

Appendix 1: Background information and analysis

1 Analysis of physical site factors

1.1. Geology, landform and soils

The solid geology underlying the site is composed largely of quartz-mica-schist, slate and phyllite.¹ Overlying these bedrocks are deposits of varying depth glacial till and colluvial material derived from the bedrock.

The attributes of the soils can be summarised as²:

- Fine in texture, susceptible to erosion and debris flow under conditions of steep slopes and high rainfall. This is exacerbated by the inclusion of mica particles, which have offer little adhesion or structural strength;
- 'Moist' to 'very wet' Soil Moisture Regime;
- Soil Nutrient Regime is 'poor' to 'medium' across the site, with pockets of higher fertility especially below the ~400m elevation contour which may reflect the inherent moderate potential nitrogen availability associated with the parent rock material.

The steep slopes are prone to slope instability. This is a particular concern above the A83.

Analysis has revealed that slope slippage tends to begin on the upper slopes, and then slide down the watercourses, gathering debris as it goes.

In 2012, Bill Rayner and Bruce Nicoll of Forest Research prepared an 'Assessment for potential woodland restoration north of the A83 in Glen Croe to reduce the incidence of water erosion and debris flows'. It is this assessment that forms the basis of the new woodland proposed in this LMP.

Analysis of these baseline factors has strongly influenced the purpose of woodland, the extent of woodland and the woodland types proposed. The overriding objective for the establishment of new woodland is to potentially contribute to the future stabilisation of the slopes by reducing the incidence of water erosion and debris flows and in turn potentially reduce the frequency and/or severity of road closures along the A83.

¹ Rayner, Bill and Nicoll, Bruce, (2012) 'Assessment for Potential woodland restoration north of the A83 in Glen Croe to reduce the incidence of water erosion and debris flows', Forest Research

² As above

The techniques for establishment and the woodland type proposed have been informed by the report 'Assessment for Potential woodland restoration north of the A83 in Glen Croe to reduce the incidence of water erosion and debris flows.'³ . The detailed operational prescription for species choice and planting densities will be provided by Forest research prior to planting.

1.2. Climate

The climatic changes affecting the potential planting in the area can be summarised using the Forestry Commission ESC⁴ analysis as follows:

- The accumulated temperature assessment indicates that the site is at the lower end of the temperature range suitable for the ready establishment of native broadleaves
- The moisture deficit assessment indicates that there is unlikely to be drought conditions on this site
- The assessment of exposure indicates that once above the level of ~450m contour elevation, exposure alone will hinder the establishment of all tree and shrub species on this site; and
- The site has an oceanic climate pattern, indicating that it has warm, moist summers and cool, wet winters.

Analysis of this information, along with soil type and site objectives, has been used to inform the species choice for the planting proposals.

In terms of climactic constraints, planting of continuous cover conifer species is ruled out due to the high risk of exposure which is likely to increase the incidents of wind throw. The preference is for the establishment of native broadleaved tree and shrub species, with an emphasis on smaller growing species that are less subject to wind throw.

1.3. Water and riparian woodland

There are no private water supplies taken from this land.

When planting is carried out outwith the core project area, the Forest and Water Guidelines (2011, fifth edition) will be strictly adhered to. Most of the

³ Raynor, Bill and Nicoll, Bruce, (2012) 'Assessment for Potential woodland restoration north of the A83 in Glen Croe to reduce the incidence of water erosion and debris flows', Forest Research

⁴ Payne et al, Ecological Site Classification, Forest Research

water courses in the core project area are temporary in nature and Native broadleaves planted across watercourses on steep slopes will have very limited adverse and potentially positive impacts. Stabilisation of gullies by planting is crucial.

The land considered for planting includes the upper catchment of the Croe Water, which currently has very little woodland cover.

Analysis of this information indicates that while the Croe Water catchment is not within a SEPA priority catchment for water management, the establishment of woodland within this upper catchment to reduce potential sudden increases in water flow downstream should be considered.

2 Analysis of current land use and management

2.1 The existing vegetation and land use

This plan covers an area of 724ha, all of which is currently grazed by stock (sheep and cattle). In addition, an unknown transient deer population is known to graze on this land. Recent helicopter deer counts identified no deer across the site in February 2018.

It is difficult to assess the implications of the current grazing patterns on slope stability, as there is no record of the changing pattern of grazing levels, and it is difficult to separate grazing from other factors. In addition, grazing may be preferential, with some species preferring specific areas, and at different times of year, so that it is difficult to determine consequences.

However, it is recognised that grazing by stock and deer can alter ground vegetation, create areas of intense trampling and cause a decline in heather cover that may in turn be replaced with vegetation of poorer soil binding qualities.

It is noted that in some of the less accessible areas, including along the A83 between catch fences and the road, there is some natural regeneration of native broadleaved species. There is also some existing broadleaved riparian woodland along the Croe Water.

The slopes above the A83 are also subject to intervention work to limit or mitigate against the potential instability of the slope. This includes various engineering interventions, the most visible of which is catch fencing.

Analysis of the current land use indicates that a reduction in stocking may at least remove the potential for erosion exacerbated by animal tracks, selective over grazing and sheep rubbing. It is also likely to assist in changing the vegetation, including the potential establishment of vegetation which may assist in soil binding alongside appropriate woodland cover.

There is also evidence that the site has the potential for natural regeneration, with Downy Birch, Rowan and Small Eared Willow present on site. Removal of grazing pressure will assist natural regeneration, and help consolidate the riparian woodland along the Croe Water.

2.2 Site access

There are no access routes currently on this site. There is some informal access (see map M2), which has been used for site survey, this is not a formal made up route.

Access is currently required to manage stock, and by those involved in the geological survey and engineering works associated with slope stabilisation.

To establish woodland, access will be required to:

- Bring materials, plants and people onto site
- Build the fence
- Prepare ground for planting
- Plant the trees and shrubs
- Carry out any works required during the establishment phase of the woodland.
- Monitoring & research.

The geology and soil types indicate that due to the significant risk of land slippage, it would not be appropriate to excavate and build roads on this site, or to bring machinery onto the site.

Analysis of access options has concluded that the best option is to airlift materials and plants to limit the need for access tracks.

Ground preparation and planting will be undertaken by hand, as no machinery is available to work in these ground conditions.

There will be a need for an ATV track within the glen of the upper Croe Water, to allow for ongoing access for any future deer management or other works associated with establishing the woodland. This should be designed to limit visual impact and use “as dug” material. Access to the edge of the project area via Butterbridge plantation would have low impacts and would greatly aid the activities as detailed above. The proposed access track along the Croe Water will follow the Upland Pathwork: Construction Standards for Scotland 2015 & SNH. Constructed tracks in the Scottish Uplands. SNH 2015(updated).

2.3 Landscape, landscape designations and visibility

The proposed new woodland lies wholly within the Loch Lomond and The Trossachs National Park.

The special qualities⁵ that relate to this area of the Park (‘The Argyll Forest’ area) make reference to the ‘high hills’ and ‘deep glens’ as well as the ‘forests and trees’ that are a key characteristic of this landscape.

The report draws particular attention to the ‘remoteness and stillness’ of the Arrochar Alps, and the ‘dramatic pass’ of the Rest and Be Thankful, with its view framed by the steep hillsides and its historical significance, indicating that these aspects of this landscape are valued.

Landscape character

Glen Croe lies within the ‘Forested Hills’ landscape character type, as described in The Loch Lomond and The Trossachs National Park Landscape Character Assessment (SNH, 2005). The opportunities for change identified in this character type reflect its location as a transition between low lying farmed glens and the more wild and open higher hills. The landscape character assessment suggests that opportunities for landscape change⁶ should include:

- Create graded naturalistic transitions between the upper edge of the forest margins and surrounding open landscapes
- Promote landscape and ecological diversity

⁵ Scottish Natural Heritage and Loch Lomond and The Trossachs National Park Authority (2010). The special landscape qualities of the Loch Lomond and The Trossachs National Park. Scottish Natural Heritage Commissioned Report, No.376 (iBids and Project no 648).

⁶ Environmental Resources Management (2005). Loch Lomond and the Trossachs landscape character assessment. Scottish Natural Heritage Commissioned Report No. 093 (ROAME No. BAT/AA302/00/01/123).

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- Encourage a high proportion of native species
- Limit the impacts of infrastructure such as roads, through the use of temporary tracks
- Consider the use of airlifts to deliver materials to sensitive locations

The National Park Authority has also published a 'Wildness study'⁷ and this suggests that while the hill summits may indeed be perceived as relatively 'wild', the sides of the glens, and the lower glens are perceived as medium to low relative wildness.

Analysis indicates that native species planted in a relatively natural pattern, with a naturalistic upper margin, possibly augmented by regenerating native woodland, would fulfil the opportunities for change identified in the LCA, and form a naturalistic transition between the farmed glens and more open and 'wilder' uplands.

Semi-natural woodland as proposed would over time extend the sense of wildness downslope from the hill summits and ridges, the new woodland in effect acting as a buffer between the busier glen floor and the elevated hinterland.

Woodland on the side slopes of Glen Croe would not detract from the topographical 'framing' of the view from the Rest and be Thankful, and the small size of trees recommended for this site will emphasise the vertical drama of the hillside, as they will exaggerate the perceived height of the slope relative to the height of the trees.

Nevertheless, introducing deer fencing into this landscape, especially at the upper elevations will impact on the perceived sense of wildness especially as experienced along the ridges and from summits, which are popular walking routes.

Note that no forest roads are proposed, only a single simple ATV track (see map M7), is proposed for the project area, with two small spur extensions within the Butterbridge Forest to facilitate access. The proposed new ATV track within the project area will occupy the lower hill slopes within the side glen of the upper reaches of the Croe Water and therefore will not impact on the perceived sense of wildness experienced at higher elevations.

⁷ Carver et al, (2011). Wildness Study in the Loch Lomond and The Trossachs National Park

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Visibility and Views

The proposed new woodland is highly visible, as it occupies steep slopes above the A83 overlooked by the Rest and Be Thankful viewpoint (see Map M4 – Landscape Analysis – & Map M1 Location and Viewpoints)

In addition, it is proposed to extend woodland into the glen of the upper catchment of the Croe Water. While this is less widely visible, this area of woodland will be visible from the elevated walking routes linking The Cobbler, Bein Ime and Beinn Lubhean.

The woodland can therefore be seen from:

- The Rest and Be Thankful viewpoint, which is a popular viewpoint where visitors stop and admire the panoramic view down the length of Glen Croe. This is therefore the most significant viewpoint in terms of both visitor numbers and prolonged visibility – it is a sustained view. The woodland is also likely to feature in photographs from the viewpoint.
- The A83, travelling along the length of Glen Croe, although only the lower edge of the woodland and the deer/ catch fences will be visible, as the upper slopes will be screened by the growing trees. Note that drivers and passengers travelling along the road tend to focus on the view along the length of the glen
- The Cobbler (Ben Arthur), a well-known and popular summit and Beinn Luibhean, from where views will be oblique, foreshortened and partial, and from where the woodland will occupy only a small and relatively insignificant part of an extensive panorama
- From the high level path between The Cobbler with Beinn Ime at Bealach a'Mhaim, where views of woodland established in the upper catchment of the Croe Water will be visible within the side glen, visually foreshortened.
- The fences are likely to be visible from the high level viewpoints, especially the path between the Cobbler and Bein Ime and the access route to Beinn Luibhean

Analysis of these viewpoints on site has led to the identification of 7 viewpoints (See Map M1) which have been used to illustrate the proposed new planting proposals. These were selected on the basis of amount of visibility and the significance of views.

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These viewpoints are:

VP No	Name	X_Coord	Y_Coord
1	R&BT Car Park/Viewpoint	223017	707350
2	A83 Approach to Site from South	224707	704650
3	Ben lme Path close to summit	225657	708313
4	Ben lme path at Coll	226200	706923
5	Ben Arthur	225938	705872
6	Core Path in FE woodland to the west	223744	705473
7	Beinn an Lochain	221851	707965

2.4 Biodiversity

Habitats and species

PAT modelling suggests that the area proposed for planting lies largely between Golden Eagle hunting ranges. An assessment of impacts on Golden Eagles has been undertaken to complement the results from the PAT model using local expert assessments. This assessment is included in the LMP as Appendix 4.

With prey availability being a limiting factor for many Eagle pairs in the area then the creation of a diverse natural treeline and maintaining ridges as open ground offers scope for enhancing Eagle habitat. Live prey is particularly essential during the breeding season, and a more diverse habitat can provide a range of potential additional feed sources that Eagles feeding young are happy to take advantage of.

The removal of sheep is likely to diminish the supply of carrion and possibly lambs as live prey.

The scattered trees and varied density of woodland along the outer margins have been identified as potentially an important habitat for Black Grouse.

A Protected Species Survey has been completed and is contained in appendix A11. An assessment of the site ecology via an extended Phase 1 Habitat survey will be undertaken prior to planting commencing in order to fine tune the design and avoid any features of ecological interest, with the caveat that on the core project area slope stabilisation is the priority. The rationale for deferring the survey is that many features of botanical interest

will be potentially more identifiable post stock removal when the vegetation is recovering.

Appendix 5 considers the impact of the proposal on Skylark and Curlew.

Analysis of these factors suggests that the potential impacts on Golden Eagles are likely to be positive with additional benefits for woodland/edge species such as Black Grouse. A diverse Native Woodland will increase biodiversity and enable the ground flora to persist and diversify. The removal of grazing from high altitude open ground habitats may improve the diversity and resilience of these areas. Impacts on Skylark & Curlew are considered to be not significant, and the proposals have the potential to enhance the habitat for a range of woodland and woodland edge bird species.

2.5 Social factors

Recreation (hill walking access)

This is a very popular area for walking, hill walking and cycling, and is an important focus for outdoor recreation within the LLTNP. The Cobbler, for example, attracts 50, 000 visitors/year, while the LMP area also includes access routes to The Cobbler and Beinn Ime.

The access route closest to the proposed planting is an informal route up The Cobbler (See map M2), which is accessed from an informal car park just off the A83 near to the bridge over the Croe Water.

Analysis of these routes indicates that impacts on access are likely to be negligible, with no existing route being directly compromised by the proposed planting.

The proposed fencing can also be designed to avoid compromising either accessibility, or the views and experience from the path routes. This is especially important on the access route to The Cobbler, where fencing comes close to the path. In addition, where the fencing crosses the higher reaches of Beinn Luibhean, or comes close to the pass at Bealach a'Mhaim, it will be important to ensure that the fence is low in the field of vision, and wherever possible, is hidden, or partially hidden, by landform and rock outcrops to mitigate any potential impacts on perceived wildness.

Heritage

There are no identified Scheduled Ancient Monuments on the project area, but a number of shieling group sites are recorded along the Croe Water.

These sites can be readily accommodated into planting plans with appropriate open ground buffers provided to protect the sites and enhance the setting. The nature of the planting and the ground preparation is likely to minimise any adverse impacts on archaeology.

Track formation is the key operation that needs to take full account of the site archaeology.