
4.3 LMP Presentation

Felling Proposals

Felling proposals are presented in **Map 9** as management coupes coloured to reflect which five year phase they are to be felled in. This map also details areas of natural reserve, minimum intervention and long term retention. The full detail of these felling proposals are contained in **Table 2.1 – Activity Summary**.

Thinning Proposals

Thinning proposals are presented in **Map 10** as operational thinning coupes. In these coupes productive crops will be thinned to prescribed intensities for the purposes of timber harvesting, improving crop stability, silvicultural improvement and where noted, beginning or continuing conversion to low impact silvicultural systems. In addition this map will highlight areas where low intensity thinning will take place for environmental purposes such as non-native removal from riparian zones and wetlands and ancient woodland protection. Finally this map will detail areas where we will undertake low intensity thinning to enhance visitor experiences or protect estate assets. The full detail of these thinning proposals are contained in **Table 2.1 – Activity Summary**.

Future Habitat Proposals

Future habitat proposals are presented in **Maps 12a, 12b and 12c** as follows:

Map 12a defines future management by a series of management prescription zones detailed in table 4.3.1 below. This map is a spatial representation of the future structure of the NFL across West Sutherland LMP area.

Map 12b details the species to be used in the restocking of felled areas and any new planting sites within the LMP area. The species for productive coupes is detailed and will largely follow the prescriptions set out in table 4.3.2 below with minor alterations for site type in compliance with limits set in the tolerance table in **section 2.2**. Non-productive native broadleaf coupes such as riparian woodland are visualised as 'mixed broadleaf' and species will be selected according to the soils and site types revealed after felling and a period of fallow to comply with table 4.3.3 below.

Map 12c shows only the coupes for which this plan seeks approval in the ten year period – the Proposed Future Habitats Coupes

Further detail on management proposals is contained in **Section 7 – LMP Proposals**.

4.3.1 Overall Management Prescriptions for Future Habitat Proposals (see Maps 12 a to c – Future Habitats)

General Habitat Type	Stocking Detail @ Initial Planting	Management Prescription
<p>Productive Conifer Woodland <i>(see Productive Forestry Table below for detailed species prescriptions)</i></p>	<p>2,500 – 3,500 stems/ha. 70% area conifer species <i>and</i> 20% area open space <i>and</i> 10% area broadleaf species.</p>	<p>Primarily comprising conifer species in a silvicultural mixture appropriate to site soils and climate. The aim of this management type is to produce softwood by clearfelling for sawlogs, small roundwood and biomass markets. The broadleaf element will generally be concentrated around archaeological and recreation sites, wet ground areas, boundaries with open ground and/or roads; however on sites with limited nutrition an increased broadleaf element will be considered for inclusion as part of the silvicultural mixture to maintain site fertility. Open ground will be incorporated around archaeological and recreation sites and on unplatable (for example rocky) ground throughout the coupe. Herbivores will be managed effectively and the sites will be monitored using the FCS Stocking Density Assessment protocol.</p>
<p>Productive Broadleaf Woodland <i>(see Productive Forestry Table below for detailed species prescriptions)</i></p>	<p>3,000 – 6,000 stems/ha. 60% area broadleaf species <i>and</i> 10% open space <i>and</i> 30% native species (including conifers where appropriate).</p>	<p>Primarily comprising broadleaf species in a silvicultural mixture appropriate to site soils and climate. The aim of this management type is to produce hardwood by clearfelling for roundwood and biomass markets including local firewood sales. The conifer element (if applicable) will generally be concentrated where it will offer biodiversity gains (for example juniper close to powerline wayleaves) but on suitable sites will also form a productive element. This management type will be the preferred option for better soils capable of producing hardwood. Open ground will be incorporated around archaeological and recreation sites and on unplatable (for example rocky) ground throughout the coupe. Herbivores will be managed effectively (additional internal fencing will be considered) and the sites will be monitored using the FCS Stocking Density Assessment protocol.</p>
<p>Productive Native Woodland <i>(see Productive Forestry Table below for detailed species prescriptions)</i></p>	<p>2,700 – 5,000 stems/ha. 80% of area native broadleaf & conifer species (% dependant on site suitability) <i>and</i> 20% open space.</p>	<p>This management type will be proposed on relatively fertile PAWS, and where strictly conifer or broadleaf prescription is unlikely to maximise the productive potential of the site. This management type will generally be used on better soils, with the aim to produce both softwood and hardwood, for roundwood and sawlogs where possible, but also biomass and local firewood market. Such approach will allow for meeting PAWS restoration objective without compromising the productivity of the site. Species selection will depend on detailed site investigation following harvesting operations. Open ground will be incorporated around archaeological and recreation sites and on unplatable (for example rocky) ground throughout the coupe. Herbivores will be managed accordingly, and the sites will be monitored using the FCS Stocking Density Assessment protocol.</p>
<p>Native Woodland <i>(see Native Woodland Table below for detailed species prescriptions)</i></p>	<p>Minimum 1,600 stems/ha. 10 - 60% native broadleaves with upto 70% Scots pine (% dependant on site suitability) <i>and</i> 20% open space; <i>or</i> 80% area native broadleaves <i>and</i> 20% open space.</p>	<p>Where this management type is proposed native tree and shrub species will be established at lower density mosaics reflecting the appropriate NVC woodland type for the local soils and climate as detailed in Section 6.6 – Native Woodland Prescriptions. Primarily established with the aim of increasing biodiversity, enhancing recreation and education opportunities and potentially producing low quality timber on long rotations (e.g. for firewood markets) this woodland will be eventually create a woodland stand structure that contains a range of different age classes, both mature and veteran trees with deadwood and some permanent open areas at the margins and internally. A light level of grazing by herbivores sufficient to allow regeneration of a characteristic range of trees and shrubs and a well-developed field layer will be tolerated although deer control will be sufficient to allow establishment of transplants and eventually progression to regeneration. Although non-native tree species will generally be absent, they will be tolerated at low levels (less than 15% of species by area).</p>
<p>Riparian Woodland <i>(see Native Woodland Table below for detailed species prescriptions)</i></p>	<p>Minimum 1,600 stems/ha. 60% area native species <i>and</i> 40% open space. <i>Average width: 30m either side of the water course - varying where practical management, terrain or landscape design require different approach.</i></p>	<p>The aim of this woodland type is to provide a significant buffer between productive forestry and watercourses and waterbodies that will increase biodiversity and enhance riparian and aquatic habitats. The species that are planted in riparian zones will be selected to match the NVC community for the appropriate soils type and detail of the proposed habitat prescriptions is contained in Section 6.6. Native tree and shrub species will be established in clusters of variable density plantings appropriate to site type and framing other significant habitat (e.g. water vole grassland). A light level of grazing by herbivores sufficient to allow regeneration of a characteristic range of trees and shrubs and a well-developed field layer will be tolerated although deer control will be sufficient to allow establishment of transplants and eventually progression to regeneration. The long term aim is that this habitat type will develop to form a permanent network of 'natural reserve' habitat so the fluctuation of levels of open space and woodland will be tolerated although prolific conifer regeneration that will compromise overall aims will be removed.</p>

<p>Low Impact Silvicultural Systems <i>(including Riparian LISS)</i></p>	<p>Dependant on individual system chosen and seed sources available.</p>	<p>LISS is proposed as a prescription where climate is suitable and where it will achieve specific aims – for example addressing water or soil quality/stability issues, enhancing landscape value and/or contributing to biodiversity enhancement. As forests move through the initial thinning regimes a decision will be taken as to which LISS is most appropriate for the site and the management aims. Most commonly shelterwood systems will be practised, avoiding clearfelling areas larger than 2 hectares. Full management prescriptions are contained in the coupe workplan for each LISS area.</p>
<p>Minimum Intervention</p>	<p>Dependent on individual area.</p>	<p>Minimum intervention is proposed where the land is predominantly wooded or progressing towards woodland cover. The aim of this management type is to develop semi-natural habitats in the future. Depending on how the woodland structure develops, it might be desirable to change the management type, so some thinning and/or group felling can take place to diversify stand or species composition. Use of MI classification allows this change to be made in the future as MI doesn't have to apply in perpetuity.</p>
<p>Natural Reserve</p>	<p>Dependent on individual area.</p>	<p>A natural reserve is predominantly wooded and permanently identified and is sited in a location where it will be of particularly high biodiversity benefit (for example riparian woodland). All NRs will be managed by minimum intervention unless alternative management has higher conservation or biodiversity value. Any management operations proposed will solely be to protect the integrity of the habitat (for example removal of invasive non-native regeneration). The function of NRs is to provide continuity of habitat to allow sedentary species to establish and thrive. They provide reservoirs of permanent habitat from which more mobile species can expand into other areas of woodland. The two types of NR proposed will be based on semi-natural woodland origin and on plantation woodland origin. It is intended that most riparian woodland will eventually be adopted as natural reserve although with the management required to establish the appropriate species this cannot yet be the case.</p>
<p>Long Term Retention</p>	<p>Dependent on individual area.</p>	<p>A LTR is a tree or stand of trees retained for environmental benefit significantly beyond the age or size generally adopted by North Highland Forest District. LTR's are proposed because the trees (not the land they occupy) are of significant landscape or biodiversity benefit. An LTR will be proposed where it is desirable to retain the existing stand beyond normal economic maturity for benefits noted, but there is no imperative to retain permanent woodland cover once the existing stand has fulfilled its objective. In most cases, when selected, LTRs will comprise a stand of stable standing trees however there may be cases where it is desirable to retain large patches of windblow to increase structural diversity and deadwood volume. This latter type of LTR, if present, will be sited where landscape is a low or insignificant priority.</p>
<p>Peatland Restoration</p>	<p>(-)</p>	<p>This management type aims to restore valuable blanket bog habitat to favourable condition and is to be applied on sites where the likelihood of success is high (poor tree growth rate in previous rotation combined with significant peat depth, high water table, presence of Sphagnum etc.) and where potential environmental benefits are highest (possibility of being turned into net carbon sink, adjacency to and/or hydrological links with designated peatland sites and/or non-designated active bogs, adjacency to high sensitivity sites for dunlin, golden plover and peatland specific species).</p> <p>After removal of the crop (depending on size of the trees by either felling or mulching) works to ground smooth, block drains and furrows and to remove regenerating non-native trees will be undertaken. Rising water table is likely to inhibit natural regeneration of tree species, but regeneration of native broadleaves (up to 10% of the area) will be accepted, primarily associated with drier knolls (significantly above the water table) and watercourses (where presence of native trees benefits riparian habitats).</p>
<p>Open Land</p>	<p>(-)</p>	<p>Land is maintained as open habitat for biodiversity gain where specific species or habitat types will benefit or where another land management objective exists (e.g. agriculture – crofting tenure). Open land will also be specifically prescribed where large scale heritage sites, not able to be accommodated in the standard open space of other habitat types needs protected. Open space will form a key element of native and riparian woodland expansion. Open land as defined in this LMP will comprise a maximum of 20% broadleaf woodland or 10% broadleaf woodland and 10% conifer woodland, primarily associated with open hill and/or and improving riparian habitats.</p>

- All procurement of planting material will adhere to the current guidance (FCS, 2007) on the sourcing of forest reproductive materials.
- All operations will adhere to the Controlled Activities Regulations 2005 General Binding Rules with respect to appropriate buffer strips between restock areas and water bodies.
- Initial applications of potassium, phosphate and nitrogen may be required to establish productive conifer crops. Any requirement for detailed remedial fertiliser programmes will be decided following foliar analysis.
- Heather control and/or silvicultural mixtures will be used to pre-empt potential fertiliser requirement. Initial and remedial fertiliser programmes will adhere to current industry best practice and follow FLS Guidelines on water catchment protection.
- Restocking will be carried out with the principles of pesticide- and fertiliser reduction foremost.

4.3.2 Productive Forestry Prescriptions Table

Soil Group	Soil Types relevant in FLS North Region	Characteristics	Species Prescription for Commercial Restocking ●
1	Brown earth	Soils with typically good aeration and drainage throughout the profile and well-incorporated organic matter. These soils range from very rich to poor and usually allow deep rooting. Likely vegetation to be encountered includes broad leaved grasses, (e.g. Yorkshire fog, Bent), bracken, bramble, foxgloves, violets and a diverse range of herbs.	<p>Douglas Fir on Poor (must be without heather) to Rich fertility with Moist to Dry soil moisture. Desirable intimate or group mixture; European Larch*, Norway Spruce or Western Red Cedar. Generally in sheltered areas with sufficient rainfall</p> <p>Sitka or Norway Spruce on Poor to Medium fertility with Wet to Fresh soil moisture. Desirable intimate or group mixture; each other or European/Hybrid Larch*</p> <p>Scots Pine in Podzolised areas on Poor to Medium fertility with Moist to Dry soil moisture. Desirable intimate or group mixture; Japanese/Hybrid or European Larch*</p> <p>European Larch* on Medium to Rich fertility with moist to Moderately Dry soil moisture. Desirable intimate or group mixture; Scots Pine or Douglas Fir</p> <p>Japanese/Hybrid Larch* on Poor to Medium fertility with Very Moist to Fresh moisture. Desirable intimate or group mixture; Scots Pine</p> <p>Sycamore on Medium to Rich fertility with Moist to Fresh soil moisture. Desirable intimate mixture: Ash† or European Larch*</p> <p style="text-align: center;">Where improved climatic conditions allow:</p> <p>Sessile Oak on Medium to Rich fertility with Moist to Slightly Dry soil moisture. Pedunculate Oak (Local seed source if possible) on Medium to Rich with Very Moist to Fresh soil moisture. Desirable intimate/group or blocky mixtures include; Norway Spruce, European Larch*, Western Red Cedar, Silver Birch or Ash†</p> <p>Silver Birch on Poor to Medium with Very Moist to Fresh soil moisture. Desirable intimate or group mixture: Oak or Scots Pine</p> <p>Ash† on Rich fertility with moist to Fresh soil moisture and less acidic sites. Mix in groups with; Sycamore, Oak or Beech</p>
3	Podzols	<p>Develop on unfertile acid soils with high rainfall where nutrients are flushed into the lower horizons of the soil profile. Very poor fertility. Induration or an impenetrable pan will prevent good drainage, resulting in a need to break this impediment with suitable cultivation that will allow freer draining and greater rooting depth.</p> <p>Vegetation common to these soils are ericaceous plants, grasses including Wavy hair, Matt and Purple moor grass. Light bracken and feather mosses may also be present.</p>	<p>Scots Pine with Moist to Dry soil moisture. Desirable mixture; intimate mixture with Hybrid Larch*</p> <p>Sitka Spruce with Wet to Moist soil moisture. Mix with; Lodgepole Pine in wetter areas or Japanese/Hybrid Larch*</p> <p style="text-align: center;">Japanese/Hybrid Larch* with Very Moist to Fresh soil moisture</p> <p style="text-align: center;">Where improved climatic conditions allow:</p> <p>Sessile Oak (not on 3m) with Moist to Fresh soil moisture. Desirable mixture; Hybrid Larch*, Scots Pine or limited Norway Spruce</p>
4	Ironpans	Develop on free draining acid soils with high rainfall. The transfer of aluminium and iron in solution down through the soil profile develops an ironpan that is impervious to water and root penetration. Vegetation and fertility is similar to that of Podzols above	<p>Scots Pine with Moist to Dry soil moisture. Desirable mixture; Japanese/Hybrid Larch*</p> <p>Japanese/Hybrid Larch* with Very Moist to Fresh soil moisture. Desirable mixture; Scots Pine</p> <p>Lodgepole Pine in elevated areas with Wet to Fresh soil moisture</p>

			<p>Sitka or Norway Spruce (4 & 4b) with Wet to Fresh soil moisture. Desirable intimate or group mixture; Lodgepole Pine in wetter areas or Japanese/Hybrid Larch* or Scots Pine.</p> <p>Sycamore (4b only) with Moist to Fresh soil moisture. Consider intimate mixture with Japanese/Hybrid Larch*</p> <p>Breaking of the ironpan is desirable; so as to allow drainage of the site and a potential increase in soil rooting volume and nutrient availability, therefore cultivation that includes amelioration of the ironpan will be considered.</p>
5	Groundwater gleys	Dominant vegetation is commonly Tufted hair grass, Willows and herbs. Occurring where a shallow water table causes waterlogging and therefore subject to compaction and poorly oxygenated. The soil is permeable but is affected by a fluctuating ground-water table. Moderate nutrient availability.	<p>These areas are generally presumed to be open or riparian zones. <u>Productive planting will be outwith the 30m buffer zone of native woodland.</u> Where rooting depth is adequate:</p> <p>Sitka or Norway Spruce on Medium to Rich fertility with Very Wet to Moist soil moisture. Consider adding blocks of Downy Birch and Alder</p> <p>Intimate mix of Downy Birch and Common Alder on Poor fertility with Very Wet to Moist soil moisture</p>
6	Peaty Gleys	Very Poor to Rich nutritional availability, these soils are indicated by Purple moor grass, Calluna and Cross-leaved heath, with sphagnum prevalent in the North and West.	<p>Sitka Spruce on Poor to Medium fertility with Wet to Fresh moisture. Experience in North Highland suggests this crop will rarely establish as a pure stand without fertiliser input. Intimate mix with Lodgepole Pine in wetter and poorer areas or with Japanese/Hybrid Larch* in more Podzolised areas. Consider adding blocks of Downy Birch</p> <p>Downy Birch on Poor to Medium fertility with Very Moist to Fresh soil moisture</p> <p>High winter water table can be expected and good drainage will be required to achieve best results.</p>
7	Surface Water Gleys	Differing from groundwater gleys in that waterlogging is caused not by a high water table, but by lateral surface-water movement through the soil profile developing a seasonally fluctuating water table. Resulting anaerobic conditions will restrict rooting. Indicative vegetation includes Tussock grass and Creeping Buttercup. Again poor to moderate nutritional availability can be expected.	<p>Sitka or Norway Spruce on Medium fertility with Wet to Fresh soil moisture. Desirable mixture; each other, Japanese/Hybrid Larch* or with Lodgepole Pine in wetter poorer areas</p> <p>Where improved climatic conditions allow:</p> <p>Pedunculate Oak on 7b Medium to Rich fertility with Moist to Fresh soil moisture. Desirable group or blocky mixture; Norway Spruce</p> <p>Drainage will be required along with micro site cultivation such as mounding.</p>
8	Juncus bog	Rushes are prevalent. A shallower peat type, nutrient rich and containing some mineral grains. Peat is black in colour.	<p>FC Forests and Peatland Habitats Guideline Note (2000) and FCS Practice Note 'Forestry on peatland habitats' (2014) states that :</p> <p>'where the site is a priority for habitat restoration on ecological grounds (to open habitat or native/bog woodland) , conventional restocking will not be required';</p> <p>'where site is not priority for restoration to open peatland or bog/other type of native woodland and it's unlikely to support tree growth greater than Yield Class 8 (Sitka spruce), the appropriate option will be to create peatland edge woodland'</p> <p>'where the site is not a priority for restoration and it's likely to support rapid enough tree growth to compensate for greenhouse gas losses from the soil – understood to be Yield Class 8 or above for Sitka Spruce – then the conventional restocking should be undertaken'</p> <p>It may be therefore considered that more fertile, flushed peats and areas of deeper peat where hydrology has been irreversibly compromised will remain suitable for restocking.</p> <p>Where areas of deeper peat are encountered in intimate mosaic with more favourable soils Sitka Spruce (QSS) will be favoured in a mixture with Lodgepole Pine of disease resistant provenance or Hybrid Larch. On these more nutritionally challenged sites a proportion (up to 20%) of soil improving species such as birch will be considered.</p>
9	Molinia bog	Often existing on hillsides where flushing is more pronounced. Moderate nutrition available.	
10	Unflushed Flat or Raised Bogs	Sphagnum Moss dominated bogs, formed as peat levels rose to form a dome, reliant on precipitation for moisture and nutrients. Mineral grains are absent and the peat is reddish-brown and tends to be deeper.	
11	Unflushed Blanket Bogs	Calluna, cotton-grass, deer grass bogs including the hill peats located on upland plateaux and hillsides deeply dissected by burns.	
14	Eroded Bogs	Very poor nutritional status characterised by bog asphodel, deer grass, bog cotton etc. Can be dominated by either deep and frequent eroded areas (haggs) or frequent pools of standing water (flows). Very deep peat.	

15	Littoral soils	Formed on coastal sands and shingles, such as the dunes found at Morrish More near Tain. The category is split into shingle (15s), dunes (15d) and then sands with varying water table depths (15e,w,g,i). These sands can be distinguished by various levels of mottling. Coastal grasses and heathland plants predominate.	Corsican cannot be considered due to the current DNB moratorium on planting therefore Scots Pine either pure or in intimate, group or blocky mixture with Birch. Downy/Silver Birch depending on climate
<p>NB – These prescriptions <u>must</u> be adopted within the local context set out in the main body of this Land Management Plan. Climate, (along with soils) must be included as the determining factor in final species selection.</p> <ul style="list-style-type: none"> - • No more than 75% of area within a restock/new planting site to be allocated to a single species (as per UKFS General Forestry Practice recommendation no.8) - Planting will generally become a mosaic of the species recommended above and will include areas of non-productive open ground and broadleaf riparian zones. Species choice will be dictated by local conditions and agreed after site visits by management staff. - No commercial forestry type likely to be suitable on sites wetter than SMR "Very Moist" and vegetation indicating SNR <4.5 - Origin for SS is QSS. - * The West Sutherland LMP area is located within the Vulnerable Area , as recognised by 'Strategy for managing larch on the NFE' (2016) . The Strategy currently states that no larch will be planted - alternative species to be used will be agreed at 75% site visit and/or at the work plan stage of planning process. - Origin for LP is ALP. - Mixed stands mean that each species occupies at least 20% of the canopy. Blocky areas should aim to cover the area that 3-4 mature trees would cover. Mixtures may need management to favour one or more species. Intimate mixtures of broadleaves with Sitka Spruce or Scot's Pine will normally result in the conifer's dominating overtime so planting in blocks is often the better option. - †Movement of any plant-passported Ash plants, trees and seeds within Great Britain is, until further notice, prohibited under UK Government legislation (2012 Plant Heath Order No. 2707) introduced on 29.10.2012. 			
<p><u>References:</u></p> <p>Kennedy F (2002) <i>The Identification of Soils for Forest Management</i>, Edinburgh: HMSO</p> <p>Pyatt, G; Ray, D; Fletcher, J (2001) <i>An Ecological Site Classification for Forestry in Great Britain; Bulletin 124</i>, Edinburgh: FCS</p> <p>Savill, P.S. (1991) <i>The Silviculture of Trees used in British Forestry</i>, Oxfordshire: CAB International</p> <p>Mason, B (2006) <i>Managing Mixed Stands of Conifers and Broadleaves in Upland Forests of Britain</i>, Information Note, Edinburgh: FCS</p> <p>Wilson, S (2011) <i>Using alternative conifer species for productive forestry in Scotland</i>, Glasgow: Bell & Bain Ltd</p> <p>http://www.forestry.gov.uk/fr/INFD-8CVE4D</p>			

4.3.3 Native Woodland Prescription Table

Soil Group	Soil types relevant to the North Highland	Characteristics	Aim*	Indicative Species Prescription**
1	Brown Earths	Soils with typically good aeration and drainage throughout the profile and well-incorporated organic matter. These soils are mainly * fertile and allow deep rooting. Likely vegetation to be encountered includes fine grasses, holcus, bracken, bramble, foxgloves, violets and a diverse range of herbs. * However Podzolic Brown earths where nutrients have been leached are "Very Poor"	NW	<p>W19 Juniper wood with sorrel (At least 50% Juniper; other species: Downy birch, Scots pine, Rowan) on 1, 1u, 1z and 1b from sheltered sites up to sub alpine areas with DAMS < 22</p> <p>W18 Scots pine with heather (50% to 70% Scots pine; other species: Downy & Silver birch, Rowan) on 1z in cool to warm with DAMS < 18</p> <p>W11 Upland oak-birch with bluebell (At least 50% Sessile oak with Downy birch; other species: Silver birch, Holly, Pedunculate oak, Aspen) on 1, 1u and 1z in cool to warm with DAMS < 18</p>
3&4	Podzols & Ironpan soils	Developed on Acid * soils with high rainfall where nutrients are flushed into the lower horizons of the soil profile. Frequently induration or an impenetrable pan will prevent good drainage, resulting in a need to break this impediment with suitable cultivation that will allow freer draining and greater rooting depth. Vegetation common to these soils are ericaceous plants, grasses including deschampsia flexuosa, nardus, carex and molinia. Light bracken and feather mosses may also be present. * NOT fertile soils	NW RW	<p>W18 Scots pine with heather (50% to 70% Scots pine; other species: Silver/Downy birch, Rowan, Juniper) on 3, 3m, 4, 4z and 4b Not in Sub-alpine climate, (Cool to Warm) DAMS < 18.</p> <p>W19 Juniper wood with sorrel (at least 50% Juniper; other species: Downy birch, Scots pine, Rowan) on 3 and 4b Possible up to Sub-alpine zone</p> <p>W17 Upland oak-birch with blueberry (At least 50% Sessile oak with Downy birch; other species: Silver birch, Pedunculate oak, Holy and Rowan) on 3s and 3ms Mainly in Lower Cool to warm climate zone. DAMS < 18.</p>
5	Groundwater Gleys	Dominant vegetation is commonly Deschampsia caespitosa, Holcus, salix spp and herbs. Occurring where a shallow water table causes waterlogging and therefore subject to compaction and poorly oxygenated. The soil is permeable but is affected by a fluctuating ground-water table. Moderate nutrient availability.	NW RW	<p>W7 Alder-ash with yellow pimpernel (50% Alder with Ash†; other species: Downy birch, Common hawthorn, Goat willow, Hazel) on 5 and 5f</p> <p>Cool to Warm. Sheltered to Moderately exposed. (DAMS <16)</p>
6	Peaty Gleys	Very Poor to medium nutritional availability, these soils are indicated by Molinia, Calluna and Erica spp, with sphagnum prevalent in the North and West. High winter water table can be expected and good drainage will be required to achieve best results.	NW RW	<p>W18 Scots pine with heather (50% to 70% Scots pine; other species: Downy & Silver birch, Rowan) on 6z "moist" to "fairly dry"</p> <p>W4 Birch with purple moor-grass (50% to 70% Downy birch; other species: Goat willow, Alder) on 6 and 6b. Cool to Warm. DAMS < 18.</p>
7	Surface Water Gleys	Differing from groundwater gleys in that waterlogging is caused not by a high water table, but by induration preventing adequate drainage leading to a seasonally fluctuating water table. Resulting anaerobic conditions will restrict rooting. Indicative vegetation includes Holcus, Juncus, Nardus and Deschampsia caespitosa. Again poor to moderate nutritional availability can be expected.	NW RW	<p>W11 Upland oak-birch with bluebell (At least 50% Sessile oak with Downy birch; other species: Silver birch, Holly, Pedunculate oak, Aspen) on 7b</p> <p>W18 Scots pine with heather (50% to 70% Scots pine; other species: Silver/Downy birch, Rowan, Juniper) on 7z possibly on margins leading to drier knolls.</p> <p>W7 Alder-ash with yellow pimpernel (50% Alder with Ash†; other species: Downy birch, Common hawthorn, Goat willow, Hazel) on 7, 7b and 7z Cool to Warm. Sheltered to Moderately exposed (DAMS <16)</p>

		Drainage will be required along with micro site cultivation such as mounding..		
8	Juncus Bogs	Juncus spp are prevalent. A shallower peat type, nutrient rich and containing some mineral grains. Peat is black in colour.	NW RW	W4 Birch with purple moor-grass (50% to 70% Downy birch; other species: Goat willow, Alder) on 8b and 8c.
9	Molinia Bogs	Often existing on hillsides where flushing is more pronounced. Moderate nutrition available.	NW RW	W4 Birch with purple moor-grass (50% to 70% Downy birch; other species: Goat willow, Alder) on 9a, 9b, 9c and 9d suitable for the transitional areas at the margins between productive forest blocks and peatland restoration sites.
			OG	9e Trichophorum, Calluna, Eriophorum, Molinia Bogs will not be planted or restocked - restoration of peatland.
10	Unflushed Flat or Raised Bogs	Calluna, Eriophorum, Trichophorum Bogs including the hill peats located on upland plateaux and hillsides deeply dissected by burns.	OG	10b Upland flat or raised bogs – priority areas for peat restoration.
11	Unflushed Blanket Bogs	Calluna, Eriophorum, Trichophorum Bogs including the hill peats located on upland plateaux and hillsides deeply dissected by burns.	OG	11a A rare peatland type mainly restricted to the driest eastern uplands
			OG	11b,c,d Unflushed blanket bogs - priority areas for peatland restoration
14	Eroded bogs	Very poor nutritional status characterised by bog asphodel, deer grass, bog cotton etc. Can be dominated by either deep and frequent eroded areas (haggs) or frequent pools of standing water (flows). Very deep peat	OG	14 & 14h Hagged bogs – unsuitable for forestry or woodland – peatland habitat
			OG	14w Pooled bogs – common across Northern Scotland forming the 'Flows' – peatland.
15	Littoral soils	Formed on coastal sands/shingles, such as the dunes found at Morrich More near Tain. The category is split into shingle (15s), dunes (15d) and then sands with varying water table depths (15e,w,g,i). These sands can be distinguished by various levels of mottling. Coastal grasses and heathland plants predominate.	NW	W16 Lowland oak-birch with blueberry limited to "Warm" climate (at least 50% Sessile oak with Downy/Silver birch; other species: Pedunculate oak, Holly, Rowan and Aspen).

Aim* : NW - Native Woodland Expansion / RW – Riparian Woodland Expansion / OG – Managed Open Ground e.g. peatland restoration

Indicative Species Prescription**: details of restock proposal will be agreed at '75% site visit'. In some circumstances (e.g. difficult/limited access, poor nutrient availability, exposure) establishment of any native species, providing at least 20% of canopy cover, will be accepted. On better, productive sites (e.g. PAWS) the aim will be to establish native species at commercial densities with up to 80% of canopy cover.

†Movement of any plant-passported Ash plants, trees and seeds within Great Britain is, until further notice, prohibited under UK Government legislation (2012 Plant Health Order No. 2707) introduced on 29.10.2012.

NB – These prescriptions must be adopted within the local context set out in the main body of this FDP. Climate must be included as a determining factor in final species selection.

- Planting will generally become a mosaic of the woodland types recommended above, dictated by local conditions and agreed after “75% Site Completion Visits”
- Particular note should be made of the inadvisability of planting the peatland types 10 – 14 that may predominate on marginal FD sites
- No native woodland type likely to be suitable on sites wetter than SMR “Very Moist” and veg indicating SNR <4.5

References:

Kennedy F (2002) *The Identification of Soils for Forest Management*, Edinburgh: HMSO

Pyatt, G; Ray, D; Fletcher, J (2001) *An Ecological Site Classification for Forestry in Great Britain; Bulletin 124*, Edinburgh: FCS

Rodwell J.S. and Paterson G.S. (1994) *Creating New Native Woodlands; Bulletin 112*, London: HMSO

Thompson, R (2009) *Management of PAWS on the National Forest Estate in Scotland*, Edinburgh: FCS

