target the removal of European larch only from a mixed sub-compartment of mature European larch and Scots pine.

The priority is to secure the remaining forest for future sustainability. The proposed clearfelling operations are summarised in *Tables 2 and 3 (Section 2)* and described in detail in the table of operations in *Appendix II*. *Map M04* displays how the proposed management structure will capture the majority of Larch within the plan area. The genesis and design of these clearfell coupes is further described in *Section 7.4* and *Appendix VIII*.

5.1.2 Thinning

Due to the historical lack of roading or access infrastructure in Cruach Tairbeirt, the forest does not have a history of thinning in the last few decades. With the exceptions of the woodlands of Kenmore and Glen Loin, the vast majority of the forest was planted in a seventeen year period between 1959 and 1976 and the result is an even aged, unthinned crop. For this reason there will be very few opportunities to instigate an ongoing programme of thinning in the existing crop.

There are scattered groups of Larch spp. throughout the forest. The larger groups are illustrated in bright green on *Map M04* and are found within wider matrices of other conifers, mainly Sitka spruce. Four thinning areas are highlighted in this plan and can be seen as dark green on *Map M04*:

- The small areas above Tarbet village in the south of the plan area, where low numbers of individual Larch trees can be found;
- The large area in the southeast, either side of the forest road, where Larch spp. occur in small pure stands, and in swathes with mixed with broadleaves;
- In the southwest, scattered groups and swathes of pure Larch spp. within a wider matrix of Sitka spruce;
- A large area in the north, where individual Larch trees can be found growing in very low numbers within a matrix of Sitka spruce.

In all four cases, Larch spp. will be specifically targeted for removal. This approach could be described as single tree- or group-selection thinning; it should be noted that the intention will be to fell all larch from these areas. These will be *felled to recycle* where it is not operationally possible to extract to roadside. In most cases it will be necessary to cut thinning racks for harvesting machinery to access these isolated stands of Larch spp. and to facilitate extraction of timber to roadside. These will be kept to the minimum required, but permission is sought to remove trees akin to a line thinning in order to achieve this. In these thinning areas, volumes removed will not exceed $50m^3ha^{-1}$ over the plan period.

5.2 Future habitats and species

5.2.1 Restocking

Restocking across the whole plan area will be fully reviewed when the next full 10 year plan is produced to replace this *Strategic Larch Removal Plan*. The outline plan for restocking of the clearfell coupes proposed in this plan is shown on *Map M05* and described in the *Table of Operations (Appendix II)* on a coupe by coupe basis. Restocking is largely based on proposals approved in the previous plan. This splits the forest into three rough zones:

- Upper elevations: Sitka spruce; only some of this will be restocked as a result of felling planned in this plan period. Some areas previously approved for Sitka spruce restocking has been changed to Norway spruce, in order to act as a buffer to the planned native broadleaf planting and existing native woodland.
- Western and eastern slopes: Native mixed broadleaves. Species selection will be determined by site suitability and in keeping with the natural *Scotland's Rainforest* composition i.e. Oak/Hazel and Oak/Birch, reflecting NVC types W11 and W17, with W4 in wetter areas. In order to secure a more natural habitat here, FLS will accept a percentage of integral open space but not to the detriment of the woodland habitat.

Following FLS policy, we will restore PAWS indicated as 1a and 2a (represented as pink on *Map M07*).

- Southern areas and middle slopes in the north: mixed conifers; this will not include Larch spp. The previous rotation included Norway spruce, Noble Fir and Scots pine. There were areas of windblow, however, so detailed site and species compatibility will be determined on a coupe by coupe basis as part of detailed site planning.

Restocking would normally take place up to 3 planting seasons after felling. In order to mitigate the visual impact of the large scale felling and road construction proposed in this plan we would expect earlier restocking, taking place either during the next planting season after felling, or before felling the next coupe, whichever is sooner. This also includes coupe 01027, to minimise any potentially negative edge effects on the Glen Loin SAC/SSSI caused by removing the adjacent trees. Conifer restocking density will be to 2500 stems per ha and broadleaves to 1600 stems per ha.

Where Larch spp. is selectively removed in thinning coupes (*Map M04*), natural regeneration will be the preferred method of restock if it is a realistic expectation. A survey of natural regeneration will be conducted at year 5 to assess progress. Where this appears to be developing, a subsequent assessment will be made at year 7; where natural regeneration is not developing satisfactorily, enrichment planting will be conducted by year 10 with appropriate species.

In the event of SPHNs being issued, species choice for restocking on those sites will follow Scottish Forestry's *Advice on Replanting Sites Affected by Phytophthora ramorum*[2]; this includes conifers and broadleaves. Natural regeneration of Larch spp. will be controlled as directed by the SPHNs.

It should be noted that in the previous plan, there was a long-term objective to lower the planted tree line in the southwest of the plan area in order to allow a more broken upper edge of naturally regenerated native broadleaf woodland to develop. The coupes in this area are not planned to be clearfelled in this plan period. The future treeline will be re-evaluated in the production of the next full 10 year plan and has not been addressed here. Clearfell coupes 01043, 01046 and 01061 will connect to open ground. For habitat and landscape reasons, opportunities to create a natural looking feathered upper edge will be sought either through natural regeneration or targeted planting with appropriate native broadleaves.

[2] https://forestry.gov.scot/publications/787-advice-on-replanting-sites-affected-by-phytophthora-ramorum [Accessed 15th June 2022]

5.2.2 Ground preparation

Ground preparation, including cultivation, is undertaken to aid tree establishment. FLS is committed to undertaking ground preparation operations with minimal site disturbance.

Soils and terrain vary throughout the plan area *(Section 7.2.1)*, as can post-harvesting site conditions. This means a mix of different ground preparation techniques will be required in Cruach Tairbeirt, ranging from no cultivation ("flat-planting") to non-linear cultivation techniques including various types of mounding. The most appropriate technique will be selected during detailed site planning following harvesting, and will include appropriate buffers and mitigations to protect vulnerable features such as watercourses, water supplies, sensitive habitats and other featured discussed in *Section 5.7*.

5.3 Management of open land

The main areas of open land in the plan area are on the high ground in the southern area, around the summit of Cruach Tairbeirt. The high ground to the north of this is characterised by broken habitat of slow growing conifers and open ground.

Open areas will be allowed up to 20% tree cover. Sitka spruce regeneration will be kept within agreed tolerance limits on both open ground and in areas designated for broadleaved woodland. Large amounts of rhododendron are known to be present and appropriate measures to control this species will be put in place.

As summarised in *Section 1* above, and as per restocking in *Section 5.2*, the purpose of this plan is to focus on the strategic removal of Larch spp. and as such the future management of open land has not been revised here. The following points from the previous plan should be noted:

- The previous plan laid out a long-term intention to expand open space in this plan area by lowering the planted tree line in some areas
- No afforestation of this area is proposed in this plan
- Management of open space will seek to control regeneration of non-native conifers and invasive species with a more feathered upper forest margin

The future management of open space, including peatland and any expansion or afforestation, will be fully re-evaluated and revised in the next full plan.

5.4 Visitor zones and access

Visitor Zones have been identified in areas where FLS encourage and manage access or where the woodland managed by FLS interacts with popular visitor sites or access routes. Visitor Zones are mapped on *Map M08.* There are four paths/trails promoted by FLS in Cruach Tairbeirt forest at present:

- Tarbet Isle Walk;
- Cruach Tairbeirt Loop;
- Arrochar Trail, part of the Three Lochs Way long-distance path;
- The Three Lochs Way and Cowal Way long-distance paths (both paths share the same route through Glen Loin).

In these areas, single trees or small groups of trees will be removed when necessary to protect facilities, infrastructure and trails, or to enhance the setting of features, or to maintain existing views.

Woodland in these zones will also be thinned, or trees re-spaced, for landscape and safety reasons (including to increase visibility and to ensure that sites are welcoming and feel safe) and where appropriate to enhance the experience of the forest setting, through the development of large trees, or to favour a particular species.

It should be noted that the development of the road network, in particular the northern route, will open up access into the heart of the forest. While this will allow informal recreational access to expand into the forest, there are currently no plans to promote the forest road network as a Visitor Zone, but this will be reviewed when the next full plan is developed.

5.5 Deer management

The proposals for restocking include replacing felled Larch spp. with a significant amount of mixed conifer and native broadleaf species, much of which will be vulnerable to deer browsing. Deer management measures will be critical to the success of this restocking strategy, including culling and fencing. Currently, external fencing is limited to stock fencing which is in variable condition. It is FLS policy that internal fences should be the exception rather than the rule, but will be considered where additional protection is required for areas of vulnerable species, or where opportunities to shoot are limited by, for example, high public usage. It is acknowledged that fencing can present a risk to wildlife, including bird strike, and that Cruach Tairbeirt and the surrounding area is highly suitable for species such as Golden Eagle and Black Grouse. The requirement for fencing will be assessed by the FLS Wildlife Management team, and design considered at the operational work

planning stage; any fencing will have to consider landscape impact and potential impacts on wildlife, including the risk of bird strike, and migration of deer species. Where fencing is deemed to be necessary, appropriate mitigations to protect wildlife will be used, including careful route design, fence markers and timely takedown.

Deer management for Cruach Tairbeirt is covered by the Deer Management Plan for *Cruach Tarbeirt and The Cobbler (Appendix VI)*. Further development of the Deer Management Plan and detailed site management will become possible as the forest road network is constructed.

5.6 Other Tree Felling in Exceptional Circumstances

FLS will normally seek to map and identify all planned tree felling in advance through the Land Management Planning process.

However, there are some circumstances requiring small scale tree felling where this may not be possible and where it may be impractical to apply for a separate felling permission due to the risks or impacts of delaying the felling.

Felling permission is therefore sought for the plan approval period to cover the following circumstances:

- Individual trees, rows of trees or small groups of trees that are impacting on important infrastructure (as defined below*), either because they are now encroaching on or have been destabilised or made unsafe by wind, physical damage, or impeded drainage.

*Infrastructure includes forest roads, footpaths, access (vehicle, cycle, horse walking) routes, buildings, utilities and services, and drains.

The maximum volume of felling in exceptional circumstances covered by this approval is 75m^3 per Land Management Plan per calendar year.

5.7 Factors affecting all forest operations

A number of constraints will affect forestry operations in Cruach Tairbeirt forest. These are outlined below, and can be seen on *Map M09*. All operations will be managed to relevant best practices to reduce the risks to the public, the environment and property.

5.7.1 Loch Lomond Drinking Water Protected Area

Cruach Tairbeirt forest lies within the catchment of Loch Lomond on its eastern watershed, which is a Scottish Water *Drinking Water Protected Area (DWPA)*. In addition to adherence to UKFS *Forests and Water Guidelines*,

Scottish Water's Guidance on Forestry Activities near Scottish Water Assets[3] will be also be referred to and representatives of Scottish Water consulted as and when appropriate. the presence of this *DWPA* will be highlighted on operational constraints maps and appropriate protection and mitigation will be identified and put in place in advance of work starting. Water quality in burns will be monitored throughout operations.

5.7.2 Private water supplies

A small number of private water supplies are to be found around Cruach Tairbeirt forest. Public consultation ("drop-ins") took place in May 2022 to present this plan; owners of water supplies have been contacted during preparation of this plan and will also be liaised with in advance of operations starting as part of our normal pre-operations work planning process. UKFS *Forests and Water Guidelines* will be adhered to. The locations of abstraction points and catchments have been ground-truthed and will be identified to operatives on operational constraints maps. Appropriate protection and mitigation will be put in place in advance of work starting. Water quality in catchment burns will be monitored throughout operations.

5.7.3 West Highland Railway line

This railway line skirts the southern and eastern flanks of Cruach Tairbeirt, and a significant amount of the proposed felling in this plan will be directly above or adjacent to the railway. Forestry and Land Scotland have been liaising with Network Rail with regard to upcoming forestry works here and in other forests managed by FLS, and regular communications and meetings are ongoing. Any forestry operations in proximity to the railway will be preceded by consultation with Network Rail to ensure safe working practices and appropriate mitigations are identified and put in place.

5.7.4 Overhead Powerlines

Overhead powerlines are routed over the southwestern shoulder of Cruach Tairbeirt forest. There may be a requirement for forestry operations to be undertaken in proximity to these lines, including tree felling; any work within the vicinity of overhead powerlines will be carried out with the prior liaison and guidance of SSE, and in line with *FISA Safety Guide 804 Electricity at Work: Forestry*[4].

[3] https://www.scottishwater.co.uk/-/media/ScottishWater/Document-Hub/Key-Publications/Energy-and-Sustainability/Sustainable-Land-Management/151018GuidanceOnForestryActivitiesNearSWAssets.pdf *[Accessed 1st June 2022]*
[4] https://ukfisa.com/Safety/Safety-Library/fisa-804 *[Accessed 1st June 2022]*

5.7.5 Conservation and heritage interests

Cruach Tairbeirt forest includes two existing areas of native woodlands, Glen Loin Woods in the west which is designated SSSI and SAC, and Kenmore Woods in the east, currently undesignated. These woods will be managed to maintain or improve the condition of the habitat, including rhododendron control. In the case of the designated site this will only be in liaison with Nature Scot. Of the felling coupes proposed in this plan, only coupe 01027 lies adjacent to the SSSI/SAC and is restricted to the plantation conifers. *Appendix IX* summarises the working method and proposals for this coupe.

Areas of *Plantation on Ancient Woodland Sites* are also present in the forest, mainly in the east; once the existing conifers have been felled these will be restocked with native broadleaved species appropriate for the restoration of *Scotland's Rainforest (Section 5.2)*.

The forest is home to a number of known protected species, and has the potential to be suitable for a number of others that are present in the wider environment *(section 7.3.2)*. Our Wildlife and Environment teams regularly monitor wildlife activity in our forests, and liaise with other organisations in the wider region including RSPB and raptor study groups.

There are a number of known heritage features in Cruach Tairbeirt forest, with the potential for other as yet unknown features to be uncovered during the forestry operations described in this plan *(section 7.3.3)*.

All operations are accompanied by site checks at the operational work planning stage, preceding the start of operations and ongoing monitoring, as appropriate, which inform suitable mitigations including protective buffers, timing and zoning of operational activities. Buffers will be marked on the ground and on operational maps. Site operatives will be made aware of known constraints and of the potential to uncover unrecorded ones.

6.0 Critical success factors

The following are critical to the success of the plan:

- Completion of forest road network
- Compliance with SPHNs
- Removal of Larch spp. from the plan area within the 5-year period
- Adequate deer management measures to protect the proposed restocking of diverse soft conifers and broadleaves

7.0 Background information

7.1 Analysis and comparison with previous plan

7.1.1 Aims of previous plan

The aims of the previous plan can be briefly summarised as follows:

- Create a more diverse age structure for the forest, through felling and restocking over a thirty year period
- Address existing and anticipated windblow through careful coupe design
- Minimise the visual impact of the proposals on the landscape, and enhance the setting of Loch Lomond
- Increase the area of native woodland, restoring PAWS and expanding rainforest habitat
- Expand and improve the resilience of the recreational offering
- Increase opportunities for LISS management techniques
- Maintain mixed conifer element, outwith PAWS areas, for landscape diversity, amenity, timber production and red squirrel habitat
- Increase open space, including upper margins and around native woodland
- Encourage and maintain development of a shrub layer beneath the powerline in the southwest on the forest.

A fuller analysis of these points is attached in *Appendix VII*.

7.1.2 Comparison of this and previous plan

The above aims remain largely unchanged in this plan. However, the proposed felling in this plan period concentrates more felling in a shorter time period. This is driven by the presence of Larch spp. throughout Cruach Tarbeirt forest, and the spread of Phytophthora ramorum. As noted in *Section 7.1.1*, the previous plan proposals laid out a near complete restructuring of the conifer element of the forest in a thirty year period, i.e. 2015-2045. This plan does not propose any fundamental change to that eventual goal, with the exception of an increased clearfelled area by 37.1ha, to be completed five years earlier. The main difference is the spread of felling through the phases; there is a strong emphasis on earlier felling in this plan. *Table 8* below compares clearfelling areas by 5-year felling phase, while *Table 9* and *Figure 4* compare the *cumulative* felling through the next four felling phases.

Please note that while figures quoted elsewhere in this plan are *Net*, those in *Tables 8 & 9* below are *Gross* figures. This is due to the way the data has been calculated. These figures still act as a useful comparison.

	Phase 1	Phase 2	Phase 3	Phase 4
Previous plan (ha)	162.5	131.2	135.7	100.2
This plan (ha)	266.5	51.3	133.3	115.6

Table 8 – Comparison of Gross clearfelling area (ha) per 5-year period, phases 1-4

	Phase 1	Phase 2	Phase 3	Phase 4
Previous plan (ha)	162.5	293.7	429.4	529.6
This plan (ha)	266.5	317.8	451.1	566.7
			Difference	37.1

Table 9 – Comparison of cumulative Gross clearfelling area (ha), phases 1-4

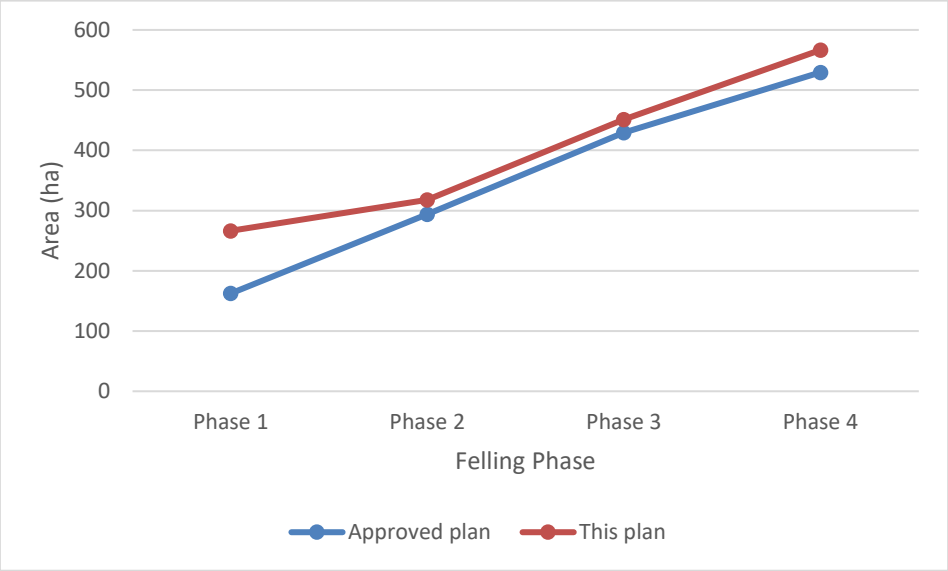

Figure 4 – Comparison of Gross cumulative felling, phases 1-4

7.2 Geology, topography and soils

7.2.1 Geology and soils

The bedrock geology underlying this plan area is part of the Beinn Bheula Schist Formation, metamorphic rock found on the northern side of the Highland Boundary Fault. There are also a small number of younger igneous intrusions, mainly in the form of dykes, with a larger area of approximately 8.5ha in the northwest part of the plan area.

The plan area is bound on its eastern side by Loch Lomond, and by Glen Loin on its western side. The forest area rises steeply from near sea level to the summit of Cruach Tairbeirt at 415m in the southern half of the forest; the steepest slopes are to be found on its eastern, southern and western sides.

Soil distribution in the plan area can be divided into three zones. The lower slopes, apart from the northwest corner, are mainly Brown Earths (soil type

1, fresh/medium); this includes the areas of ancient woodland and PAWS of the and Glen Loin and Kenmore Woods. In the northwest of the plan area, from the Inveruglas Water south to the highest point of Glen Loin, there are ironpan, peaty surface water gleys and Calluna bog (soil types 4xp/6p/11b, slightly dry to wet, very poor 3). At higher elevations soils are dominated by Calluna bog and peaty surface water gleys (Soil types 11b/6p, wet, very poor 3). Just above the village of Tarbet at the south end is an area of podzol (3x/6p, slightly dry to wet, very poor 3).

7.2.2 Climate

Mean annual temperatures for this area are around 9.0°C, January being the coldest month and July-August the warmest. Annual rainfall is up to 3500mm, making the west of Scotland one of the wettest parts of the UK. October to January is the wettest season with rainfall of 120mm-150mm per month; April to June is the driest season, with 60mm-100mm per month. Western Scotland is very exposed to Atlantic weather systems, and the frequency and intensity of depressions is highest in the winter. Subsequently, winds are strongest from November until March, and lightest in July-August. Prevailing wind directions are typically from the south through to the northwest. Climate change projections suggest that the climate will in general become warmer and wetter in this area, with an increase of frequency and intensity of extreme weather events expected[5].

7.2.3 Water

There are several burns in the plan area, draining into either Loch Lomond to the east or Loch Long, via Glen Loin, to the west. A number of private water supplies are to be found, in the north, east and south of the forest. Loch Lomond itself is a drinking water catchment and is designated a *Drinking Water Protected Area*; and also lies within the Clyde and Loch Lomond Flood Risk Management Plan Area (Potentially Vulnerable Area 11/01)[6]. This report flags no specific actions for FLS to address, but the wider role forestry can play in flood management is acknowledged.

7.3 Conservation and designations

7.3.1 Plantation on Ancient Woodland Sites and Scotland's Rainforest

There is a significant amount of *Plantation on Ancient Woodland Site* (PAWS) in Cruach Tairbeirt forest. Much of this is on the eastern side of the forest at Kenmore Woods and Tarbet Isle. The lowermost slopes of Kenmore Woods, between the railway and Loch Lomond, are presently mixed broadleaf

[5] https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/regional-climates/western-scotland_-climate---met-office.pdf *[Accessed 28th Jan. 2022]*

[6] https://www.glasgow.gov.uk/CHttpHandler.ashx?id=33977&p=0 *[Accessed 28th Jan. 2022]*

woodland, with conifer plantation above the railway line. The Tarbet Isle area in the southeast is mainly 1930s European larch and Scots pine plantation.

Glen Loin Woods lie on the steep ground in the western part of Cruach Tairbeirt forest and is designated a SSSI for its upland oak woodland and upland mixed ash woodland[7]. Glen Loin Woods is also SAC designated as part of Loch Lomond Woods SAC for western acidic oak woodland[8].

The forest lies within LLTNP Atlantic Woodland expansion area[9]; FLS is a member of the Alliance for Scotland's Rainforests. An internal action plan is in development.

Coupe 01020 may contain remnants of Norway spruce and broadleaves dating from the 19th century plantation, although this will need to be ground-truthed prior to felling.

A designations map (*M07*) has been provided in *Appendix III* of this plan.

7.3.2 Species

Observations around most parts of the forest have identified the presence of red squirrel, as well as pine marten. Black grouse are present in wider area in fragmented populations, but there are no known leks in or around Cruach Tairbeirt forest at this time. Populations are monitored by FLS staff including formal surveys each spring. It is recognised that Cruach Tairbeirt and the surrounding area could be highly suitable for species such as Black Grouse and Golden Eagle, and the open ground around the summit of Cruach Tairbeirt and the irregular forest edges could be important habitats for these species.

The presence of otters is remarked upon in the Glen Loin SSSI/SAC citations.

Invasive species including *Rhododendron ponticum* are present in Cruach Tairbeirt forest. This is also a known vector of *Phytophthora ramorum*. It is anticipated that the widespread felling proposed in this plan will offer an opportunity for this invasive species to expand. *R. ponticum* is already subject to a programme of eradication in the wider FLS Central Region and this is an objective of LLTNP[10].

[7] https://www.eservices.ros.gov.uk/sssi/?_ga=2.243103682.1352563418.1643642931-1704309708.1643642931 *[Accessed 31st Jan. 2022]*
[8] https://sitelink.nature.scot/site/8298 *[Accessed 31st Jan. 2022]*
[9] https://www.lochlomond-trossachs.org/wp-content/uploads/2019/10/Board_20191024_Agenda5_Appendix-5_Final-Trees-and-Woodland-Strategy.pdf *[Accessed 28th Jan. 2022]*
[10] https://www.lochlomond-trossachs.org/park-authority/what-we-do/conservation/invasive-non-native-species/ *[Accessed 24th May 2022]*

7.3.3 Heritage

The remains of Creag t-Searraich farmstead and field system within broadleaves below forest road at the entrance to the forest.

Relict 18th/19th century plantation enclosure is also identified along the lower eastern slopes of the forest, largely coinciding with the Kenmore Woods and PAWS area *(Map M07)*. This plantation can be seen illustrated on early maps, including OS Six Inch 1st Edition 1843-1882[11].

There is the potential for hitherto unidentified heritage features to be uncovered during the forestry operations described in this plan.

7.4 Landscape

Cruach Tairbeirt forest lies within Loch Lomond and The Trossachs National Park, and on the eastern side of its watershed forms part of the Loch Lomond National Scenic Area. A fuller description and analysis of the landscape qualities of Cruach Tairbeirt forest can be seen in *Appendix VIIIa*.

The geographical position this plan area gives it a significant landscape impact from a number of viewpoints. While the wider topography limits views of the whole block to high ground around Ben Lomond's summit, there are several other viewpoints where the forest makes a significant contribution. These include from the A82 at Firkin Point, and in around Tarbet; from the A82 travelling south, from the car park and viewing platform at Inveruglas; from the A83 travelling north alongside Loch Long and between Arrochar and Tarbet; looking across Loch Lomond from Inversnaid and the West Highland Way; and from highpoints on the slopes of The Cobbler, Ben Vane and Ben Vorlich.

Graphical visualisations of the operations proposed in this plan accompany this document in *Appendix IV*. Locations of key viewpoints are annotated on *Map M01*.

The coupe design in this plan is intended to maximise the removal of Larch spp. and this has resulted in a large area of clearfelling in this plan period, particularly on the eastern and southern slopes of the forest. This will have a visual impact when viewed from the above locations. A detailed rationale of the coupe design can be seen in *Appendix VIIIb*; advice has been taken from FLS' Landscape Architects throughout this plan's development in terms of the visual impact of the proposed felling. The extent of coupe 01005 was reduced on the basis of this advice. The full detail of this advice can be seen in *Appendix VIIIa*; in summary, despite the large extent of clearfelling, it was

[11] https://maps.nls.uk/geo/explore/spy/#zoom=14&lat=56.22867&lon=-4.72738&layers=5&b=1&r=30 *[Accessed 31st Jan. 2022]*

felt that this would be acceptable within the large scale of the surrounding landscape.

Concern over subsequent adjacency issues with the contiguous clearfell coupes 01003, 01005 and 01020 will be largely mitigated by restocking proposals; these coupes will be restocked predominantly with mixed native broadleaves which will develop into a forest with varied structure and complement existing Atlantic Rainforest in the surrounding environment. The design of these coupes is limited by the distribution of Larch spp. here and a detailed rationale can be seen in *Appendix VIIIc*.

The proximity of the present treeline above coupe 01043 will be lowered slightly, as per the current approved plan and in light of comments received. This will enhance the open ground around Cruach Tairbeirt's summit when viewed from the south, as described in *Appendix VIIId*.

The amount of felling required as proposed in this plan will have a visual impact on the landscape. The proposals in this plan are also significantly different from the last approved plan, which may affect the visibility of the forest road and this will be addressed in the revision to the aforementioned *EIA* which is being carried out concurrently with this plan. It has been acknowledged that the planned widescale planting of native mixed broadleaves will help mitigate the scale of the felling by providing "built in" structural diversity as will restocking earlier than normal, as discussed in *Sections 2.4 & 5.2*.

7.5 Neighbours

Cruach Tairbeirt forest marches with another FLS forest, Glen Croe, to the west separated by the open ground of Glen Loin. To the north lies Inveruglas estate. The villages of Tarbet and Arrochar, including Succoth, are immediate neighbours where some private gardens back onto the forest. To the south, the neighbouring landholdings are of Luss Estates.

7.6 Public access

Formal recreation activities are limited to the south end of the forest, and in the adjacent Glen Loin. A circular walk is promoted in the Tairbeirt Isle area in the southeast of the forest, as is a short walk linking the railway station with the head of Loch Long[12]. A longer footpath forming part of the Three Lochs Way and Cowal Way long distance walking routes skirts though the west side of the forest[13]. Informal routes exist leading to the summit of Cruach Tairbeirt hill.

[12] https://forestryandland.gov.scot/visit/forest-parks/argyll-forest-park/arrochar *[Accessed 31st Jan. 2022]*
[13] https://threelochsway.co.uk/ *[Accessed 31st Jan. 2022]*

Little other recreation takes place in the forest due to the historic lack of road infrastructure. The construction of the forest road network, especially to the north, will vastly improve public access into the forest and is likely to lead to an increase in recreational activity in and around the forest.

In addition, the Tairbeirt Isle area is a promoted "Camping In The Park" area for Loch Lomond and The Trossachs National Park[14].

Public access features are shown on *Map M08*.

[14] https://www.lochlomond-trossachs.org/things-to-do/camping/go-wild/ *[Accessed 31st Jan. 2022]*