Forestry and Land Scotland
Coilltearachd agus Fearann Alba

West Region
North Mull
Land Management Plan

Appendices

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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Appendix I - Land Management Plan Brief

1. Key background information

Introduction

North Mull LMP encompasses 3089 ha of land and the main woodlands covered within this LMP are:

- Quinish (687 ha)
- Ardmore (1121 ha)
- Aros (1217 ha)

This management plan will replace and renew the previous Land Management Plan of Central Mull (SF File Ref 033/W/N/12(7))

Silvicultural Potential

Across the plan area elevation ranges from sea level at Quinish to 300 m height on the slopes of An Speinne in Aros. The blocks sit within a landscape type described as Stepped Rocky Coastlands with low stepped headlands and ridges following a SE/NW alignment interspersed with ribbon lochs and undulating moorland.

The prevailing cool & wet climate is conducive to good conifer tree growth although the combination of soil types and varied topography (exposed and sometimes steep combined with very flat, wet areas) limits the choice of tree species suitable for continued productive conifer crops. Climate change predictions suggest that the climate will become generally warmer, with drier summers and wetter winters. Previous species and provenance choice has not always been ideal to make the most of the silvicultural potential.

Existing crop

Approximately 68% of the site is under woodland cover, with a further 11% having been felled awaiting restocking and the remaining 21% given over to open ground. Sitka spruce accounts for just 34% of the woodland and Ardmore & Aros blocks have a high percentage of Lodgepole Pine at 40%. Broadleaves currently account for approximately 10% of the woodland area.

The current split in terms of age classes structure is approximately:

- 10% establishing crop (0-10 years)
- 5% thicket (11-20 years)
- 17% pole stage (21-40 years)

- 53% mature (41-60 years)
- 15% old forest (61+ years)

Age diversification is therefore minimal with a predominantly even aged mature crop.

Most of the remaining pole stage and mature trees are first rotation forest with a small but increasing area establishing as second rotation. Both the first and subsequent rotations of productive forest were managed as patch clearfell. Thinning is not suitable due to the relatively exposed nature of the site and predominantly peat soil.

There is a reasonably significant element of larch within the forests, SPHNs have been issued across many areas of Ardmore for Phytophthora ramorum and it is assumed further infections are likely although only a small area of larch remains in this area following subsequent operations.

Operational Access

The forests have a road network totaling approx. 33 km, allowing economic operational access (i.e. 500 m or less) for most of Quinish block. In parts of Ardmore and Aros consideration needs to be given to further roading for future harvesting operations in areas which currently have no access.

Natural Environment

The richness of the natural environment on Mull is well known both across the UK and internationally. The island is known as a nationally important area for a variety of species including raptors such as White Tailed Eagle, Golden Eagle and Hen Harrier. Open habitats for peatland include both Blanket Bog and Upland Flush with varying conditions from drained to favourable – bog restoration will be an important component of this LMP area, especially in Ardmore and Aros.

There is one SSSI designation, 'S Airde Beinn, which is a geological site bordering the south of Ardmore. In addition the whole of the isle of Mull is designated as an Environmentally Sensitive Area and the surrounding seas form the Inner Hebrides and the Minches marine Special area of Conversation. The Mingary Burn SAC which unusually does not have an underpinning SSSI designation starts at Loch an Torr in the south east and travels the length of the burn to the north west corner.

There are no Landscape Designations within the plan area.

There are 206 ha of Ancient Woodland sites within the plan area, mostly within Aros, and there is one area of Natural Reserve in Quinish. Rhododendron ponticum is present in Aros along the boundary with the main road to the east.

A small corner of Quinish forest sits within the River Catchment Area but the majority falls within the Mingary Burn SEPA Waterbody Catchment which has a Poor Status. The lower half of Ardmore and top half

of Aros is within the Tobermory River Waterbody Catchment. There are no potentially vulnerable areas but an area around Newdale campsite north of Aros can be prone to flooding.

Cultural Environment

There are four scheduled monuments within the plan area, the Cnoc Fada and Maol Mor standing stone rows in Quinish, Dun Urgadul in Ardmore and Baliscate Chapel in Aros, just above Tobermory. There are also a variety of undesignated features across the sites which are recorded in the heritage layer including a large number of important deserted settlements in Ardmore, of which one was only discovered under mature forestry in 2005, near Cnoc Carrach.

Landscape

NatureScot Landscape Types show the FLS land area to be entirely within the Stepped Rocky Coastlands category on Mull. There are no Landscape Designations on these forests.

Community Use

A very popular Scotways Right of Way runs through Ardmore right to the coast on both forest road and formal recreational trails. Core Paths also run from here across neighbouring land to connect to Quinish and Dervaig.

Argyll and Bute Council's Local Development Plan LDP2 has been consulted on in 2019 and was implemented in February 2024; the revised plan identifies FLS land as Countryside Areas.

Neighbouring reservoirs / fisheries

The areas surrounding the Mishnish Lochs, south Ardmore and west Aros fall within the public water catchment areas for Tobermory. A small number of private water supplies are also located in the plan area. Aros is within the catchment for Tobermory Distillery.

Loch Tòrr is part owned by FLS and offers fishing opportunities mainly for brown trout. Responsibility for the dam is shared jointly with the other owners, Glengorm Estate.

Wildlife Control

Deer control in both Central and North areas is undertaken by direct Wildlife staff with additional contract control assistance in five forest blocks to reduce deer impact on current and future establishment operations, this combined approach currently provides a red deer cull figure of 350+ per year across both plan areas.

Both plan areas are subject to sheep and deer movement from neighbouring estates with current neighbouring deer density's being available from the helicopter deer count undertaken by NatureScot in Spring 2019.

Stakeholders

- Scottish Forestry
- NatureScot
- Argyll & Bute Council
- Argyll Fisheries Trust
- Argyll Timber Transport Group (ATTG)
- Scottish Environment Protection Agency
- West of Scotland Archaeology Service (WoSAS)
- Royal Society for the Protection of Birds (RSPB)
- Mull and & Iona Community Trust (MICT)
- Rural Payments and Inspection Division (RPID)
- Scottish Water (SW)
- Loch Frisa Fish Farm
- Mull Deer Management Group
- Historic Environment Scotland
- Visit Scotland
- Mull and Iona Community Council
- Holiday Mull
- Association wildlife tour operators
- Scottish Southern Energy
- Scottish Water
- Mull Museum
- Mull Native Woodland Group
- Tobermory Distillery
- Argyll Raptor Group
- Dervaig Community Orchard
- Neighbours

Appendix II: Analysis of Previous Plans

The previous Forest Design Plan covering the LMP area ran from August 2013 to present.
At Mid Term Review in 2018 the plan was identified as no longer fit for purpose and required complete revision.

The previous plan has since been significantly shaped by a number of factors including Phytophthera infections, availability of contractor resource and poor and failed crops due to species choice, weevil and heather check.

Objectives	Achievements/Changes	Relevance to the plan revision
Commercial timber production: 706ha of felling (34km3 p.a.)	Approx. 15% of felling achieved	SPHNs impact; also poor crops & coupe sizes affected roads prog. Aim to increase coupe sizes.
New planting & 694 ha of restocking	Nearly 20% of conifer restocking; 25% of planted BL	Ensure restocking can progress in new plan; progress opening up of areas for deer control via bigger coupes. Ensure correct provenance eg Alaskan
Full PAWS restoration	PAWS restoration in Aros but hampered by high herbivore impact; also at Mingary burn in Quinish	Continue programme of restoration; invasives in Quinish and Aros
Development of habitat networks: open space & riparian corridors	Networks developing across Aros and Mishnish lochs; also Mingary burn	Continue development of habitat networks
Landscape improvement	Not as far progressed due to reduced felling	Leave hilltops visible in Ardmore, similar to adjacent landscape.
Enhancement & protection of habitats		Invertebrates: Chequered skipper & Marsh fritillaries.

Objectives	Achievements/Changes	Relevance to the plan revision
benefitting key species, notably raptors: protect sensitive features	Peat restoration: a big projects being undertaken in Ardmore	
Incorporate review of open space prescriptions	Open spaces surveyed	Identify peat restoration areas with peatland foresters, more detailed survey of soils and peat depths where relevant
Construction of new forest roads:	Only 15% of roads constructed	Progress roading of Aros
Enhancement & protection of water features/supplies	Work being completed along Mingary burn improving water quality	Continue restoration of habitat along the burn.
Enhancement & protection of cultural heritage	Good work around Baliscate chapel and Cnoc Fada	Poss. further heritage potential around Maol Mor
Comply with UKWAS guidance	Guidance followed for all operations	Wildlife viewing very important to island economy (RET).
Design improvements in line with visitor zone analysis.	Restructuring hindered by reactionary approach required by repeated SPHNs	Ensure no conflict with increased campervans, liaise with MICT

Appendix III: Background Information

Context

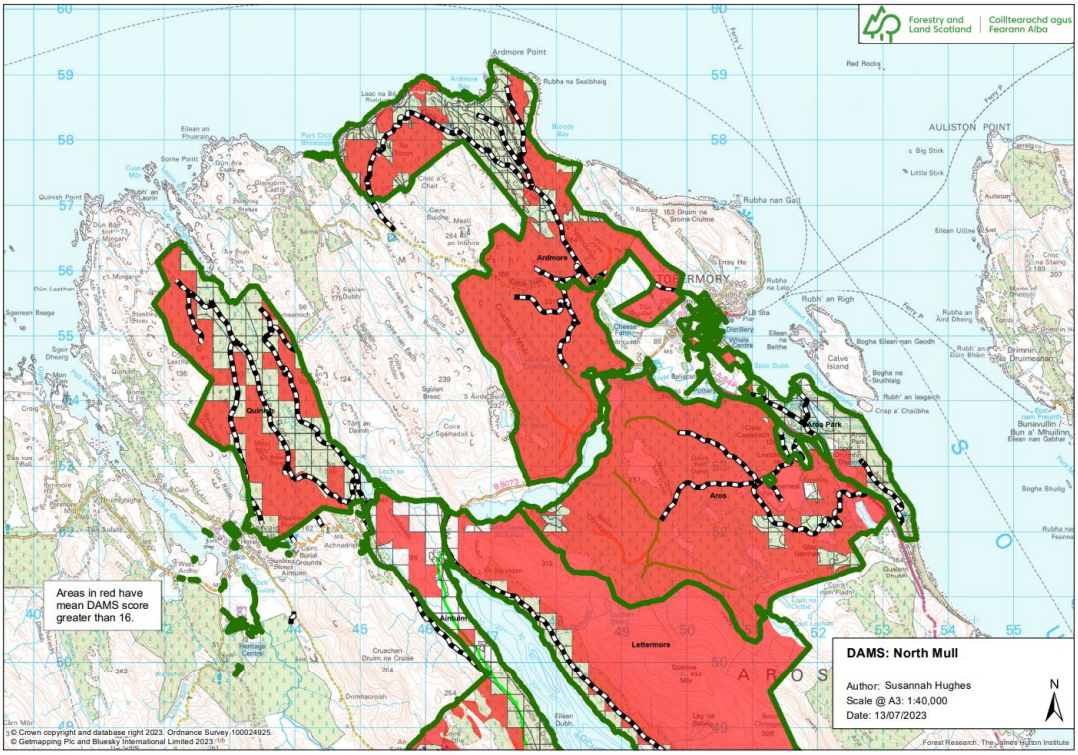
The forests of North Mull are comprised of Aros, Ardmore and Quinish.
Ardmore was acquired in two parts, Ardmore (planted 1954-1961) and Erray in the south (planted 1970-1990). Felling commenced in the late 1990's.
Aros was planted between 1973 and 1977. Significant areas of LP failed and most were either beaten up or replanted in 1990, although there remains a sizeable area of failed crops within the wood. A couple of stands dating from 1925 border the A848 and relate, along with some less common mature conifers, to planting in Aros Park across the road. Some windblow of South Coastal provenance Lodgepole pine (LP) has occurred, related to the poor provenance selection.
Quinish was planted between 1957 and 1967.

Physical site factors

Geology, Soils and landform

The solid geology of the area comprises intrusive igneous Basalts, Dolerites and Comptonites, with Tertiary extrusive Basalt lavas forming narrow bands within these.

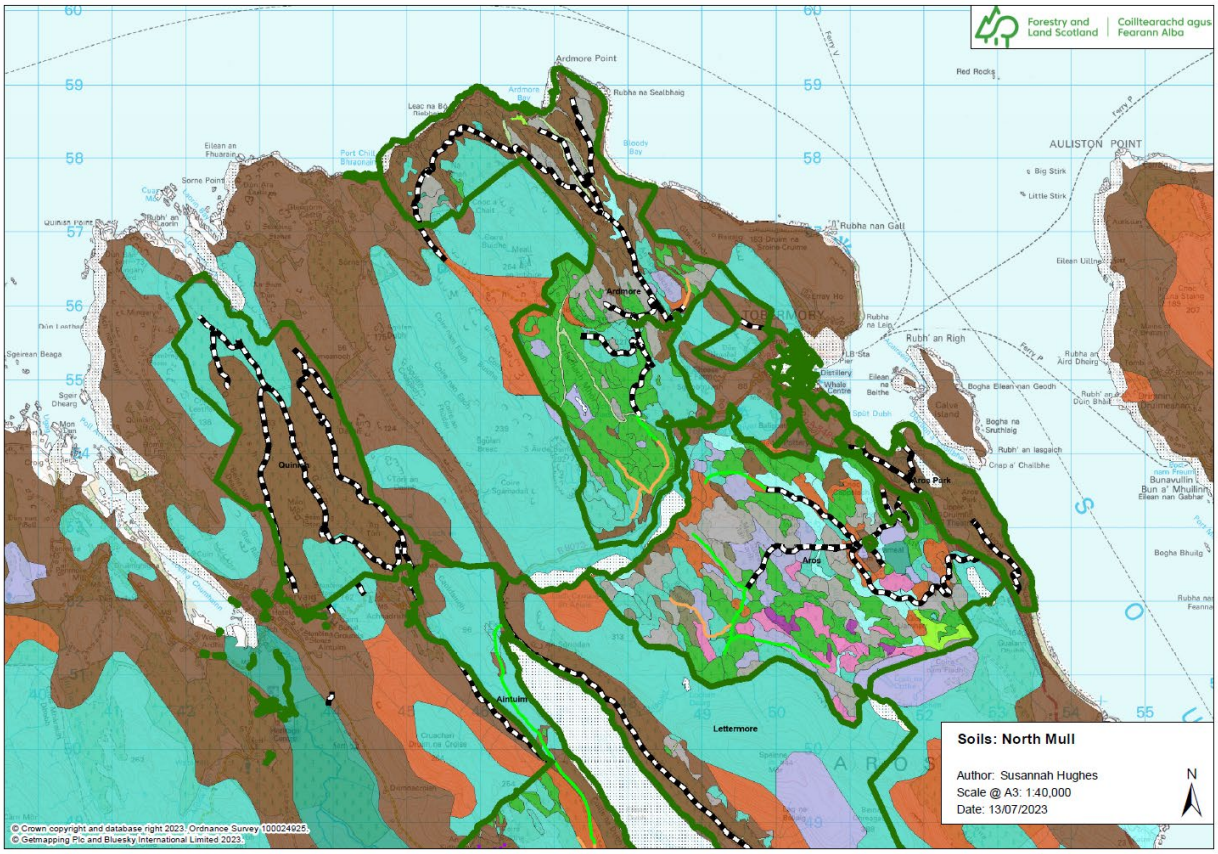
The steeper slopes are typically Upland Brown Earths and podzols, associated with Basalt outcrops. But poorer flushed Blanket bogs are typical in both sites with higher elevation and with flatter topography. Where some drainage has been possible, peaty gleys are found.



Soil survey data for the forests is being built up across the area, with a focus on peatland areas taking priority in line with FLS policies.

There is a presumption against planting open hill ground where Blanket Bog and Upland Heathland vegetation types and soils are present; FLS policy on assessing peatland soil types has been followed to identify areas for restoration or restocking. Coupe shapes reflect landform where possible.

The adjacent map gives an indication of soil survey coverage across the forests of North Mull although Quinish is yet to be surveyed.



Water

Water is an important component of the North Mull LMP area. Enhancement of riparian corridors will have benefits for both water users and woodland and open habitat networks. Broadleaved woodland will be envisaged here, either by planting or preferably by natural regeneration, where soils, climate and seed sources are suitable. Creation of partially shaded riparian corridors will benefit fish and freshwater shellfish populations.

WATER QUALITY:

Under the Water Framework Directive, the water quality assessments for all the waterbodies assessed within the plan area ranged from Moderate - Tobermory River (Erray part of Ardmore and Aros) - to Good - Allt nan Torc (Aros) – and Poor, Mingary Burn (Quinish). None of the watercourses were classed as 'definitely at risk' but potential improvements in the Ecology of the Mingary Burn may result from the

restoration of PAWS sites alongside the riparian area through the forest. This work is ongoing and continues into this LMP.

WATER SUPPLIES:

Private water supplies utilise forest burns where properties are not served by mains water, and the few that are present within these forests are recorded on our GIS mapping layers to ensure they are prioritised during any works within the forest. Both the intake for the supplies and the catchment areas upstream are identified. The public water supply for the majority of the island comes from the Mishnish Lochs to the north of Aros within this LMP area although Dervaig to the west has a separate supply to the south of the village. There are plenty of opportunities within the longer term to develop robust riparian corridors. These will contribute to habitat network development, private water supplies and fishing interests.

Slope instability – there are no slope instability areas identified within the North Mull LMP area.

Renewable Energy

Some 30 or so small scale woodfuel plants were running on Mull throughout the period of the last last plan including the hospital, the biscuit factory, hotels and the swimming pool and Crannich Farm ran a wood chip supply business on the island. Lack of firewood merchants on the island is currently an issue. There are no small-scale hydro schemes being pursued on FLS land within the plan area and there has been considerable opposition to any windfarm proposals on Mull in the past.

Climate

Continentality is low (3 to 5), the forests being close to or adjacent to the sea. The climatic region is described variously for coastal sections as ‘warm, moist or wet’ and for more inland parts as ‘cool, wet’. Exposure is mostly moderate to severe and high open tops are classed as ‘cool, wet, too exposed for forestry’.

Climate projections point to a warmer climate with lower summer rainfall and higher winter rainfall. DAMS scores vary across the area of the plan.

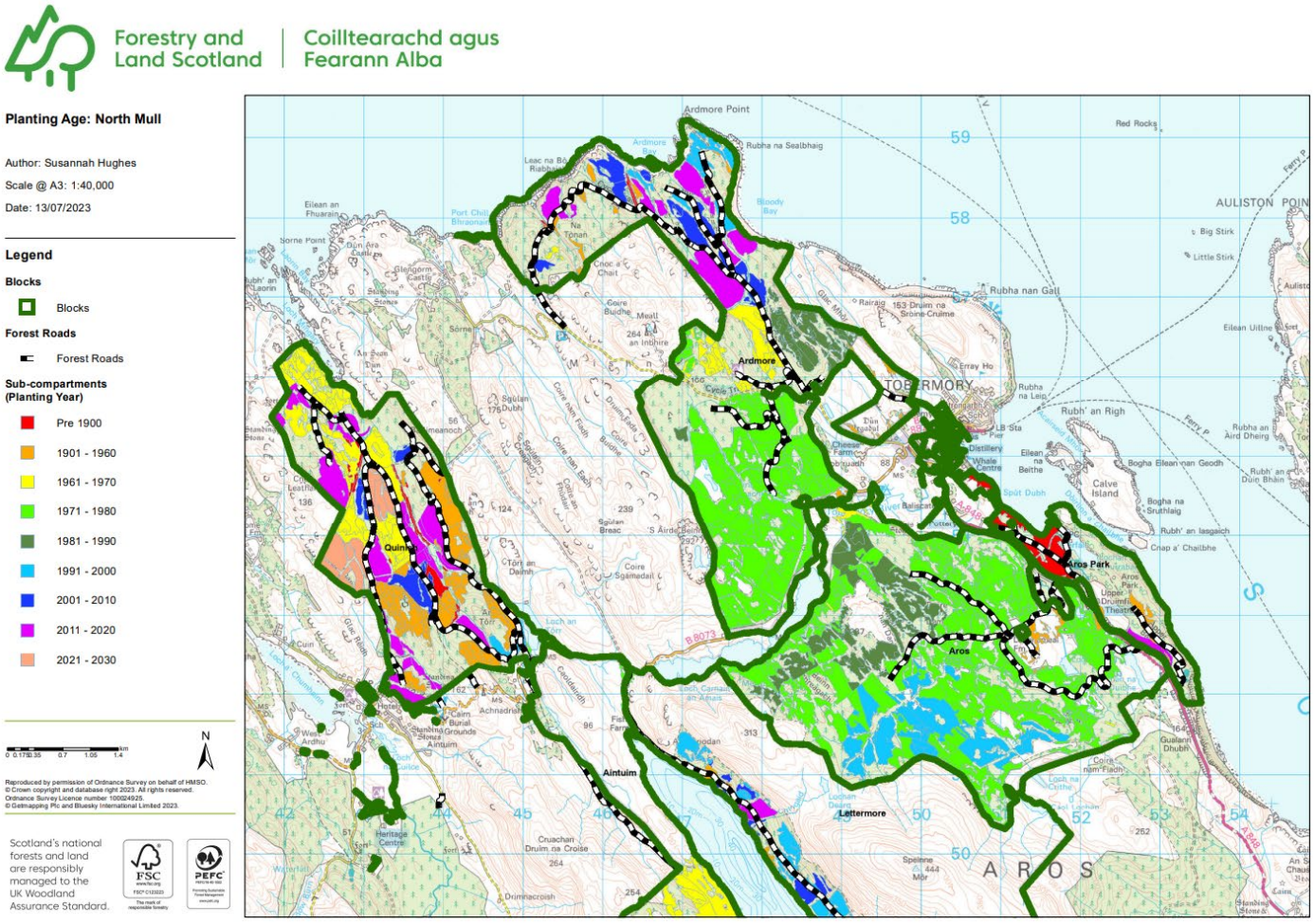
The climate is mild, wet and windy, with average annual temperatures around 8°C and precipitation above 1800 mm per year. Although snow is less prevalent than eastern and central Scotland, the region is subject to rain bearing South Westerly winds. Humidity levels are high throughout the year, rarely sinking below 70% relative humidity. The wet conditions contribute to soil leaching and development of gleys and bogs where soils are insufficiently free- draining.

Coupe structure follows windfirm boundaries where possible to alleviate windblow risk. Mounding rather than ploughing will be preferred for cultivation, to minimise runoff and erosion risk. Retention of naturally regenerated broadleaves along coupe buffers will be encouraged to aid formation of windfirm edges.

The existing forest

Age structure, species and yield class

There are social, landscape and biodiversity grounds for increasing diversity, along with possible benefits for countering the effects of climate change. However, the objectives vary widely across the areas with the primary objectives in some being the restoration of both temperate rainforests and peatlands. Whilst others are more suited to commercial conifer plantations, with predominantly Sitka spruce being the main species suited to thrive in the area. Brown earths are mostly restricted to PAWS sites and areas of existing native woodland, and also to the north of Ardmore.



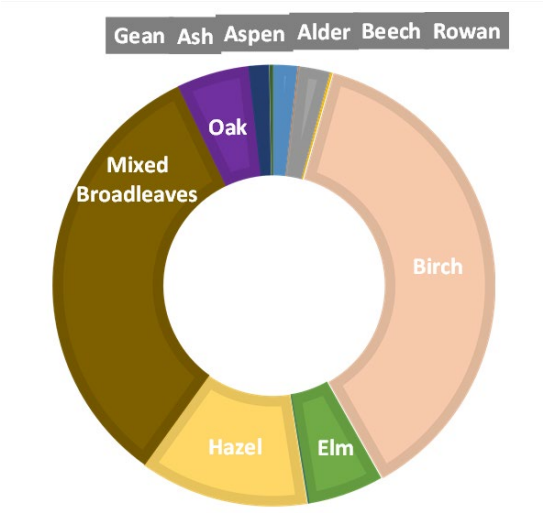
Neighbouring Land Use

Native woodland habitat networks are developing within Quinish and Aros forests, linking areas of AWS.

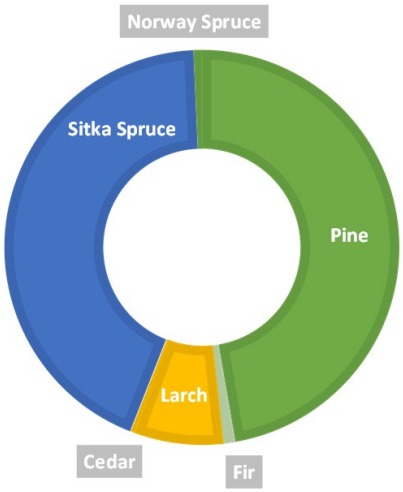
There are several crofts/small-holdings within Ardmore forest that contribute to the diversity by providing open space and alternative landuses. However, neighbours sometimes have very different approaches to deer control which creates a difficult situation for enabling successful establishment of our forests.

Species Choice

Much of the lower areas are suitable for a variety of species, although a predominance of Surface-water gleys on the slopes normally excludes the use of Douglas fir. Soil data coverage is partial eg in Quinish. Frost hollows are problematic for establishment, but will grow high yield class crops once established. Such areas are vulnerable for broadleaf regeneration. Exposure, poor nutrients, heath check, browsing damage and shallow soils are major challenges to achieving productive forestry in some areas. These crops were routinely fertilised in the past and many show requirements for further input.



Broadleaves – predominantly Birch



Conifers – predominantly Sitka Spruce

Timber

High yield classes are achievable in some areas for spruce, especially on the better soils. The average yield class for Sitka spruce is 16. Restructuring has progressed well in places, however the impact of multiple Statutory Plant Health Notices, especially in Quinish and Ardmore forests, has impacted on the carefully phased approach to restructuring. There are not many areas of the forest suitable for thinning, as exposure and in places terrain is a major obstacle.

Timber Quality

Timber quality is mixed across the forests, due in part to poor species choice in the first rotation. Stocking densities are mixed, with some understocked second rotation crops and multi-stemming. Larch is typically of poor straightness due to exposure. Hardwoods are also poor, with few straight stems in any species, either

Timber in construction

Markets exist for spruce and small quantities of minor conifer species. Few specialist markets have been established. Large diameter material is more difficult to sell.

Hardwood Timber

Much of the existing oakwood in Aros is of poor form and high conservation value, hence is unsuitable for quality hardwood production. Most regeneration, typically of birch, is also of poor form, but may be useable in the biofuel market. Most planted broadleaves have been planted for amenity or landscaping purposes. The SAC designation in Quinish means this is not a suitable area for hardwood timber.

Access

Much of the forest is adequately roaded, with all timber going to the Fishnish pier just south of Salen. The majority of the public roads are not useable by timber transport and a network of forest road haulage routes are used with short sections on public roads agreed by the council and maintained as such. This is for both FLS forests and private forestry. Some roading still requires to be constructed as in the main part the first rotation crop is still coming up to harvestable age, especially in Aros forest.

Cultural Heritage

North Mull LMP contains a wealth of cultural heritage, including four scheduled sites in the plan area; including Baliscate Chapel, Cnoc Fada and Maol Mor standing stone rows and Dun Urgadal. In addition, there are numerous unscheduled sites in the area, including a large number of townships in Ardmore, isolated farm buildings, clearance cairns and sheepfolds, related to former agricultural communities and activities.

Landscape

Landscape character assessment: NatureScot

This puts the area within the 'Basalt Lowlands' landscape type including key characteristics:

- Undulating eroded moorland on the lower fringes of the high stepped basalt.
- Low ridges broadly follow a SE-NW alignment, with ribbon lochs in the glens.
- An indented coastline; low headlands have a distinctive stepped profile.
- Open moorland broken by rocky outcrops and ledges.
- Extensive conifer plantations on lower slopes of plateau.
- Diverse, patchy mosaic of woodland, bog & marginal pasture on lower fringes of moor.
- Scattered small-holdings and cottages on edge of moor.
- Small estates influence the landscape character in some sheltered coastal bays.

The description generally holds true for the forest area, which occupies the lower slopes. The ridged pattern is very evident in Quinish and north Ardmore, but is far less evident in Erray and Aros. Where this alignment is present, ribbon lochs occasionally feature. The diverse, patchy nature of native woodland remnants and bogs, with former rough pasture between is typical of Aros, but less so for Quinish and Ardmore. Rocky outcrops and ledges are also apparent, more apparent when felling has taken place. Ardmore and Bloody Bay reflects the indented coastline, but Loch Mingary and Loch a' Chumhainn,

although far more indented, are more akin to ribbon lochs. The eastern side of Aros has been influenced by the former Aros Park estate, including older conifer planting and presence of Rhododendron ponticum.

There are no landscape designations within the plan area.

Designations

Sites of Special Scientific Interest and SAC/SPA

The Mingary Burn SAC runs through the Quinish block. The protected area includes the river bed and associated banks. An agreed management plan is in place, and is renewed as part of this LMP process (see Appendix XI).

The S'Airde Beinn SSSI is located on the western edge of the Erray section of Ardmore. It is of geological interest, being a volcanic composite Gabbro plug. Only minor slivers of existing open space along the boundary edge are within FC ownership.

Environment

Priority Species

- Open hill-tops are used by raptors, including White Tailed Eagle, Golden eagle and Hen harrier.
- Freshwater pearl mussels, Margaritifera
- Beautiful Agrion, Caolpteryx virgo
- Barn owl barrels are sited in several places.
- Various species of bats (Daubenton's (LBAP), Natterer's (LBAP) and Pipistrelle (UKBAP, LBAP).
- Otters are known to use the riparian networks, but no confirmed holts are known.
- Invasive Mink are present within the plan area.
- Bryophytes, ferns and lichens are found especially within Aros and Quinish forests.
- Pine Marten – Historically no records of pine marten on the island, however since 2004 the number of reported sightings has increased rapidly. We have no records or confirmed sightings within the North Mull LMP area.

Biodiversity

Deadwood

The ecological potential for deadwood is generally for the LMP forested area. The highest ecological potential for deadwood is found in the established woodland and in PAWS areas. Areas of lower potential for deadwood will be found in the higher, more exposed areas of conifer crop.

Social factors

Recreation & Community

A variety of informal recreation facilities are provided within the forest area including car parks at Gualine Dubh and Ardmore and trails around the northern tip of the island, used by both the local community and visitors to the area. There is a formal Wildlife Hide facility at Loch Tòrr. The majority of Ardmore and Quinish are well roaded and used regularly via informal access by visitors; many of these roads form part of the core path network.

The island of Mull is a hugely popular visitor destination especially for people wishing to enjoy the outdoors and experience the wildlife the island has to offer. A right of way follows one of the informal trails from the entrance of Ardmore forest to the coast.

There is a strong community on Mull, due in part to life on an island bringing people together with a shared sense of place.

Appendix IV: Concept Tables

Objective	Opportunity	Constraint	Concept
Ensure both forest road network and provision of quarries is suitable for future management via an achievable road programme, especially in Aros and Ardmore.	Solving access issues opens up multiple opportunities for peatland restoration, PAWS restoration and larch access as well as commercial forestry access.	Potential impact on open habitat in Aros and steep ground / larch limitations.	Explore access/roading options for problematic areas of inaccessible crop such as western Aros and southern Ardmore.
Work towards removing all larch from Mull within the next ten years by managed removal of prioritised larch areas, especially in Ardmore and Aros, minimising the impact of future SPHNs on the sustainable management of the forest.	Include areas of larch within priority coupes where possible.	Phytophthora ramorum potentially may be found in difficult to access places eg Mishnish lochs with limited access. Large amounts of larch in Aros and larch regeneration in Ardmore.	Prioritise difficult to access Larch areas so they can be felled in a controlled manner, in accordance with good forest design, ensuring all larch to be removed is accessible by the end of the plan's 10 year period.
Review and improve both the choice of species and their provenance (in conjunction	Allow a more successful productive forest to be planted over the second	Previously poor species and provenance choice and availability.	Careful and considered choice of both tree species and provenance and ground conditions

with ground condition suitability) and also diversification of species (within the constraints of high wind hazard classes impacting on the thinning potential of species other than SS/LP), to ensure sustainable timber production as the forests move into their next rotation.	rotation, focussing on the right tree in the right place. Opportunity to combine objectives e.g. increased diversity of species around archaeological and recreational areas.	Ground planted previously would no longer be considered appropriate for afforestation.	Where appropriate, increase diversity of conifer crop, potentially in better visited areas to reduce impact of deer browsing.
Develop a strategy for the future management of existing poor quality crops in current rotation and increase rotation length where appropriate.	Increase in potential new markets for poorer quality crops.	Availability of contractors and machinery given the constraints of working in an island setting.	Working with marketing teams, develop a strategy for the large volume of poorer quality crops.
Develop a strategy to reduce herbivore impact across the FLS estate.	Successful combination of 'in-house' rangers and contractors currently ensures targets are achieved for status quo.	Planned restocking has not been able to proceed due to excessive herbivore constraints despite current cull efforts.	Work with Ranger teams to explore full range of options to manage herbivore impact on current and future forests.

	Fencing certain areas of blocks would help overall management of forests and successful tree establishment and habitat restoration.	Cost of fencing often prohibitive to achieve herbivore impact reduction; however, in two areas FLS manages large contiguous areas of land but resident herbivores in between our ownership has a large impact on crop protection. Large sporting estates can impact on protection of trees with differing overall objectives. Lack of available open land within blocks, especially Aros, to allow access for safe herbivore control due to proximity of people.	Working with neighbours and collaborate with Mull DMG to reduce impact.
Improve the long term sustainability of timber production by exploring opportunities for crops of varying quality into the next rotation; this will work towards future smoothing of	New and expanding timber markets may provide opportunities for improved viability of variably performing crops.	Highly variable performance of crops across LMP area, often dependent on species and provenance choice. Reactionary approach has had to be implemented due to prevalence of disease.	Where possible, work collaboratively where objectives overlap. Improved access and a planned approach to larch removal should allow for a

the production forecast whilst incorporating the impact of peat restoration work on age restructuring.			smoother production forecast across whole forested area.
Management and protection of key species including considerable raptor interests across Mull ("Eagle Island" draws in high tourist numbers), and in addition the archaeological heritage of the area.	Highly successful WTE reintroduction and 'Mull Eagle Island' has resulted in increased raptor numbers across the island. A diverse number of archaeological sites from standing stone rows to recently excavated Baliscate chapel and a high density of Clearance villages on advertised recreational route.	Unpredictable timing and location constraints on operational activities during breeding seasons. Access to archaeological sites needs to be considered in Quinish and Aros.	Aim to minimise impact of timing constraints on operations where possible with alternative 'paired' coupe suggestions. Continue to work with RSPB and Mull Eagle Watch to promote and help protect key raptor species. Work with Mull Museum and HES on taking forward archaeological sites.
Ensure water quality maintained in Mingary Burn water catchment (Quinish), the Mishnish Lochs catchment (Aros and Ardmore: the island's drinking water supply) and	Restoring riparian areas eg at Quinish will also provide additional benefits of improved water quality.	Highly sensitive water catchment for invertebrate interests. Roading solutions in Aros need to take into account sensitivities of the island's	Continue with planned restoration work along riparian corridors. Develop an access solution for Mishnish lochs to minimise the potential impact on both the island's and Tobermory Distillery's water supply.

the Tobermory Distillery (Ardmore).		water supply to potential siltation.	
Develop large scale Peat Restoration project in Aros and Ardmore and enhance Open Habitats.	Large areas of high quality peat areas especially in Aros and Ardmore can be restored improving Carbon balance of the forests.	Patchy peatland mosaic more prevalent in Crannich and unsurveyed area in Salen requiring more in-depth solutions. Access to some peat areas needs to be established in Aros and Ardmore.	Work up peat project areas in conjunction with Peatland Foresters when appointed.
Develop PAWS restoration in Aros and Quinish blocks, and develop habitat networks via woodland expansion to increase the percentage of broadleaves and subsequent biodiversity (including control of Exotic Invasive species in Aros).	Existing and areas under restoration can be linked to increase broadleaf corridors, using buffers, reducing opportunity for invasive conifers to recolonise in eastern Aros.	Rhododendron ponticum is impacting on the PAWS areas in places	Work towards PAWS restoration, prioritising access where necessary and programme of exotic removal where impacting most on natural habitat.
Maintain & enhance both views and existing recreation provision for the benefit of locals and increasingly large	Many informal routes used by community to be built into future establishment for plan area.	Lack of resources to create new any new formal provision.	Work with MICT and communities to identify areas that would be beneficial to locals and visitors and opportunities to enhance

visitor numbers to Mull; focussed in Ardmore.	Large increase in visitor numbers to Mull both pre and post Covid.	Difficult to prevent the negative landscape impacts whilst operations are progressing.	views / access as part of forestry operations using Visitor Zones.
Work with local communities and MICT, especially around Dervaig and Tobermory, supporting the large-scale tourism now dominating the local economy with subsequent high nature visitor numbers.	Dervaig community orchard and nursery alongside new educational area is a highly successful collaboration.	High visitor numbers can also have a detrimental impact on island infrastructure; capacity at existing FLS car parks does not meet demand at Ardmore.	Work with schools and community groups especially in areas close to communities, especially in Dervaig and Tobermory.

Appendix V: Peatland Appendices

LMP specific proposals

SUMMARY AREAS TABLE	Hectares (Ha)	Description
All deep peat soils	278	*Total estimated area size (Ha) of deep peat within the forest block/LMP area during the ten year period of the plan based on the soils data.*
Afforested deep peatland	212	*Total area size (Ha) of afforested peatlands based on sub-compartment database (SCDB) information.*
Existing open habitat on deep peat	66	*Total area of open peatland (Ha) from SCDB.*
'Presumption to Restore' total area	49	*Only includes afforested peatlands which lie next to open existing peatlands, or Scenario A peatland types, as per the SF Practice Guide. The area is based on the complete hydrological unit.*
'Assessed Peatland' total area	163	*Total area of afforested peatlands that will be restored following an assessment of current and future crop performance. The area is based on the complete hydrological unit.*
Restock afforested peatlands	0	*The poor growth of crops on Mull means that there are no areas identified on deep peats that will fit the criteria of being restocked as opposed to being restored to peatland.*

'Presumption to restore' table

Attribute	Description
Designated Sites, priority open peatland habitats	Some Blanket Bog Priority Open habitat areas adjacent or close to areas for restoration.
Scenario A peat types	*There are 49ha of Scenario A peat types within the LMP area but these will all be restored. They are 41ha of 10b and 14w (Aros, Allt nan Torc) and 8ha of 10b (Aros, Loch nam Mìol).*
Peatland condition and hydrology	Peatland condition mixed within these sites; very small discrete areas.
Target habitat	Target M15 (as per adjacent BB)

'Assessed Peatlands' table

Attribute	Description
Peatland condition and hydrology	*Peat condition is varied across the sites; more detailed assessments based on vegetation, water table and impacts*

	of any historic modifications will take place prior to site specific proposals being worked up for each area.
ESC statement	*The site has a warm, highly exposed and wet climate. Exposure constraints may limit species options and the ability to thin woodlands without significant risk of windthrow. The soils are wet moisture status and vp2 very poor nutrient status. Wet soils may cause flotation problems for heavy machinery on establishment, and on harvesting, if only lightly crowned species are present (e.g. birch). Tree species recommendations in ESC do not take account of each countries regulatory approval process, so prior to including species in a forest plan advice should be sought from relevant forestry authorities.*
Accumulated Annual Temperature	*1286*
DAMs score	*19*
Current crop health and performance	Crop stands on peat where varied across the forests: Aros: mostly poorly performing crops in Allt nan Tòrc, with the exception of patches of better crop isolated within the larger area. Poor quality and patchy residual crops in smaller Loch na Mìol area to the east. Ardmore: consistently poor quality crops, mostly LP
Predicted Yield class of future rotations	Future crop performance was assessed and can be seen on Map B for each forest. As these are all first rotation forests, the performance of any theoretical second rotation stand depended on the fact that no drainage or fertilisation would be able to take place. Crop species was assumed to be SS, not LP which had consistently performed poorly throughout each of the forests.
Area to be restored and target habitat	**Aros – Allt nan Tòrc**: of the 180ha site, 5ha is of non-deep peat soil type (5v). Of the 175ha, 49ha is existing open land and 126ha is afforested deep peat. There are 41ha of afforested Potential to Restore peat soil types (10b/14w). Assessed deep peat soil types (9d/9e/9b/11b/13p) show 77ha to be restored to peat as poorer performing crops; a further 8ha are better performing crops but due to their hydrological connectivity to the peat, these areas will be restored together. Target M15 (as per adjacent BB) **Aros – Loch nam Mìol:** of the 17ha site, 7 ha is open land and 10ha to be restored to peat, of which 8ha are Presumption to restore (10b) and the remaining 2ha are Assessed 9e which will not achieve a YC>8. Target M15 **Ardmore – Geàrr Abhainn:** of the 86 ha site, 10ha is open land and 76ha of Assessed deep peat soil types (9b/9c/11c/13c) to be restored with poorer YC. Target M15 (as per adjacent BB)
Areas to be restocked	PEW is proposed where YC indicate a potentially better crop but traditional restocking of a commercial crop is

	unfeasible due to logistical constraints of the isolated areas involved, and where PEW would benefit the site at a landscape scale.

Restoration specification

Attribute	Description
Treatments to restore the hydrology	*Full restoration specifications will be developed following site surveys after clearfell when the extent of modifications are visible. This will include Peatland restoration methods, Restoration outcomes and Monitoring of sites.*

Peatland Maps

See Map 17 in Map booklet

Terminology

The terminology that FLS uses is adopted from the guidance 'Deciding future management options for afforested deep peatland'. The exception is the term 'assessed peatlands'*, which FLS has found helpful in making the distinction between this and PtR. This is to ensure consistency regarding definitions and avoid confusion.

Term	Definition
Presumption to Restore	The circumstances of when a site is a PtR reflects the potential indicators of acceptability given in the SG Control of Woodland Removal policy. This may include areas with peat less than 50 cm deep. These include; • Habitats designated as qualifying features in the UK Biodiversity Action Plan, or on Natura sites, Ramsar sites, Sites of Special Scientific Interest (SSSIs) or National Nature Reserves (NNRs); • Sites or parts of sites where restocking is likely to adversely affect the functional connectivity (hydrology) of an adjacent Annex 1 peatland habitat (as defined in the EU Habitats Directive), or a habitat associated with one; • Sites where deforestation would prevent the significant net release of greenhouse gases.

	On these sites restocking should not take place, but restoration started as soon as possible. This list reflects the potential indicators of acceptability given in the Scottish Government's Control of Woodland Removal policy for when deforestation would contribute to enhancing priority habitats and their connectivity.
Assessed Peatlands*	This terminology has been adopted by FLS internally to encompass the peatlands which are not defined as a 'Presumption to Restore' and therefore require an assessment of crop performance to determine best future management. The assessment method is based on desktop and field data to establish historic and future crop performance, taking reduced cultivation and fertiliser inputs into account.
Scenario A peatland	Peat types that are edaphically unsuited for woodland and so are more suitable for restoring or converting to peat edge woodland. • Peat types: 8a, 8d, 9a, 10a, 10b, 14, 14h, 14w. • Characteristic habitat: basin bogs, raised bogs, wet flushes, hagged peats. • Characteristic vegetation: *Sphagnum*, *Juncus*, willow
Scenario B peatland	Peat types that should grow pure SS on maintained drained sites, with PK added, in order to achieve a growth rate that allows a positive greenhouse gas balance. • Peat types: 8b, 8c, 9b, 9c, 9d. • Characteristic habitat: fertile wet peats. • Characteristic vegetation: *Molinia*, *Calluna*, Downy birch.
Scenario C peatland	Peat types that should grow SS if planted 50:50 with ALP on maintained drained sites, with PK added, in order to achieve a growth rate of the SS that allows a positive greenhouse gas balance. Note, though, that these peat types may face climatic constraints if the site is not AT5>1000. • Peat types: 9e, 11a, 11b, 11c, 11d. • Characteristic habitat: infertile but drier peats. • Characteristic vegetation: *Erica*, Scots pine.
Hydrological unit	A well-functioning peatland (and not a degrading one) is dependent on an intact and healthy hydrological unit. Lowland Raised Bogs have developed and 'grown' over the last 7,000 years, while blanket bogs are thought to have developed over the last 2,000 to 3,000 years. It is very likely that their speed and extent of development has been limited by the supply of water. It is useful to visualize water as feeding the growth of sphagnums and the laying down of peat. This varies throughout the seasons. A

	hydrological unit that is compromised by drainage or an unnatural drawing of water in times when water supply is limited, for example during a drought or after, will mean the peatland experiences harsher conditions, and will degrade to some extent, and act as a carbon source for part of the year as a result. Conditions may be so severe that the peatland degrades, contracts and emits significant amounts of carbon dioxide. Further mechanisms such as the development of peat cracking would accelerate this degradation, causing higher and higher emissions. Some peat types only receive water and nutrients through precipitation, however the topography and slope of the surrounding landscape will also feed water to peatland units, for example the flushed blanket bogs so this, and are often associated with other peat types, such as Lowland Raised Bogs, flushed blanket bogs, and basin bogs. Water input and retention is important for maintaining a high water table which is essential for supporting peatland vegetation and habitat functioning, with the critical period being during the spring, summer and autumn droughts. The boundaries of a hydrological unit can be relatively easy to identify in some landscapes and peat types such as for Lowland Raised Bogs, Basin Bogs. However, they can be more challenging in the margins around unflushed and flushed blanket bogs, especially if the original field layer is absent, as is often the case under tree canopies. Nevertheless, contour mapping, digital terrain modelling, the field layer, topography, and the presence of mineral soils or water courses with a mineral base are all helpful to determine the boundaries of hydrological units.

Guidance: New forest road on Peat

Purpose and necessity

Where a new forest access road is required to be constructed, a general footprint of 10m (6m wide formation and allowance of 2m either side for drains) will be allowed.
This road will be constructed to carry traffic suitable to facilitate the harvesting, timber extractions and restocking work associated with the Land Management Plan.

The road is required to provide safe and suitable infrastructure, allowing access for harvesting and extraction of mature non-native timber (harvesting as per the approved forest plan). This includes achieving a suitable and efficient forwarding distance of 600m to all stands of timber and creating access suitable for heavy goods vehicles used in the transportation of timber to ports and mills.

Once the ground has been surveyed, one of three types of Road Construction will be applied: Standard, Standard with flushes or Peat.

Construction and Design Specification

General

The Forestry and Land Scotland (FLS) standard road specification will be used, taken from the FLS Civil Engineering Handbook, details of which are also contained within the latest revision of the Timber Transport Forum publication 'The design and use of structural pavement of unsealed roads, 2020'. The pavement thickness will be designed to accommodate 44 tonne HGV's and 500,000 standard axles of 80 kN.

Road Construction: Standard

The formation of the road will generally be around 6m in width, increased on bends as per the FLS specification. Overburden is removed to expose the sub-grade below for creation of the formation level.

Overburden will be stockpiled outwith the road corridor, generally on the lower side on cross-slopes, and landscaped to encourage re-vegetation and to aid in reducing visibility of the road within the wider landscape.
Where overburden is removed from extractives sites along the length of the road, this should be retained and utilised to restore each site on completion of the extraction of stone material.

Once stripped, the formation is constructed to the general level and gradient of the overall road. This uses the as dug mineral materials found along the roadline or by using stone from locally extractives sites identified along the roadline.

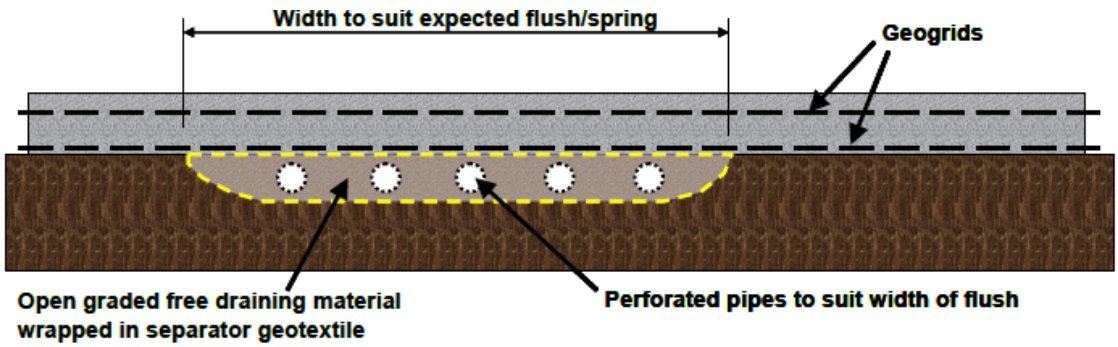
Once formation is completed, the road base course layer of around 500mm thick of 150mm down stone material will be placed and compacted in 2 layers. This will be followed by a 300mm thick layer of 75mm down stone material placed and compacted in two layers to provide a final width of 4m. The finished profile will generally have a 5% camber from the crown. The road will not exceed a gradient of 10% at any time.

A turning T will be constructed at the end of the road suitable to turn an HGV. Several passing places will be built in suitable locations along the length of the road.

The standard road construction will be with low verges and soil will be recovered to dress off the construction envelope. There will be no verges on either the Standard with flushes or Floated road construction types.

Road Construction: Standard with flushes

Specification for flushes of water as well as longer sections of obvious wetland crossing as per below (a mosaic with initial floating section transitioning into standard road with specification for long flushes where necessary):
For areas in which water appears to flow or settle on the ground diffusely, it shall be allowed passage through the road carriageway via a series of perforated pipes spaced across the area. These pipes are to be surrounded by an open graded, free draining material to allow water to filter through. This entire drain is to be wrapped within a geotextile membrane to prevent migration or movement of the drain.

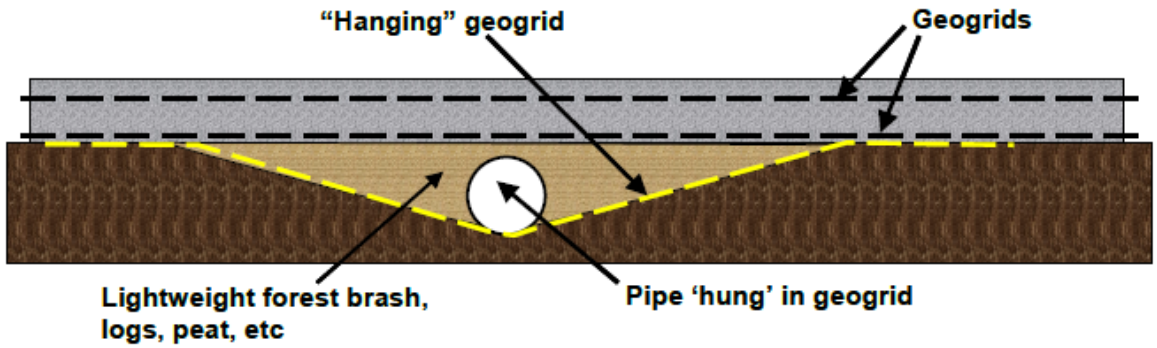


Road Construction: Peat

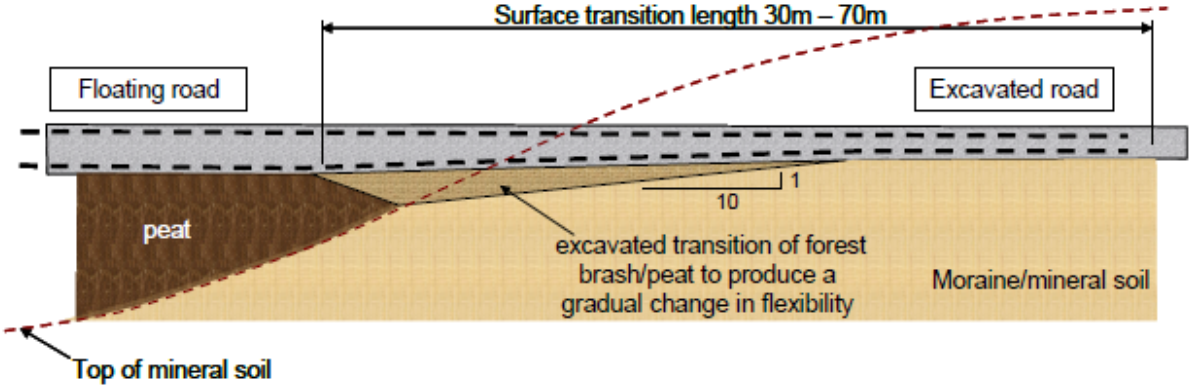
Where areas of deep peat identified around the site a peat probing survey can be carried out using peat probes to determine a preferred corridor across the peat sections. This minimises impact on the deepest areas and allows access for future restoration of the peatland including blocking old drains. These sections of the road corridor are generally open ground with no stumps or brash. In these locations the proposed method to construct the road would involve the use of geotextiles and geogrids to provide support and strength to the construction as a floating road.

A geogrid would be placed directly onto the unbroken ground, lapped into an area of construction on firmer ground to anchor it in place. The grid is rolled out over the proposed route and material is pushed out onto the grid. The road is gradually constructed in layers of geogrid and crushed stone to provide strength to the construction. A typical detail is provided – see drawing WR_FLS_004.

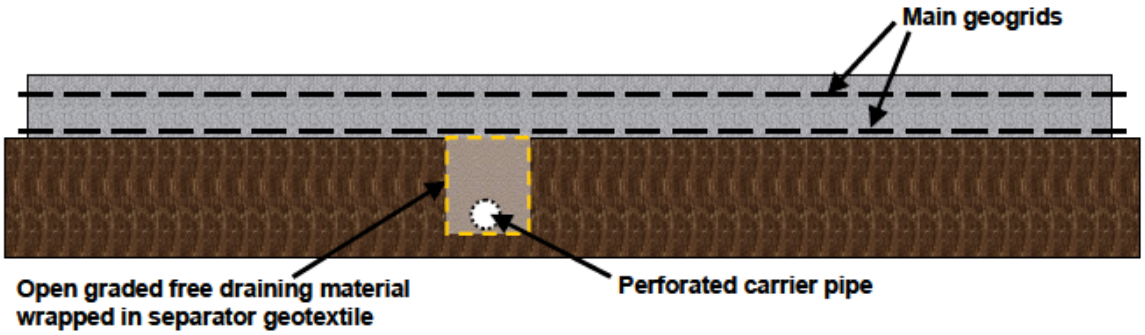
Hanging culverts to be used for cross carriageway drainage in floated sections of road. Specification to consist of an upsized culvert pipe “suspended” by the floating road mass by a section of geogrid. Infill around the pipe and between this geogrid and the underside of the floating road to consist of lightweight brash, smaller logs or peat. Geogrid section to be firmly anchored underneath floating road with a minimum overlap of 10m each side to prevent subsequent vertical movement of the pipe.



Stone used for geogrid to be cone crushed to 75mm-down to remove sharp edges, preventing damage to geogrid. This is on the assumption that geogrid apertures are sized approximately 65x65mm.
Transition zones are to be utilised to increase the durability of the constructed road at each interface between standard and floating construction. The transition itself from peat to base rock will be a flexible layer of forest brash or peat spread over a transitional distance of minimum 30m. The thickness of this transition layer will reduce gradually to zero on a recommended slope of 1:10.
For transitions from rock to peat, this shall apply inversely.



The drain at the head of the loch shall be crossed in a similar way to the hanging culvert method described above, but with vertical rather than sloped sides.
A geotextile membrane will line the entire cross section of the trench. 100mm of open graded free draining material will be placed in the base of the trench to act as a bedding layer. A perforated pipe shall then be placed longitudinally in line with the flow of water. Open graded free draining material will then be added to the “trench” to both surround the pipe and act as support for the sides of the existing ground up to road sub-grade level. The geotextile membrane can then be wrapped across the top of the trench cross section creating an enclosed drainage unit. Floating road construction can then proceed across the drain.



Water Environment

Where any watercourses need to be traversed, culverts will be sized using river and rainfall data available from the Flood Estimation Handbook to calculate an appropriate size of pipe. This data considers existing rainfall volumes and adds an allowance for future climate change and an increase in rainfall volume. In the west coast of Scotland this usually equates to an increase of around 50% of the volume of the pipe.

Ditches and Culverts

A ditch will be dug on the top side of the road to a depth of 150mm below formation. On flat areas or low ground, ditches will be dug on both sides.

Ditch relief culverts will be spaced as required according to the table below, extracted from the FLS Civil Engineering Handbook, Revision 3.

Ditch Gradient	Culvert Spacing (m)	
%	Normal conditions Ground cross slope <15%	Very wet or steep conditions Ground cross slope >15%
<4	200	100
5	160	80
6	130	65
7	115	55
8	100	45
9	90	40
10	80	35
11	70	30

12	65	25

Culverts will be a minimum of 450mm diameter. Sumps will be installed in both the drain line and at the upstream end of a culvert to manage diffuse pollution during general road operation. Silt traps and netting will be used during installation to manage diffuse pollution during construction.

Additionally, a minimum 450mm diameter culvert will be installed around 10m upstream of any watercourse and roadside drainage will be crossed to the downside of the road and discharged into vegetation to prevent roadside pollution from entering watercourses. CAR and UKFS regulations and guidance will be followed to protect the water environment

Felled width

Through the planted area an existing track will be widened to suit the new road. A 30m felled width has been allowed for with up to 50m on corners where the road widens. This area will be accounted for in the open ground allowance on the forest plan and will be built into the restocking design to prevent deforestation.
The road will be constructed within this 30m – 50m wide corridor, centered on the proposed route of the roadline.

APPENDIX VI: Deer Management Plan

Background

This Deer Management Plan (DMP) outlines the deer management issues and priorities for Scotland's National Forest Estate in Central and North Mull, managed by Forestry and Land Scotland. The DMP underpins the Land Management Plan. However, this DMP is based on best available information and wider issues for deer management across the whole of West Region still remain to be addressed. The DMP also relates to, and should be used in conjunction with, FLS Deer Management Strategy.

In line with the Scottish Government's consultation on Scotland's Strategic Framework for Biodiversity "Tackling the Nature Emergency" we recognise that reducing herbivore impacts is one of the biggest levers we have in Scotland for reducing biodiversity loss and enabling regeneration at scale.

National & Local objectives

National strategies and objectives:

- Contributing to Scottish Forestry - Forestry Strategy (also includes Climate Change)
  Deer will be managed to help ensure Scotland has a healthy, diverse ecosystem, contributing to our climate change objectives, whilst also contributing to our national and local economy in line with Scottish Government objectives and public interest.
  - Lower deer densities to 2-7 per km^2 to ensure the above objectives can be met sustainably.
  - Ensure all designated sites are in favorable condition
  - Achieve less than 10% leader browsing damage on all first year restock coupes.
  - Ensure Stocking Density Assessment at year 5 achieves productive forest objectives of 2500 per hectare.
  - Ensure all designated sites are in favorable condition meaning that the features for which SSSIs or Natura sites are designated are in satisfactory condition; or are recovering, with the necessary management measures in place, such that NatureScot (previously SNH) predicts, using expert judgement, that the land will in due course reach favourable condition.
- Deer Management Strategy Deer management strategy - Forestry and Land Scotland
- Scottish Biodiversity Strategy Biodiversity strategy: consultation - gov.scot (www.gov.scot)
- Outcome 2 of the FLS Corporate Plan 2019 – 2022 is most relevant to this Deer Management Plan:

- "Looking after Scotland's national forests and land" – "Scotland's national forests and land are looked after; biodiversity is protected and enhanced; and more environmental services are provided to people".
- The scale of FLS property allows, "whole landscape management, restoring, enhancing and linking habitats", "to adapt forests and land to increase their resilience and protect and enhance natural assets so they can continue to provide for us".

Local strategies and objectives:

The main objective of deer management within the West Region is to manage deer populations at a level that is compatible with FLS environment and other management objectives. The aim is:

- to prevent unacceptable damage to commercial tree crops:
- to maintain or enhance biodiversity in key areas;
- to protect all designated sites.

Deer will be managed to help ensure Scotland has a healthy, diverse ecosystem, contributing to our climate change objectives, whilst also contributing to our national and local economy in line with Scottish Government objectives and public interest.

Management of the deer population will be done in a professional, humane and cost-effective way, ensuring the physical wellbeing of the remaining deer populations within the forest boundaries. Venison income will be optimised and opportunities to create revenue from recreational deer management permissions (RDMP) will be taken, but without compromising the over-riding issue of minimising negative impacts by grazing herbivores.
In the Strategic Plan area, the urgent short- and medium-term aim is to achieve deer browsing levels that allow successful establishment of young trees (planted and natural regeneration) including soft conifers and broadleaved species. Given the scale of native woodland restoration and creation that is planned across the area, including species that are extremely vulnerable to grazing/browsing pressure, we propose that reducing deer densities to the lower end of the spectrum outlined in national targets, i.e. ideally, < 2 deer / km^2, will be required but note that this will need to be achieved in stages, working with available resources and supported by effective ongoing monitoring of herbivore impacts.

The Central and North Mull DMP is also informed by the Mull DMG Deer Management Plan.

What are we going to protect?

The FLS land holding in Central Mull comprises four forests – Salen, Crannich, Aintuim and Lettermore – and three forests in North Mull – Ardmore, Aros and Quinish; together these cover approximately 7,900 hectares. The area is characterised by mountain and coastal landscapes of national and international significance. The mountainous terrain supports a range of designated habitats and species with areas of high ecological and heritage value. The land includes hills, glens draining into coastal waters of significant importance, some with international designations, and a

range of habitats including blanket bog; upland heath; wet flushes, springs and lochs; rivers; conifer plantations and native broadleaved woodland. Priority open habitats, particularly blanket bog and wet flushes have been mapped and require protection from high grazing and browsing pressure. However, some of these habitats benefit from grazing, albeit at low levels, so sustainable numbers of deer need to be maintained - as an important element of properly functioning ecosystems.

Areas suitable for native woodland expansion have been identified. Of the forested ground, 90% is under conifers – predominantly Sitka spruce and Lodgepole Pine – and 10% is under broadleaves. Median Yield Class of Sitka Spruce is 12 and Lodgepole Pine is 6 but there is significant variation across the area and within forests.

Some designated sites may be particularly impacted by deer browsing and deer management. Salen and Aintuim in Central Mull support Ancient Semi-Natural Woodland (ASNW) and Aros and Quinish (North Mull) also have significant areas of PAWS, for which FLS has an obligation to restore 85% to native woodland.

In addition to the planned felling works identified in the previous Land Management Plan, a high amount of extra felling has had to take place across the majority of these forests due to Statutory Plant Health Notices (SPHNs) being issued where larch has been infected by P.ramorum. Coupled with the effects of Covid on contractor resource on the island, this has resulted with an unusually high proportion of unplanted land requiring restocking. Beat-ups are required in many sites across the forests and those in Crannich in 2022 were unsuccessful again.

Geography

The locality is defined by seascapes and rugged or mountainous country inland. The land-holding comprises hills and glens, draining to coastal waters. Much of the area is characterised as Stepped Rocky Coastlands and Stepped Cliffs and terraces. The rugged terrain and difficult access constrain opportunities for carcass retrieval from the open hill. Retention of open space within forests will also be essential for deer control. Mull is a hugely popular tourist destination and all roads on the island are well used by visitors and local residents, which must be accommodated when planning for deer management and control.

Many of the FLS forests on Mull are contiguous land apart from Salen (Central Mull) and Quinish (North Mull) which are isolated forests. Whilst this is currently bounded by open space, planned woodland creation will eventually link native woodland habitat between Aintuim, Lettermore and the neighbouring Aros forest. Successful establishment of native broadleaf woodland will be highly dependent on achieving a significant reduction in herbivore pressure in the short – medium term.

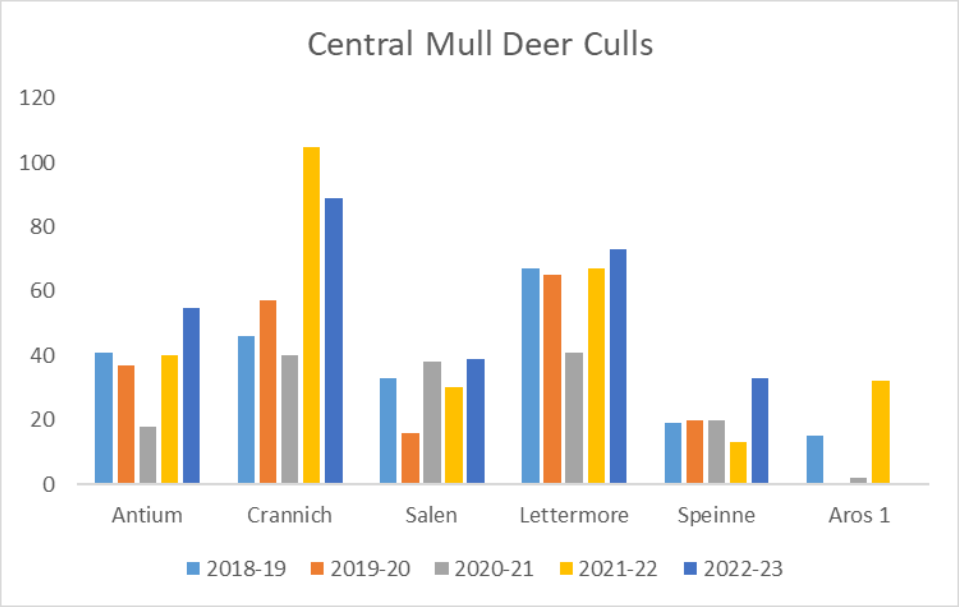
Deer Species (and other herbivores/feral pigs)

Red deer are the main deer species and remain at a high density. Fallow deer are present in low density in other parts of Mull and a single Sika stag has been found a few years ago. There are no Roe deer, feral goat or feral pig sightings in the Strategic Plan area.

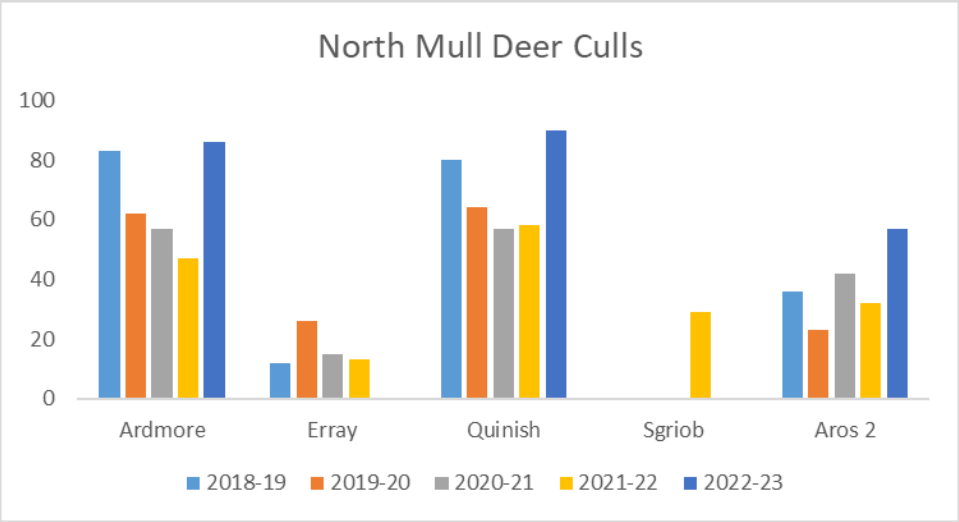
What have we done to date?

Cull over the last five year period:

	2018-19	2019-20	2020-21	2021-22	2022-23
Antium	41	37	18	40	55
Crannich	46	57	40	105	89
Salen	33	16	38	30	39
Lettermore	67	65	41	67	73
Speinne	19	20	20	13	33
Aros 1	15	0	2	32	0



	2018-19	2019-20	2020-21	2021-22	2022-23
Ardmore	83	62	57	47	86
Erray	12	26	15	13	0
Quinish	80	64	57	58	90
Sgriob	0	0	0	29	0
Aros 2	36	23	42	32	57



A DPA for the whole of Mull conducted in 2015 estimated populations around 30 deer/km^2. This had dropped to 17 by 2018 and it is estimated that figure is now around 12 deer/km^2. This is backed up by the population model which demonstrates there has been a significant reduction in numbers over the last ten years. However we are working towards reducing the number further to a level commensurate with our objectives within the LMP.

Population numbers in hot spots have increased in recent years, caused by in-migration from neighbouring landholdings. Deer density varies from medium to high on neighbouring land; from SNH deer count taken in 2019 by helicopter survey. But these figures do not show areas where deer are concentrated and it misses deer within forests. Where deer number are low enough, hotspots can be tolerated and can be prevented from spreading.

However, deer densities of under 5 deer/km^2 are necessary, to allow establishment of broadleaved trees and mixed conifer species. The data suggest that a cull of at least the upper recommended figure would be required if the native woodland restoration, native woodland creation and broadleaved restocking programmes proposed across the Plan area were to be wholly successful.

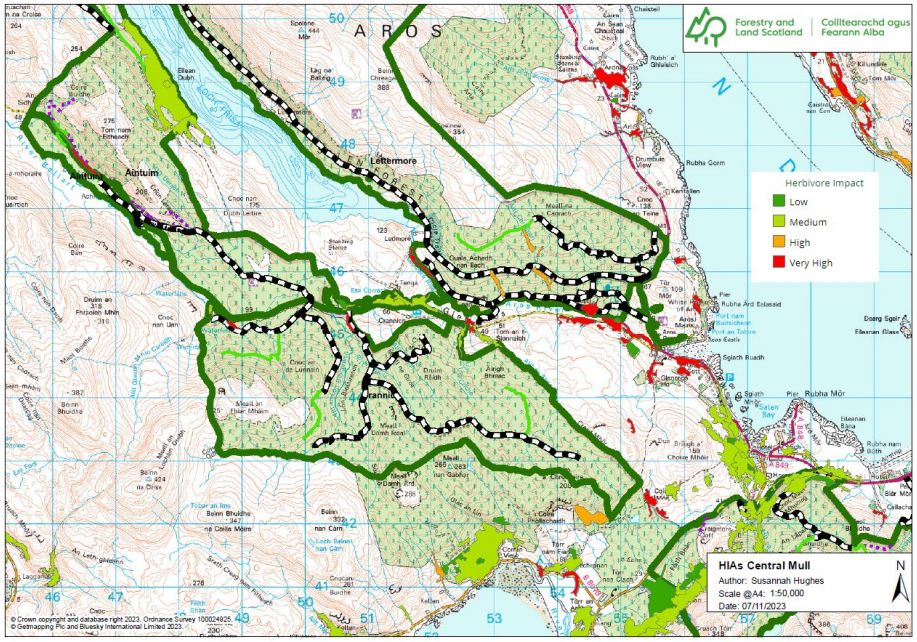
Have an evidence-based approach

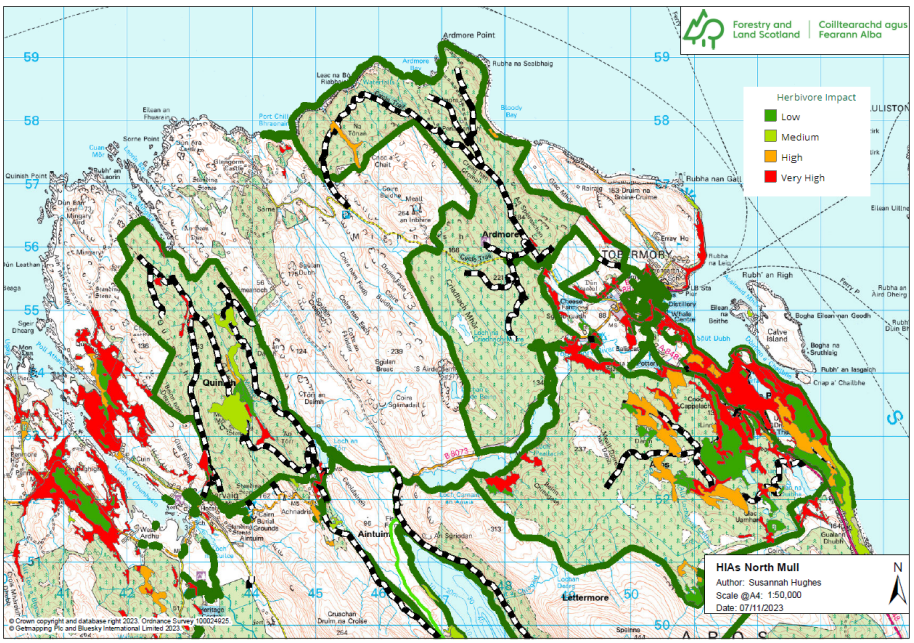
Deer Population Assessment surveys were undertaken by Strath Caulaidh in 2015 across the Mull Deer Management Group area using dung count methodologies (Faecal Accumulation Rate method and Faecal Standing Crop method). Although there are various caveats and weaknesses attached to these, they are standard methodologies commonly used for assessing deer population dynamics. These assessments resulted in an estimate of 30 deer/km^2

Stocking Density Assessments: proportion of restock browsed at Year 5 has been assessed, primarily in Crannich where plots show that there are between 19 and 22 live trees found per plot.

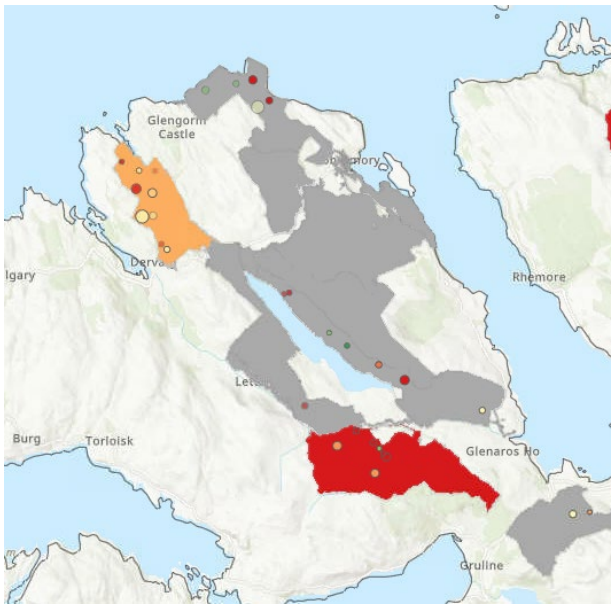
NatureScot Helicopter survey in 2019 indicated low numbers on FCS land and between 6 and 11 deer/km^2 on neighbouring land; however this does not show deer under tree cover, just deer present on the open hill at the time of the count.

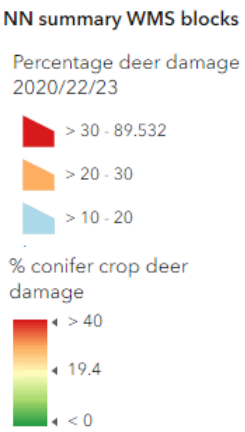
Herbivore Impact Assessments as part of Native Woodland in Scotland Survey (NWSS) indicate very high to high browsing levels in Central Mull: around Lettermore, also in Crannich and the Aintuim face. However HIAs on the shores of Loch Frisa are currently medium impact as are large areas of Salen forest. For North Mull, areas within the internal fence at Quinish are low to medium but outwith the fence are very high. Ardmore has high levels of impact whereas a large area of Aros forest surveyed shows consistently very high and high impact.





Nearest Neighbour Results indicate there are issues with deer damage in crops varying from areas with more than 30% damage (especially Crannich and Quinish) down to less highly impacted sites around 20%. Some sites in Ardmore and Lettermore fall within less than 20% damage.





Nearest Neighbour surveys, Herbivore Impact Assessment and Natural Regeneration surveys will be carried out in relevant establishment coupes. Stocking Density Assessments assess tree crops in Years 1 and 5 following restock and include note of any herbivore damage. It is likely that deer population assessments based on dung counts will continue to be used but in future, drone surveys may be used to ground-truth these indirect methods.

Link to Deer Dashboard

Most of the data used to create this DMP can be found in the FLS Deer Dashboard.

Population Modeling and Future Culls

Financial Year (FY)	Popn at 1st April (Start FY)	Popn at 1st April (Start FY)	Total Popn	*No per 100ha 1st April*	Kid % of pop at 1st April	Recruit-ment Female	Recruit-ment Male	Total Recruit-ment	Female pop 31st Aug	Male pop 31st Aug	Popn 31st Aug	No per 100ha 31st Aug
2021	592	592	1184	***15.0***	30	89	89	178	681	681	1362	17.3
2022	583	521	1104	***14.0***	30	87	87	175	670	608	1278	16.2
2023	465	424	889	***11.3***	30	70	70	140	535	494	1029	13.0
2024	374	346	720	***9.1***	30	56	56	112	431	402	833	10.5
2025	301	281	583	***7.4***	30	45	45	90	347	327	673	8.5
2026	243	229	471	***6.0***	30	36	36	73	279	265	544	6.9
2027	195	186	381	***4.8***	30	29	29	59	225	215	439	5.6
2028	157	150	308	***3.9***	30	24	24	47	181	174	355	4.5
2029	127	122	248	***3.1***	30	19	19	38	146	141	286	3.6
2030	102	99	200	***2.5***	30	15	15	31	117	114	231	2.9

Financial Year (FY)	Set % Cull	Female Cull	Male Cull	Total Cull	% Cull Achieved	Female Pop at 31st March (End FY)	Male Pop at 31st March (End FY)	Total Pop 31st March
2021	30.0	98	160	258	18.9	583	521	1104
2022	30.0	205	184	389	30.4	465	424	889
2023	30.0	160	148	309	30.0	374	346	720
2024	30.0	129	121	250	30.0	301	281	583
2025	30.0	104	98	202	30.0	243	229	471
2026	30.0	84	80	163	30.0	195	186	381
2027	30.0	67	64	132	30.0	157	150	308
2028	30.0	54	52	106	30.0	127	122	248
2029	30.0	44	42	86	30.0	102	99	200
2030	30.0	35	34	69	30.0	82	80	162

Protection Options – cull/fence/tubes

Deer culling across the LMP area is carried out by a combination of direct FLS staff and contractor resource. The main challenge in these parts of Mull is not resident deer populations but a highly migratory population of transitory red deer moving across FLS forests. Deer estimates do not easily allow a full understanding of the full impact of these populations on the crop.

Priorities are to maintain existing livestock and deer fencing and to use contract culling to support the deer control undertaken directly by the FLS Wildlife Ranger team.

If increased deer culls do not result in the improvements to restock protection, new deer fences will also be required as per maps attached. An example of the success of this approach can be seen in South Mull where a strategic fence has allowed the remaining deer to be brought under control and has brought about successful regeneration across this forest. Some internal fencing will also be established as temporary regenerative plots primarily in Aros where establishment has failed to date.

Strategic deer fences such as Loch Frisa to Bellart are to be maintained. Any fences no longer required are to be removed as and when operational conditions allow.

Infrastructure

New tracks are to be constructed to facilitate wildlife operations. Tracks will also be integral to establishment of the proposed / potential woodland creation areas and these will be incorporated into the planting and natural regeneration proposals.

How will the objectives be met?

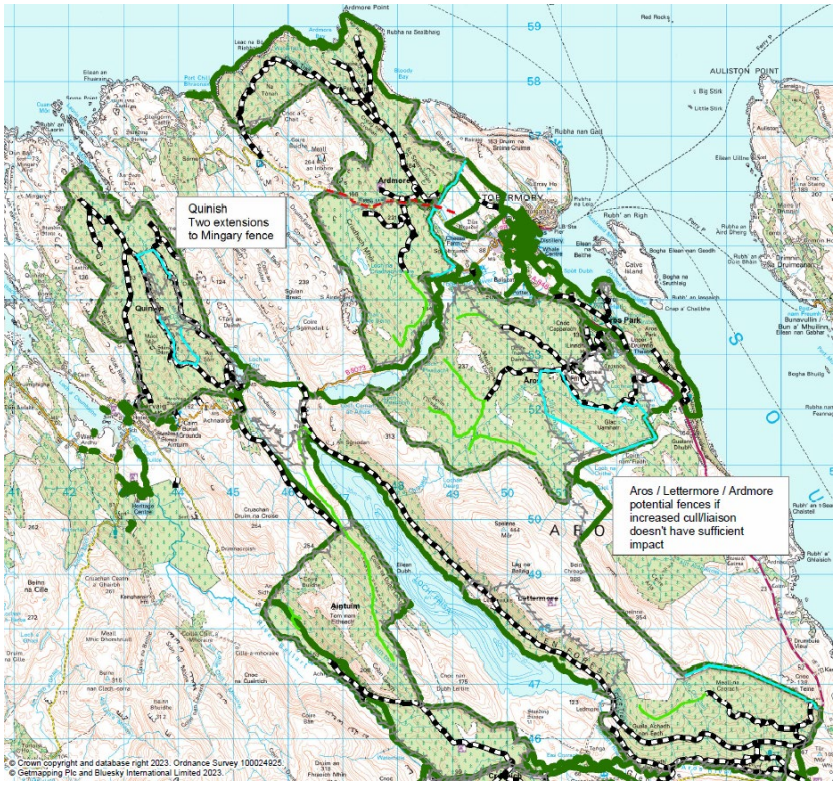
To prevent regulatory action, deer numbers need to be reduced in order to allow successful establishment of the increased amount of felled land.

1. Use of both FLS wildlife team and contractor resource to achieve culls and continue to bring deer management under control.
2. Increase the contractor resource to assist in achieving this.
3. Drone count could be undertaken to update figures from the helicopter survey in 2019.
4. Temporary fencing will be used in Aros forest broadleaf areas using a series of 10 x 10 and 20 x 20 areas to encourage regeneration.
5. If no shooting rights are obtained in east of Salen, a fence must be erected fence between blocks.
6. An annual review will be held each August between the Wildlife, FM and Planning teams to monitor progress against targets and assess implications of any Nearest Neighbour / Beat up results collated through the year.
7. Improving access by increasing ATV tracks and new forest road network: these will be identified by Wildlife team e.g. at Lettermore and passed to the Planning team for permissions and thence construction. Two such tracks have Prior Notification permissions and can proceed in Aros forest.
8. Increased larder capacity will be explored for delivery within the next five years.

If no improvement to the success of establishment is found by the end of Year 2 of the plan and deer numbers are still above 10/km^2, the following measures will also be applied:

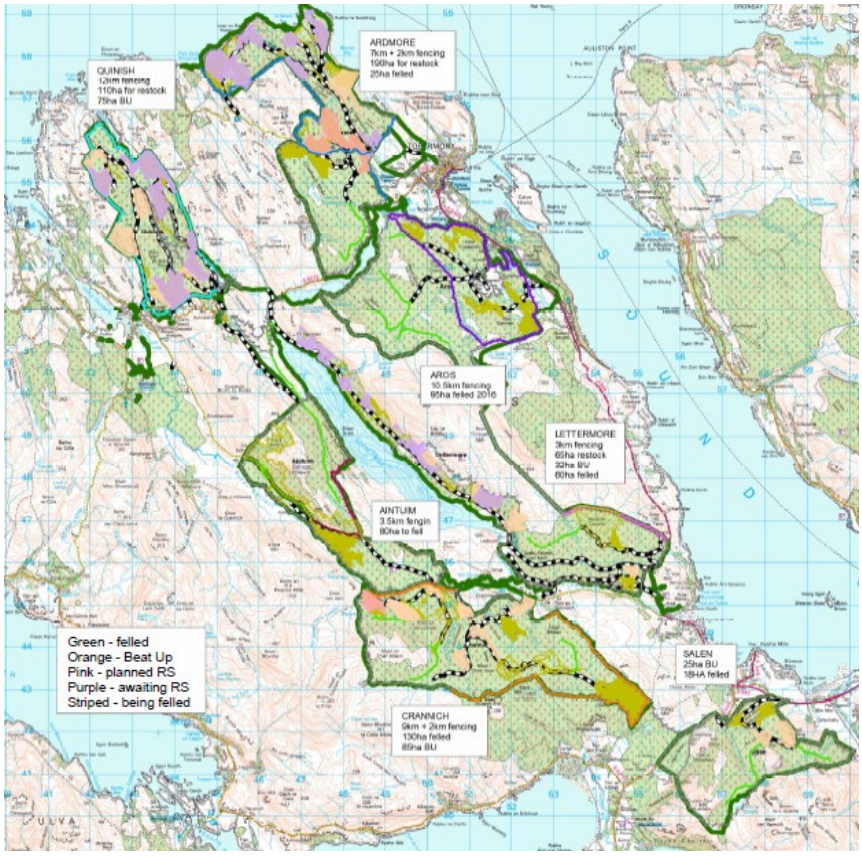
9. Use of extra FLS resource based on Mull as opposed to contractor resource to allow focus on lower volume of migratory deer causing failure of crop.
10. Strategic fencing will be renewed as per the attached maps if there is no solution found to the high number of migratory deer (short term priority and long term priority).

Although culls have regularly been met across the island, a significant increase in cull targets will be set; this will require a similar increase in resources. Given the unique challenges of working on an island, this increase in resources will be met through a combination of use of an Apprenticeship leading to submitting a business case for going back to a second full time ranger based on the island.



Areas in blue identified for fencing if deer numbers do not fall below 10/km^2 after two years.

If a landscape scale approach can be successfully adopted across North and Central Mull, a less intense annual cull would be sufficient to maintain deer numbers at sustainable levels; this is provided migratory deer numbers are also reduced by FLS neighbours.



Areas identified for strategic fencing if required in longer term.

Regular monitoring, including Nearest Neighbour surveys; Natural Regeneration surveys and Herbivore Impact Assessments will continue and if levels of damage remain high in particular areas then culls will increase in those areas, to be achieved by rearranging staff resources. Consideration is being made to include HIA surveys as part of the next deer management framework contract, which is due for renewal in 2024. Standard monitoring of fell/ restock and woodland creation sites will be undertaken, with additional monitoring sites included if required.

This DMP will be reviewed regularly, as a minimum at years two, seven and 10, to consider if the proposed actions have led to reductions in herbivore pressure and if these impacts are sufficient to promote acceptable growth of desired species.

Collaborative working opportunities

FLS undertakes landscape-scale deer management across its land in the LMP areas but opportunities to work more closely with partners across a wider area will be explored. As part of the Deer Working Group Recommendations, we will seek out opportunities where FLS can take a collaborative approach to achieving Deer Management Objectives.

FLS will continue to participate in the Mull DMG, also with immediate neighbours, to identify where there is a mutual benefit to cross boundary culling agreements.

FLS will continue to work with NatureScot to identify opportunities to address issues with neighbouring resident deer regularly migrating onto FLS land.

DMG present

The Mull Deer Management Group (DMG) covers all these forests. FLS is a member of this Group. No specific issues are identified within the DMG at present.

Venison

FLS subscribe to the Scottish Quality Wild Venison (SQWV) scheme. All venison is quality assured and sold to Highland Game. The Mull larder adjacent to the Aros office services the LMP areas.

Appendix VII: Provenance guidance chart

Species	Guidance
SS	Improved QSS standard throughout Alaska (ASS) provenance may be considered (if available) for its slower growing properties in specific locations. i.e Short Rotation Forestry (SRF) in Windfarm renewables developments.
VPSS	Limited use in best locations
SP	High rainfall type specified as standard. W20
NSP	From the nearest appropriate zone near CFR areas
LP	Only ALP being used in mixture with SS on poorer sites
DF	Seed stand or coastal origin
ESF	Czech or central European
NF	Registered seed stands
GF	Scottish registered seed stands
WH	Registered seed stands with low fluting
WRC	Scottish seed stands
NS	Seed stands, Eastern European or Harz
JCR	Northern Japanese range
NBL	Region of Provenance 10, Native Seed Zone 106
XC	PSSB will advise on any other minor species
Notes: PSSB can provide the most up to date guidance on provenance selection including advice on best suited seed stands. Virtually all seed supplied by PSSB comes from registered seed stands and is based on geographic area compatibility. Use of VPSS has declined as seed orchard QSS improves and this also has a wider genetic base for resilience purposes.	

Appendix VIII: Abbreviations used in the plan

Abbreviation	Meaning
FLS	Forestry and Land Scotland
LMP	Land Management Plan
ASNW	Ancient Semi-Natural Woodland
PAWS	Plantation on Ancient Woodland Site
ATV	All Terrain Vehicle
Ha	Hectare
MAI	Mean Annual Increment (Average annual growth a tree of stand of trees has experienced to a specific age)
MI	Minimum intervention (minimum level of management)
PEFC	Programme for the endorsement of forest certification
YC	Yield Class (Index of potential productivity of even-aged stands of trees. Measured in units of cubic metres per hectare per year)
LISS	Low Impact Silvicultural System
CCF	Continuous Cover Forestry
EIA	Environmental Impact Assessment
FSC	Forest Stewardship Council
UKWAS	UK Woodland Assurance Standard
UKFS	UK Forestry Standard
RBMP	River Basin Management Plan
UKBAP	UK Biodiversity Action Plan
SEPA	Scottish Environmental Protection Agency
SF	Scottish Forestry
ESC	Ecological site classification (based on soil and climate information, aids tree species choice)
DAMS	Detailed Aspect Method of Scoring (A modelled windiness score used to calculate the probability of damaging winds occurring)
SPA	Special Protection Area (birds)
SAC	Special Area of Conservation (habitats)
SPHN	Statutory Plant Health Notice
Species	SS = Sitka Spruce HL = Hybrid Larch EL = European Larch NF = Noble Fir WH = Western Hemlock MCP = Macedonian Pine AR = Alder BI – Birch (downy/silver) OK = Oak (robur/petreae) HAW = Hawthorn GWL = Goat Willow NS = Norway Spruce JL = Japanese Larch XL = Larch WRC = Western Red Cedar LP = Lodgepole Pine MC = Mixed Conifers CAR = Common Alder HAZ = Hazel ROW = Rowan WCH = Wild Cherry / Gean MB = Mixed Broadleaves

Appendix IX: Unexpired PN / EIA screening

There are no unexpired PN or EIA screening opinions within these forests.

Appendix X: Correspondence for EIAs

There are no unexpired EIA screening opinions for these forests.