Forestry Commission Scotland
Coimisean na Coilltearachd Alba

North Tummel Land Management Plan

Tay Forest District

Approval date: ****

Plan Reference No: ****

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We manage Scotland's National Forest Estate to the United Kingdom Woodland Assurance Standard – the standard endorsed in the UK by the international Forest Stewardship Council® and the Programme for the Endorsement of Forest Certification. We are independently audited.

Our land management plans bring together key information, enable us to evaluate options and plan responsibly for the future. We welcome comments on these plans at any time.

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Summary of Proposals

Proposed Felling

Felling will be carried out in both Phase I (2018-2022) and Phase II (2023-2028) within the North Tummel plan area. The management coupe map illustrates Phase I coupes in red and Phase II in orange. Total felling area within Phase I will be 480 ha and within Phase II will be 497 ha.

Felling will be used to break up the very uniform age-class structure and move it towards a more normalised distribution, respond to incipient windblow, progress species change and PAWS restoration, and maintain and enhance managed open space on Meall Reamhar.

Proposed Thinning

In general the plan area has had a good thinning history and this will be carried forward within the plan period. Thinning will take place to develop CCF shelterwood management within the plan area, to maintain the thinning cycle of mid-rotation crops, and to initiate thinning in young crops to develop long term stability. An area of around 1290 ha (plan thinning extent map) will be assessed and thinned as required within the plan period.

Proposed Restocking

Planned restocking will tackle 3 broad themes: re-establishment of productive spruce-dominated crops to maintain production, reversion to native species dominated stands within areas of PAWS, principally on the southern faces above Loch Tummel, and conversion to a more pine-dominated structure within the Glen Errochty zone.

In addition, successional regeneration will be accepted and monitored within around 420 ha of open ground, principally around Meall Reamhar.

Restocking coupes showing target future species composition are illustrated on restocking map.

Species Composition

The change in species composition for the North Tummel plan area is illustrated in Figure 1 for the next 30 years. Sitka spruce proportion is planned to decrease from 31 to 26 percent with Scots pine proportion increasing from 33 to 38 percent. Lodgepole pine proportion is planned to decrease to reduce the effect of *Dothistroma* needle blight and larch proportion will also reduce in response to the risk posed by *Phytothphora ramorum*. The proportion of broadleaves will increase from around 5 to 16 percent as PAWS restoration progresses and regeneration gradually colonises successional open space.

Age Class Structure

Restructuring of the uniform age-class structure of the plan area over the next 30 years is illustrated in Figure 2. The plan area is currently dominated (*c.* 71%) by 41-60 year-old crops. Restructuring will reduce this cohort to around 40% by 2048 with a more even spread of ages in younger crops.

Figure 1: Species composition of the plan area from 2018-2048

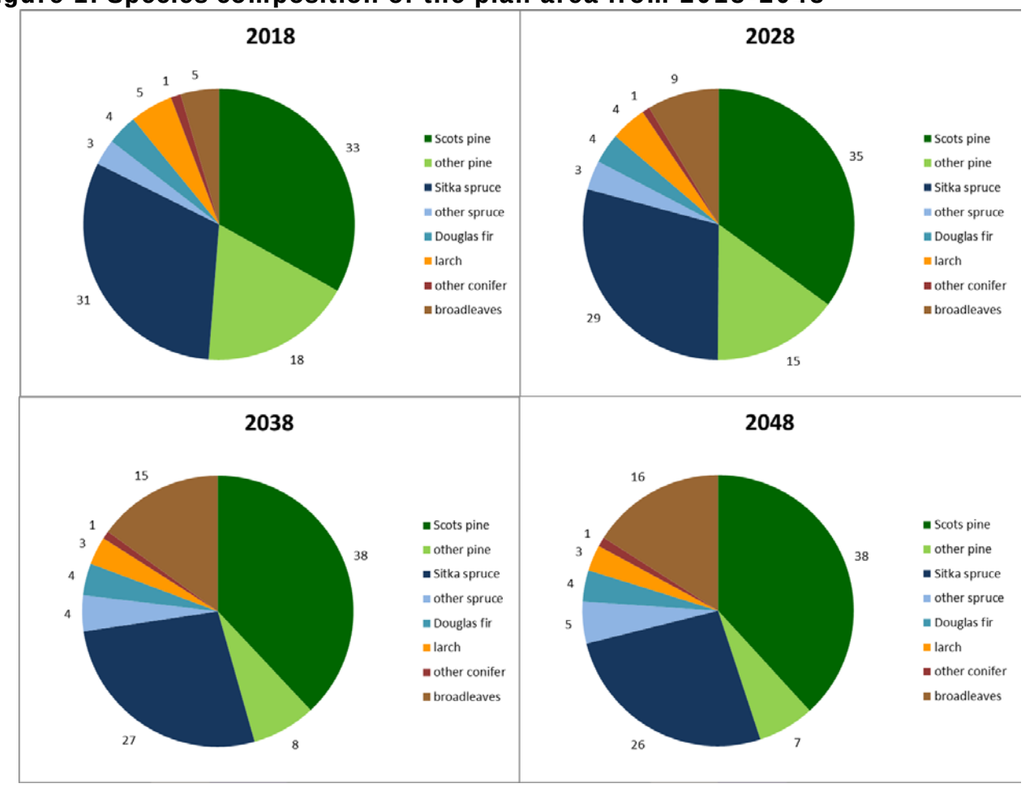
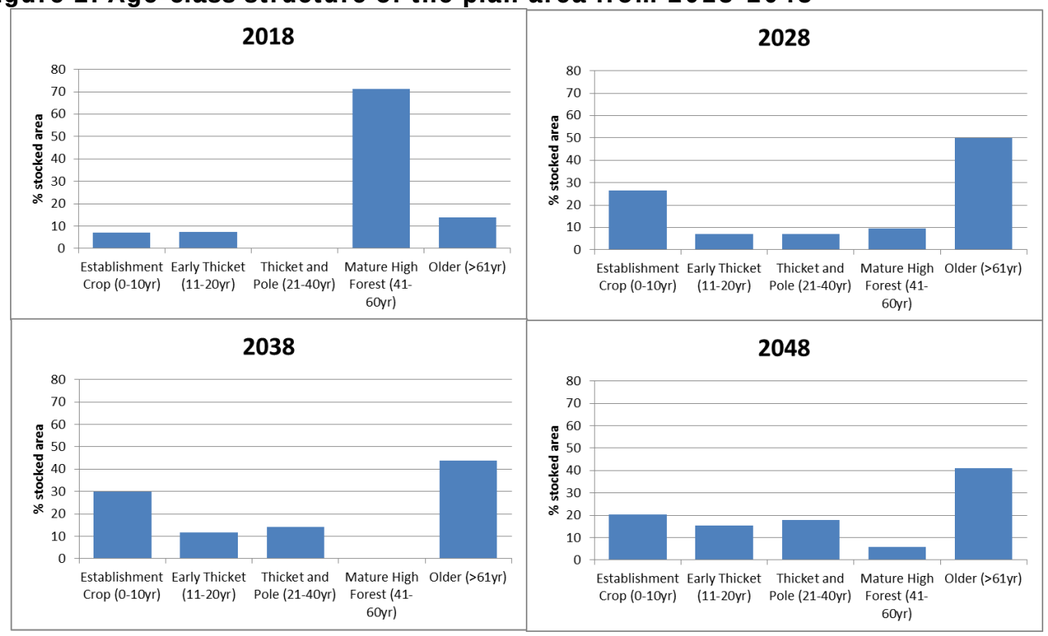


Figure 2: Age-class structure of the plan area from 2018-2048



Management Systems

Proposed management systems are summarised in Table 1 and illustrated on page 4. Current plan systems are illustrated on page 9. Several management system changes are proposed.

Table 1: Summary of Management Systems

Management	Current		Plan	
	Area (ha)	%	Area (ha)	%
Clearfell	1948.1	49.2%	2198.3	55.5%
Open / Other	600.5	15.2%	461.6	11.7%
Clearfell with Seed Trees	208.1	5.3%	201.7	5.1%
Group Shelterwood	227.9	5.8%	44.0	1.1%
Irregular Shelterwood	754.8	19.1%	975.4	24.6%
Minimum Intervention	134.0	3.4%	62.1	1.6%
Natural Reserve	39.5	1.0%	14.3	0.4%
Long Term Retention	44.4	1.1%	0.0	0.0%
	3957.3	**100.0%**	**3957.3**	**100.0%**

Group shelterwood areas in Allean have been converted to a mixture of irregular shelterwood, clearfell with seed trees, and clearfell. PAWS restoration in the eastern part of the zone was not thought to be tenable under the previous system whereas clearfelling will enable quick establishment of productive broadleaves on this site through planting. Stand development above the Queen's View car park was also thought to be better suited to further development through irregular shelterwood than group shelterwood.

Areas of reserve have also been rationalised. Natural Reserve has been limited to a single high-quality area in Glen Errochty. Classification of Minimum Intervention has been restricted to areas of pine and bog restoration in Meall Reamhar and Drumcroy Hill as it is not appropriate for the productive areas of PAWS restoration and birch through Strathtummel and Tummel Bridge zones. Long Term retention has also been rationalised in line with what was thought to be achievable given other constraints, however the retention of trees past rotation or conventional diameter limits will be delivered through seed trees within CCF areas throughout North Tummel.

Area of irregular shelterwood through the Strathtummel zone is planned to increase, taking advantage of well-thinned crops.

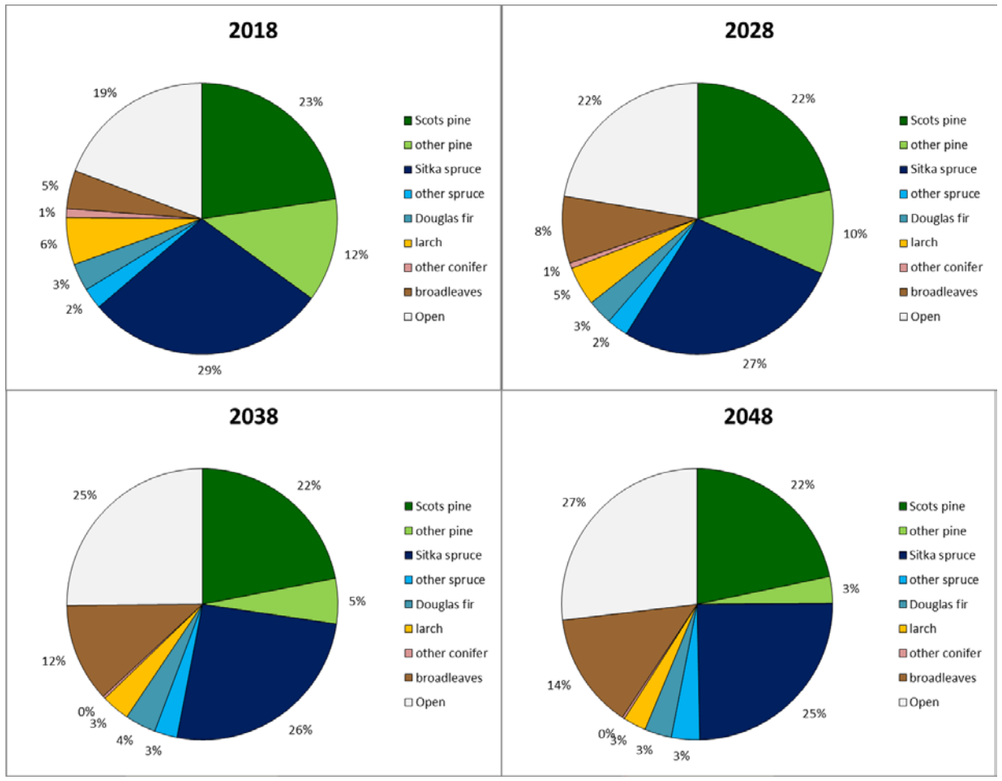
Land Use Summary

Changes to proportions of land-use are presented in Figure 3. Principally, open space within the plan area will increase from the current 19% to 27% over the next 30 years. This increase is largely due to the removal of poor crops on Meall Reamhar with associated open habitat restoration, primarily blanket bog, and partial replacement with low density broadleaf regeneration.

Access and Timber Transport

The North Tummel plan area is bounded to north and south by Agreed Timber Transport Routes. Access points along both east and west boundaries are served by consultation routes connecting into the main Agreed routes. There are currently 10 access points into the plan area, and another 4 are planned to access currently isolated coupes. Overall, access to the plan area is good and no road-building is proposed; upgrade of existing network and addition of 4 access points with spurs should be sufficient to service harvesting works. Access infrastructure is presented on Access and Timber Map.

Figure 3: Land-use summary 2018-2048



1.0 Introduction:

1.1 The existing land holding and location

The North Tummel forest block is situated on the north shore of Loch Tummel and covers an area of 3954 ha. Because of its size and geographic composition the North Tummel area contains a wide variety of ecotypes which support a mixture of proposed land uses as described in this LMP.

On the higher slopes the environmental conditions are a limiting factor. This has resulted in limited diversity of tree species and a patchwork of open ground and woodland. Because of the low yield classes and the windy conditions these areas are currently mostly un-thinned and are managed through the clearfell system. The open ground forms an important asset on these areas, although not in terms of tree cover but in carbon accumulation potential and environmental benefits.

The lower-slope soils are very fertile and planted with mixed species which result in a diverse tree species composition including some of the best conifers in the District. In terms of the silvicultural management these areas are managed under a combination of continuous-cover and clearfell regimes. These lower slopes are also predominantly classified as Plantations on Ancient Woodland Sites (PAWS) areas and also have important environmental, landscape and niche timber market contribution values.

1.2 Setting and context

Focus for this LMP is the integration of two earlier Forest Design Plans (FDPs), namely Allean and Errochty, into a single North Tummel plan. The previous forest design plan covering Allean was last approved on the January 2012 and was set to expire 6th of January 2022. The previous plan for Errochty was last approved October 2006 and was set to expire 18th of October 2016, but was extended to allow preparation of this LMP.

The bulk of the forest area was established from the late 1950s and throughout the 1960s, however Allean was established in the 1940s, and planting continued in smaller areas into the 1970s.

The eastern end of the block (Allean) consists of complex, intimate terrain with a number of small scale summits, steep gradients and mixed species composition. This area plays an important role in the setting of Loch Tummel, particularly for producing good autumn colours that help this area be considered a National Scenic Area (NSA). The western end (Errochty) consists mainly of larger management coupes with a good timber production potential. The lower slopes are more complex and have a good proportion of broadleaved cover. The majority of the south-facing slopes of North Tummel are fertile and are classified as PAWS. These areas also have good potential for alternative conifer species such as western red cedar (*Thuja plicata*), various true firs (*Abies* spp.) or Douglas fir (*Pseudotsuga menziesii*). The areas also link to existing native broadleaves around StrathTummel.

The north facing areas of North Tummel have generally poorer soils and lower growth potential but are well suited to Scots pine (*Pinus sylvestris*) on the higher elevations and Sitka spruce (*Picea sitchensis*) on the wetter or more fertile soils on the lower slopes. The slopes of Glen Errochty also hold PAWS areas with some adjoining native broadleaved woodland.

The block is surrounded by a good public road network. The B8019 runs adjacent to the block on the southern periphery, the B847 on the northern and north-western periphery and C453 on the western periphery. The B8019 and B847 are both classified as agreed timber haulage routes and the C453 road is a consultation route (Timber Transport Forum 2017).

There are six entrances which give access to the block. Four of these can be used to access the major internal road system, whereas two of these (easternmost Allean entrance and westernmost Drumcroy Hill entrance) are shorter sections which just give access to some of the coupes which would be otherwise isolated. Of these six entrances, four are connected to agreed routes for timber haulage, and two are connected to the C453 consultation route.

North Tummel is known to hold five of the six Forestry Commission Scotland (FCS) priority species. Capercaillie (*Tetrao urogallus*), black grouse (*Tetrao tetrix*) red squirrel (*Sciurus vulgaris*), pearl bordered fritillary (*Boloria euphrosyne*) and juniper (*Juniperus communis*) are to be found inside the block.

Although there are no populations inside the management area, conservation of Atlantic salmon (*Salmo salar*) and freshwater pearl mussel (*Margaritifera margaritifera*) is influenced through the quality of water leaving the management block and expansion of riparian woodland to help drive natural processes. All watercourses from the management area flow into the River Tay Special Area for Conservation (SAC)

Other important species present in North Tummel are Kentish glory (*Endromis versicolora*), northern brown argus (*Aricia artaxerxes*) and pine marten (*Martes martes*).

The management area has high deer pressure along north, east and west boundaries, exacerbated by incomplete fencing, and future restocking plans are contingent on reinstating fencing and controlling deer numbers internally.

The Meall Reamhar Site of Special Scientific Interest (SSSI) is located in North Tummel and is designated for its geological interest, which can be easily accessed, observed and studied by visitors.

There are several areas visited by a variety of user groups for their archaeological and recreation value. There is a strong cultural heritage theme within the forest which hosts an Iron Age ring-fort and remnants of an abandoned township. The latter includes a reconstructed clachan which serves as a key interpretive feature.

The forest block also contains on its periphery the famous Queen's View with associated visitor centre. This has a forest shop, café, view point trail and car park and is heavily used by coach tours as well as being signposted from the A9. There are also a number of way-marked trails and a picnic area with impressive views down Loch Tummel.

The surrounding land uses consist of a variety of housing, recreational and caravan areas, agriculture, forestry, open hill, and water bodies. Of these, the housing, recreational areas, caravan park sites, agriculture and Loch Tummel are located at the southern side of the block. On the northern, eastern, and western sides the surrounding land use is mainly forestry and open hill land, although some housing and arable agriculture is also present. Loch Bhac within the block is well used for angling, with the main access to it via the forest road network.

Typical of highland Perthshire, tourism is a major industry and Loch Tummel-side is a popular route for individuals and tour parties who either pass through on route to other local destinations or stop at the Queen's View or Allean forest carpark. A seasonal campsite borders Allean, catering for static caravans, as well as touring motor homes, caravans, etc. The campsite and domestic properties nearby are reliant on water from the forest.

The management area contains a large amount of utilities infrastructure; transmission lines along the southern borders of Errochty and Allean, the Beauly Denny transmission lines along the western border of Erroctthy, and a surge shaft and associated infrastructure for the hydro power station.

Key Features are illustrated on the Context Maps.

2.0 North Tummel LMP Objectives

2.1 Management objectives

Following the review of the previous plan (See Appendix I), an analysis of the scoping responses (See Appendix V), and the special aspects identified in each management zone, the following management objectives were identified for the whole North Tummel plan area:

Primary: Timber production (Sustainable forestry management)
Secondary: Landscape improvement, PAWS restoration and SSSI site management, Archaeology, and Community and recreation management.

As this LMP covers a very large area, additional objectives have been identified in each management zone, leading to concept and proposals. This way the unique factors of these zones are captured and can be used to drive the overall management. These zone specific objectives are explained in the Sections 3 – 9 of this LMP.

2.2 Analysis and Concept

North Tummel is a diverse forest with a complex set of dynamics which range from high landscape value, archaeology, biodiversity, clearfelling forestry, continuous cover forestry, timely/late/un-thinned sites, PAWS management, remnant semi-natural native woodland and forest recreation which includes trails, picnic sites, fishing and motor sport events.

Objective	Opportunities	Constraint	Concept
Ensure the forest is managed in a sustainable way	• CCF is already well initiated across the forest block. • Areas with poor timber quality are good areas for environmental objectives. • The soils and aspect ensure that most species will grow well • The Western part is dry, grows good timber, is easy to access, has good roads, with good quarries to serve them.	• There are challenges to some CCF areas, particularly in the East: risk of *Phytophthora ramorum* in larch crops; halo thinned broadleaves require further management; PAWS areas under conifers; steep ground working with adjacent roads and utilities.	• Review all the CCF areas. • Assess the top line for productive timber and how this fits into environmental objectives.
Ensure the quality and volume of timber production is maintained or enhanced	• Improved tree quality • encouraged natural regeneration,	Removal of areas of Larch due to moratorium on planting and PAWS restoration and replacement with native trees will reduce productive timber potential.	• Ensure timely thinning continues to be carried, particularly in CCF areas. • Monitor and promote regeneration of stands
Ensure the effects of wind blow are kept to a minimum	• Most of the forest block has had timely thinning.	• Large areas were planted within a few years, of limited species and with few wind firm edges making restructuring difficult without windblow	• Fell into the wind where possible, using large coupes where appropriate in landscape terms. • Establish future wide rides in younger crops to prevent reiterating the problem.
Manage the risk posed by future potential infections of larch within the forest block by *Phytophthora ramorum* by planning removal on difficult sites.	• Phytophthora ramorum is not yet present in the plan area, giving a brief window to plan.	• *Phytophthora ramorum* has been identified very close to the Eastern end of the plan area. • There are a number of issues to overcome such as powerline switch offs, steep ground working and sites next to the B8019: a major tourist route	• Prioritise felling of larch areas which are most difficult to extract so that this can be achieved in a controlled manner.
Ensure the characteristics of the NSA (‘*rich and varied woodland’*, ‘*constant but changing colours throughout the seasons’*) are maintained and expanded.	• There are opportunities to expand further West the characteristic of “rich and varied woodland with autumnal colours” of the Eastern end in Allean. • Queen’s View sits within NSA but looks outwards towards Schiehallion and south Tummel, and other than maintaining the view over the trees directly in front of it, there is little of North Tummel that influences the view.	• Larch may be affected by *Phytophora* at some point. As this is the main species producing the autumn colour that gives the NSA its quality, replacement species need to be considered. • The road along North Tummel is heavily used by sightseers (Lochs and Glens type tours especially), so the visitor experience in this Visitor Zone is important.	• Plant a variety of species, with regard to the seasonal change of colours.
Ensure that coupes are appropriately scaled and shaped to relate to the landform, especially as viewed from key viewpoints	• There are well established areas of LISS on the lower slopes as a permanent element of the forest.	• Some of the most visible parts of the forest have few wind firm edges, and those that are there, are not well shaped with regard to the landform.	• The simplicity and scale of the landform can take large coupes at the Western end. • Younger crops can have rides cut through at thinning to give more choice for the future.
Ensure the conversion to native species on	• Most of the PAWS areas do have an	• Stands of award-winning Doulas fir	• PAWS conversion will be long-term on areas

PAWS sites is continued.	element of native trees in them as a seed source • The most difficult Larch harvesting sites are on PAWS areas; its early removal will instigate the conversion to PAWS.	which are a national seed-source are within the PAWS area. • PAWS restoration may be difficult in conifer-dominated CCF areas on the lower slopes • Native broadleaves along water courses are a high PAWS priority and therefore a priority to protect from deer	with Douglas fir. This will be offset by the early removal of larch in other PAWS areas.
Work with SNH on managing the SSSI site or impacts on SSSI sites	• Agreement is already in place with SNH on managing the SSSI. • Grazing to keep the vegetation clear of the geological interest is an option.	• Some of the better parts of the geology appear within forested areas, and some poorer areas fall within the SSSI. • Watercourses and loch Bhac may affect the limestone if it drains into the SSSI limestone area.	• Adopt a pragmatic approach to managing the best examples, rather than strictly the SSSI boundary. • Instigate and monitor management with grazing.
Work with SEPA on managing for the River Tay SAC, and assess where improvements can be best made.	• Any change in species for SAC protection will also improve the general riparian habitat and linkage. Most of these areas also fall into PAWS areas.	• The SAC covers all of Loch Tummel and Errochty Water, running along the two long sides of the forest block. Its quality will be affected by virtually any management in any part of the forest.	• Remove those areas of conifers most affecting the SAC within this plan timescale. • Ensure any felling works do not adversely affect the SAC.
Enhance priority habitats such as peatland to help create the environment for priority species such as Black Grouse and Capercaillie	• A survey of peatland to be restored has been undertaken. Much of the higher ground with poor tree growth would be a good habitat for Black Grouse and Capercaillie.	• The peatland is not as extensive as previously thought. • Access is challenging in this area due to the wet soils. • Expansion West of the native woodland/open habitat on Cragan Liath Mor is slow to evolve and would have to be long term	• Restore identified peatland • Expand the suitable habitat across the plateau.
Ensure the Historic environment is protected and accessible	• There are a number of well-maintained and accessible scheduled monuments which have good interpretation	• There are historic features close to the FC boundary that do not have a suitable buffer between them and the commercial forest	• Manage areas around key monuments to maintain and improve visitor experience. • Restructure forest edge to favour boundary features
Ensure management for visitor zone areas are well integrated into the LMP.	• The diversity of the woodland and CCF lend themselves to the human scale	• Good soils and robust regeneration can create a corridor of vegetation along the visitor zone corridors	• Consideration should be given to the impact any felling operations or species change will have on the landscape and, in particular, to the iconic view from Queen's View. Options to minimise this impact should be carefully considered during the planning stages of any felling and re-stocking coupes. • Views into the forest and across the loch from the main roads should be created during thinning operations. • Use small scale felling coupes near any Welcome visitor zones.
Protect the iconic view from the Queen's View and enhance the current trails on offer in Allean.	• Good soils give great potential for alternative species which can be used to develop texture and colour on the steep ground of Allean • Chance to re-establish the viewpoint above the Clachan.	• Phytopthora ramorum could necessitate rapid felling of the larch which is a major component of the forest and landscape.	• Develop a more diverse and interesting forest through continued thinning and habitat enhancement. • Develop internal views through careful thinning and external views either by small scale clear felling or heavier thinning. • Consider alternative species to larch which in particular will offer Autumn colour
Increase the protection from herbivores in a timely manner, to protect the planting of soft species, and natural colonisation and regeneration.	• A proportion of deer fence is already in place.	• The deer fence is needed in three locations in order to ring fence the whole block. • Substantial shooting intervention will still be needed to ensure the success of the planting/regeneration.	• Complete the deer fence during this design period
Ensure there are timely	• The existing roads are	• There is some shared	• Identify road

road improvements to access coupes that need management.	generally in good condition • Good quarries exist within the plan area	access with neighbours and this will need to be kept up to standard, and the neighbours kept informed. • Requirement for EIA determination for worked quarries • Requirement for prior notification and potentially planning permission of roads work • Part of management area is within NSA and will have a higher bar	construction, upgrade or maintenance required for Phase 1 and 2 felling, and programmed thinning. • Identify and obtain suitable permissions for development

2.3 Implementation of the objectives

The objectives which extend across the whole of the LMP area will inform the management of the land across all the management zones. Opportunities to implement the approach to taking forward the objectives, as outlined in the 'concept column' above, will be identified in all the management zones wherever possible.

3.0 North Tummel Management Prescriptions 2018-2028

Management of North Tummel is split between zones worked under CCF and clearfell silviculture. Management prescriptions will consider landscape, recreation, biodiversity, and deer management. Key management aims are timber production, PAWS restoration, conservation, and landscape & tourism.

Areas of retention and natural reserves have been updated as a part of this new LMP and now account for the specific areas inside this block appropriately in terms of the environmental condition, current governmental policies, and 2017 FES nationwide management aims, criteria and drivers.

The western portion of North Tummel, is dry, grows good timber, is easy to access and has good roads with good quarries to serve them. There is a long term contract for thinning and felling producing a good quantity and quality timber. There is a good thinning history and success on large portions of this area which makes it possible to alter some of the silvicultural systems from clearfelling to CCF. Because it is easy to access, it can be used as a solid source of the overall production of timber for the district with a variety of coupe sizes to help the operational programming. For the future these western zones demonstrate excellent possibilities in terms of both clearfell and CCF silviculture.

Over the period of this LMP there are further aims to increase PAWS areas located on the lower south facing slopes (Strathtummel) by decreasing the amount of current standing non-native conifer proportion while restocking these areas with native broadleaves. The north facing slopes does not have as favourable conditions for most of the native broadleaves but instead are suitable for native Scots pine. As these areas are felled, or managed through CCF, the proportion of Scots pine will increase, along with birch, which drives them towards their native state while improving the PAWS conditions by the removal of non-native species.

The eastern half of the forest block has good structural variation and as a result this area will continue to be managed through CCF silviculture. Lower slopes are south facing and offer good microclimate and soil conditions for the variety of tree species, both broadleaved and conifers. With increased elevation the microclimate and soil conditions decrease in quality and are more favourable for coniferous species.

The long term drive is to improve the autumn colours and visitor attractiveness along with the commercial forestry. This aims to produce high quality timber through variety of silvicultural systems along with the aim to meet further human and environmental values. During the period of this plan it is important to acknowledge and monitor the condition of larch as the national spread of *Phytophtora ramorum* progresses.

3.1 HM – Clearfelling

Within the block the conventional clearfell regimes are to be worked over an approximate 45 to 70 year rotation subject to site index and species. Where appropriate the rotation includes thinning interventions, but where it is seen impractical, the remaining rotation will be carried through without further thinning interventions. This can be because of factors such as lack of previous thinning interventions, poor crop growth or quality, or unsuitable ground conditions where environmental damage is likely if thinning takes place.

3.2 HM – CCF

There is a long history of CCF practice in North Tummel and this will be carried over into the future. The past FDP had good CCF prescriptions for some of the North Tummel area, particularly Allean. CCF coupes were checked and confirmed in terms of their objectives and suitability and management proposals for this plan.

CCF prescriptions were almost absent within the western half of the forest block, and although some areas have been thinned they were being managed to rotational clearfell. These areas were reviewed and the CCF area increased where appropriate.

CCF is being reduced reduced on the lower slopes of Allean, as discussed in the management prescriptions section, to enable the more rapid and effective shift of species to progress PAWS restoration. In the Strathtummel/Meall Reamhar zones, CCF is expanding to cater for species change and PAWS management.

Within PAWS areas this process of natural regeneration of native broadleaves is both welcomed and encouraged, but it should however be recognised that considerable

time will be required to achieve this vision and will take a number of future LMPs to complete.

3.3 HM – Thinning

Thinning will initially build crop stability through crown thinning, gradually changing into low thinning to improve the crop quality towards the end of the rotation. The specific timing of the change is driven by the tree species' specific ability to respond to different thinning types and will be agreed at the workplan stage before the management operation. The rationale for this is that the crops response is usually best during the beginning of the rotation (Kerr & Haufe, 2011). Crown thinning with future final crop tree selection at the beginning of the rotation concentrates the volume production on the best individuals in the stand and develops stability. To confirm the site suitability in terms of crop, soil and wind vulnerability the final thinning prescription must be discussed in terms of each operation at the workplan stage before the work commences.

The most significant aspect of future management will be to develop a programme of thinning on steep ground to fully maximise available volume within the forest resource. As North Tummel is a forest block with multiple values it must be acknowledged that this programme must also meet the management aims in terms of recreational use, visitors and landscape.

The thinning operations are vulnerable to timber price fluctuations, availability of specific machinery, and unforeseen windblow, which all relate to the operational costs and affordability to follow the planned thinning prescriptions. Because of this the proposed thinning programme should be seen as aspirational and liable to assessment and change.

Currently planned thinning operations are aimed be undertaken within the areas highlighted in the Thinning Extent Map.

3.4 FM - Restocking and natural regeneration

The restocking proposals as seen in the restock map aim to select the most suitable species on the specific sites depending on the soil type, moisture, deer pressure elevation and aspect. This is done by the combination of observations from the current forest structure, Ecological Site Classification tool (ESC) and professional opinions of FES foresters.

It is proposed that on the productive areas which don't overlap with broadleaf expansion sites (e.g. PAWS), commercial coniferous restock species such as Sitka spruce, Douglas fir, Scots pine, Norway spruce (*Picea abies*) and western red cedar will be planted. At the higher elevations Sitka spruce and Scots pine are likely to be the best species, but at the lower slopes it is seen possible to diversify the conifer species composition.

Restocking will take place as soon as appropriate after felling, balancing requirements to protect against expected pine weevil (*Hylobius abietis*) pressure, maintain site productive potential, and reduce site inputs to control both weeds and weevils.

On the more fertile lower slopes, where most of the PAWS areas are found, it is proposed that an additional broadleaf component is planted. This is to drive species composition towards mixed broadleaved-dominated, and to enhance the stocking density to the appropriate level.

Many management coupes located in these areas currently have distinctive areas of mature conifers which have reached, or are about to reach, their rotation age. As some of these management coupes are now planned to be felled and restocked over the 10 year period of this LMP an ambition is to use the surrounding mature broadleaves as a seed source for some of these felled areas.

As a part of using natural regeneration the management coupes will be monitored and re-spaced as required to produce a quality full-stocked young crop. If natural regeneration does not give appropriate stocking densities, or species composition, the areas will be beaten up manually.

The greatest potential in terms of future habitats/species change lies on the more fertile free-draining slopes by the side of Loch Tummel where remnant semi-ancient native broadleaved areas can be found. It is envisaged that over a period of several thinning cycles, broadleaves will become an increasingly dominant proportion of the stands. Some degree of intervention may be required to favour desirable species (birch, oak (*Quercus* spp.)) but this is to be determined prior the operations as a part of the work planning procedure.

3.5 Civil Engineering

Overall North Tummel has good road infrastructure, and most of the roads which are needed for forest management operations have been well maintained. To enable future harvesting operations, and the safe extraction of timber, there are civil engineering work areas that proposed for the 10 year period of this plan:

- Glen Errochty - the internal road which connects the management coupe 02114 (at the end of the internal road) to the public road is in poor condition. A road section close to the coupe has already suffered because of a landslip, and the second half of the road is in very poor condition. Work will take place inside the block, outwith the NSA, further than 25m from a public road, so will not require EIA determination or Planning Permission. Prior Notification will be sought due to culverting and footprint.
- The western Drumcroy Hill management coupes which are to be worked this, and the next LMP - two new access points with stacking and turning areas will be built. The proposed work needs Planning Permission as the work will take

place next to the public road. A portion of internal road will also need to be upgraded to service the phase 1 coupe but this will not require permissions.

- The south-west side of Allean - this area is proposed to be clearfelled over phase 1 of the LMP. Upgrade of existing access from the forest road and creation of a separate access spur are required to allow timber extraction. Work is within the NSA and will require EIA-determination in addition to planning permission
- The East of Allean - access is required for the Phase 1 coupe. Access from the public road will require planning permission and EIA determination.
- There are six quarries inside the North Tummel plan area. Two quarries are within the NSA and require EIA determination if they are to be worked, and the others require monitoring to ensure that they do not exceed area threshold.

3.6 PAWS restoration

PAWS areas of North Tummel are mainly found on the lower, more fertile slopes and are an important aspect, and management driver of the area and this LMP because of their connections to the environmental, landscape and spiritual values of the forest. PAWS restoration will be a gradual process achieved through thinning and felling over a number of plans. The long term vision for identified PAWS areas is to expand native woodland to enhance the local and wider environment while giving future managers the option for timber production.

The restocking of the PAWS areas will need careful work planning. The management of deer is closely correlated to the success rate of the broadleaved establishment and this can be particularly difficult in the North section of Allean. There is no current deer fence located round this area, so the felling of the phase 1 coupes needs to be in conjunction with the erection of a deer fence to help the PAWS restoration. The other PAWS restoration priority areas do not have such a high risk of deer damage, so a planned culling and fence upgrading should be enough to suppress the deer numbers for broadleaves to establish.

3.7 Deep peat bog restoration

There are deep peat areas in North Tummel, particularly around Cragan Liath Mor in the western part of the Meal Reamhar zone. These areas have historically been ploughed and planted with lodgepole pine and Sitka spruce. On these areas the tree growth and survival is poor, and the trees that are still living are not likely to give much benefit in terms of timber production, environment, landscape or carbon storage.

As the tree cover of these areas has more negative impacts than positive this LMP proposes that these areas are felled and classified as deep peat restoration. Bog areas will be felled to waste, or harvested where possible, stumps and furrows will be flattened and drains blocked to raise the water table and encourage redevelopment of bog ecosystem. This process should then change these sites from potential carbon sources to carbon sinks.

3.8 Management of open land

Managing open land, particularly in wetland areas, will generally be low intervention over the course of this LMP. The exception is use of grazing to maintain open space on the Meall Reamhar SSSI and the calcareous grassland and limestone outcrops.

Open space is classified as Open or Successional. The emergence of regeneration in open areas should be periodically monitored and if significant stocking of undesirable trees are found to be establishing, particularly in areas of restored open habitat control measures will be deployed.

Most of the open sites are found at the higher elevations, in the central and eastern parts of the block, namely Cragan Liath Mor, south of Glen Errochty, north of Drumcroy Hill and Loch Bhac. Some of these bog areas do not have deep enough peat depth for the meaningful restoration but are too poor, shallow and/or wet to establish a woodland which produces timber, or acts as a better carbon sink when compared to the current situation. In these cases it is better to manage these areas as open successional, which gives additional value in terms of the landscape and the environment.

3.9 Deer management

Management of deer must take into account a variety of factors to achieve sustainable population density. Ultimately a sustainable population will be of a density that it will not impact negatively on floral diversity and allows successful natural regeneration and restock planting.

The FES assessment for population dynamics starts by the assessment of the deer numbers by the periodic dung counts which are carried out as a monitoring tool. Additionally browsing levels are assessed within restock sites and on sites with natural regeneration. From these the final cull numbers can be determined.

Overall the deer pressure around and inside North Tummel is relatively low, although hot spots are known. An increased planting of broadleaves and soft conifers over this LMP period may be a challenge as these are more susceptible to browsing by deer.

There are known weak points in terms of the current perimeter deer fence; specifically the north side of Allean, eastern section of Glen Errochty, northern section of Loch Bhac and western section of Drumcroy Hill.

Control of red and roe deer is undertaken by a dedicated FES wildlife ranger and a deer management contractor. For the next 10 years there are specific sites where the shooting pressure is likely to be focused. There are no immediate plans to fence individual coupes, instead it is proposed that the perimeter fence is made sound and monitored. As the management coupes found at the eastern end of Allean and Glen Errochty are felled and restocked with broadleaved species they are likely to receive

high deer pressure and control must be focused ensure successful restock in these areas.

It is proposed that the deer management contractor stays in place to achieve the control required to meet objectives. Out of season and night culling are proposed to achieve continued high culls. Monthly checks will be carried out on restocking sites and in areas of vulnerable crops to inform culling strategy.

The Forest District maintains a Forest Deer Management Strategy for all its forest blocks. This is carried out as a mechanism for identifying deer management issues at both strategic and operational level. Feeding into the strategy is captured data from cull records, boundary fence condition, browsing impacts, and estimated deer population figures within forest blocks and on neighbouring land. This information is collected by local staff and external bodies to give a holistic view of deer dynamics effecting individual forest blocks.

The areas of known larger deer population, major pressure points and fence conditions are illustrated in zone context maps.

3.10 Plant health

Over the last FDP approval period there was a steady increase in plant health issues which now have to be taken into account for this plan. Currently-known plant health issues for the North Tummel are *P.ramorum*, *Dothistroma* Needle Blight (*Dothistroma septosporum)*, and ash dieback (*Hymenoscyphus fraxineus)*.

In addition there are a number of long-standing forest pests and diseases present in the plan area and are dealt with in operational work planning; fomes (*Heterobasidion annosum*), honey fungus (*Armillaria mellea*), great spruce bark beetle (*Dendroctonus micans*), green spruce aphid (*Elatobium abietinum*) and pine weevil (*Hylobius abietis*).

P.ramorum was first found in the UK in 2002, but it was 7 years later when it started to cause large-scale damage, principally in larch crops, and is now widespread in Scotland, England and Wales.

North Tummel is partly within an NSA designated in part for the autumn colour created by larch stands, recreation and tourism benefiting positively from the landscape.

This plan considers the future management of larch in the context of likely *P. ramorum* infection and an assessment of larch crops is provided in the map on page 67. Larch in North Tummel is very important for its multiple values but plans must consider controlled removal and replacement to provide equivalent benefits. Some management coupes have been adjusted, in terms of shape and phase and prescription, from the previous FDPs. This is particularly important for initiating operational planning for some of the more difficult sites in Allean which are likely to need more input than “business as usual”. Additionally larch has also been taken out as a restock species.

Dothistroma Needle Blight, first found in the UK in 1954, is the major threat and damaging agent for pine species. Although the disease is quite well researched, and good updated reviews are produced (Bulman *et al*. 2016), it is up to the forest manager to make the final management prescriptions at the forest block and management coupe level through the workplan process prior the management operations. The current research shows that through thinning interventions the likelihood and damage of this particular agent can be limited, and this is something that the manager must take into account when decisions are made in terms of the future of the pine components inside North Tummel.

There is a fairly high proportion of pine located in North Tummel. Most of these areas have a good thinning history, although the high elevation areas of Cragan Liath Mor, Glen Errochty, Drumcroy Hill and Loch Bhac have been mostly left un-thinned because of the access issues and poor crop quality. The thinned areas are mostly Scots pine which have better resistance to the disease if compared to lodgepole and Corsican pine (*Pinus nigra* ssp*. laricio*) (Fraser *et al*. 2015). At high elevations, poorly growing and stocked areas, where species mostly consist of lodgepole pine it is proposed that the management coupes are felled and where restocked, lodgepole pine is not a component. This is because they do not offer any reasonable value in terms of timber, environment, recreation or carbon storage, and landscape value is minimal. If these areas are to be restocked after this LMP it is proposed that sparse, low-density cover is achieved by using Scots pine and native broadleaves as restock species.

Ash dieback was first found in the UK in 2012 and since then the disease has spread over much of the UK. It can kill young trees quickly, while older tree can usually resist the stress for a longer period of time but usually the extended exposure allows another disease agent or ash dieback itself eventually kills the tree.

Ash is not a major component of North Tummel (*c.*3ha), but it is native broadleaf so is important to some PAWS areas and contributes to autumn colours. As there is not a large area of ash there are no proactive measures proposed in terms of the felling. Infected trees will be left as deadwood source to benefit the environment. The only proposal in terms of the disease is to exclude ash from planted stock and replace with site appropriate broadleaves, removing what would be one of the most productive site-type appropriate broadleaves from our restocking choices.

4.0 UKFS Departures

None

5.0 EIA Screening Determination

5.1 Proposed new planting

None

5.2 Proposed removal of woodland

Phase 1 felling associated with deep peat restoration on Cragan Liath Mor in the western part of the Meal Reamhar zone – c. 35ha

5.3 Proposed new roads and upgrading of roads

- Allean phase 1 coupe access

5.4 Quarries

- Proposed quarry working over the next five years is listed below:

Block	Location	Current Area (ha)	Development Area (ha)
Allean	NN858613	0.8	1.3
Errochty	NN801611	0.9	2.0
Errochty	NN794603	0.8	1.4
Errochty	NN756612	0.3	0.5

6.0 Critical Success Factors & Final Words

<u>The summary of the critical factors is the following</u>:

- **Conifer component and dominance in PAWS areas reduces**
- **Restoration of blanket bogs takes place**
- **On CCF/LISS areas natural regeneration is achieved**
- **The visual aspect of the forest block is improved**
- **The road structure is fit for purpose in time for forest operations.**
- **The deer damage is minimised**
- **The productivity is at least maintained, if not improved, on the areas where the first rotation ends and the long term aim is to grow productive crop over the second rotation**
- **Proposed forest management operations are carried out.**

Success of this plan is very much dependant on the timely delivery of the key management LMP and zone specific objectives, and the associated operations - be it restocking, thinning or provision of habitat.

In terms of the continuous cover areas, the critical factor will be in the level of natural regeneration which develops as an understorey over the regeneration fellings, what the species and stocking density will be and how recordable this data will be for future crop prediction and forecasts. It is likely that local staff will have to upskill with regard to managing natural regeneration for plotting and determining what levels of respacing should be applied to each species – all of which will take more time to manage.

Given the high landscape value of most of the North Tummel, and its surrounding area, coupe design and timing of felling are critical in avoiding any detrimental effect to what is an iconic woodland landscape and key component of the Loch Tummel NSA. Phase 1 felling coupes in Allean may have a short term detrimental effect on the landscape quality, but if hot planted, should soon succeed in satisfying more objectives, such as PAWS restoration. The issue of thinning on the steepest ground is a challenge given the small scale of volume and high costs involved in this particular operation. Under the current forest economic situation of Scotland any use of cable crane extraction is very questionable. If it takes place it must to be carefully targeted to gain the maximum silvicultural and environmental benefits.

A number of interventions for roads are required in order to carry out the forest operations at the required time. If these are delayed, it could have a knock on effect on the operational programme.

Deer management must be critically discussed and proactively planned before any restock of broadleaves. Under the current economic situation the beat-up costs because of the predicted deer damage must be minimised. Further on, the success of PAWS restoration will rely on this: planning and communication which must take place prior to operations being done. If it does not take place it is more than likely that all broadleaved planting will go to waste and some of the objectives of this plan are not appropriately met.

Finally, the forest health issues can suddenly alter the direction of the North Tummel proposals. It is important to follow the spread and progress of the current, and possible future forest pathogens to proactively take account of the issues which may affect the objectives brought forward in this LMP.