

# Friends of the Ochils



## Comments on Gleneagles Woodland Creation Scheme

### 1. Introduction

This survey is submitted by the Friends of the Ochils (FotO). It has been prepared by Alistair Godfrey in partnership with FotO and represents work carried out through both site visits and other research. Alistair has over 30 years of experience in environmental work, including woodland management. In 2012, to respond to a proposed sand and gravel quarry development at Glenquey, he surveyed and produced a *Report on Glenquey Moss, Blanket Bogs of the Ochil Hills and Raised Bogs in Perth & Kinross*. This was commended by Scottish Natural Heritage and with this report, FotO and its many supporters swayed opinion in favour of preserving this remarkable natural feature.

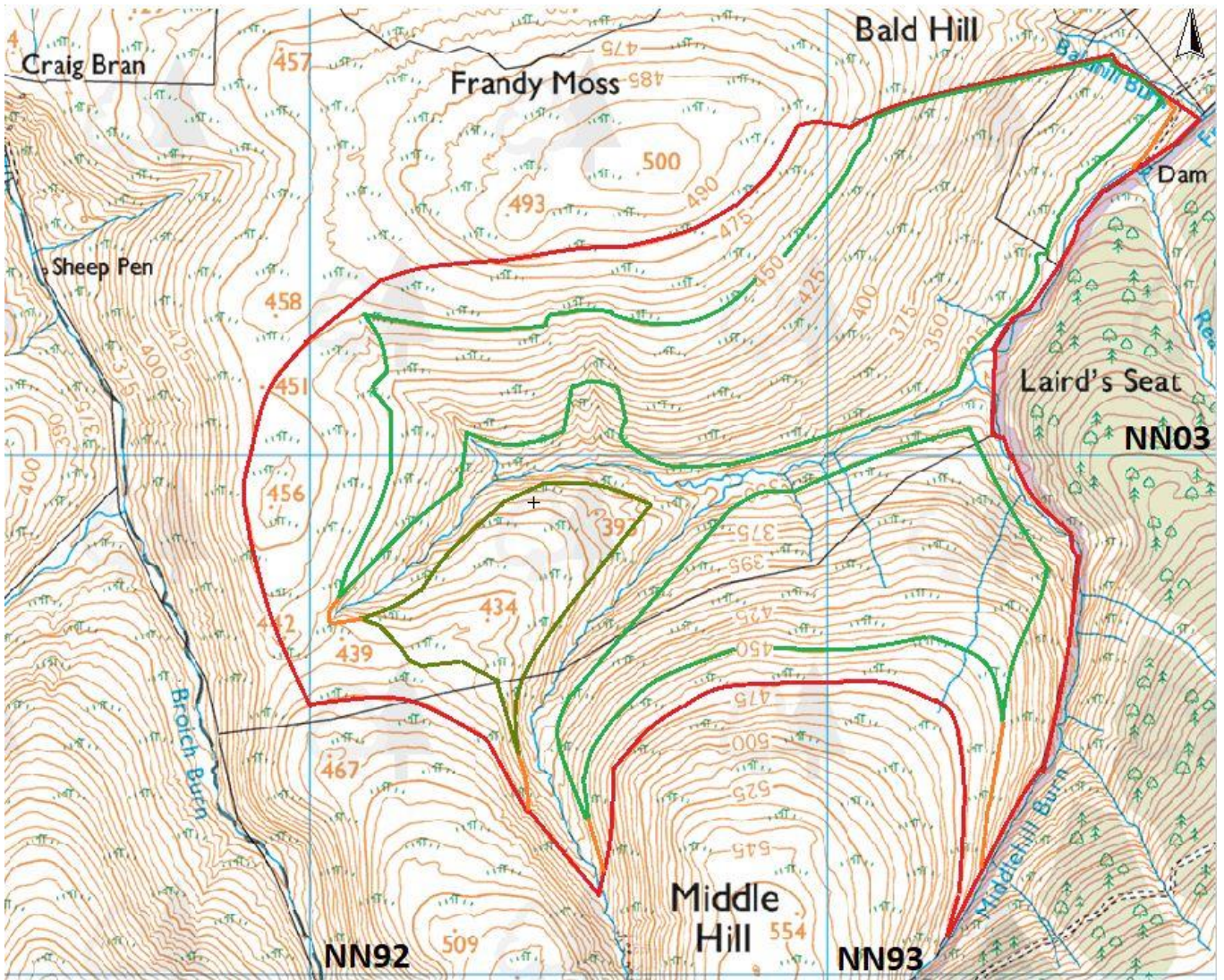
The Friends of the Ochils is a registered charity whose primary aim is the protection of the landscape of the Ochils and the enjoyment of that landscape by those who live and work in and around the hill range, and the many thousands of people who visit the Ochils each year. It was founded in 1993 by Rennie McOwan and has, over many years, responded to applications for developments such as windfarms, powerlines, solar farms, quarries as well as proposals for woodland and forestry development.

We recognize that some change is inevitable in the Ochils but wish to see change that is positive and adds to the visual amenity of the Ochils landscape, and the protection and enhancement of the biodiversity of the hill range. We also aim to protect the historical and social character of the Ochils.

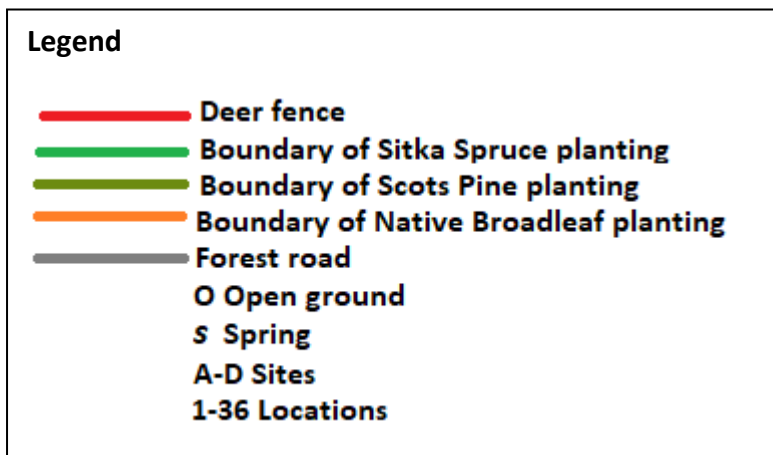
We trust that this survey helps all parties to evaluate this application and to come to a decision on how best to proceed. We believe that it provides a constructive way forward such that any planting can be undertaken that not only meets the interests of the landowner but, at the same time, maintains the character, appearance and biodiversity of this part of the Ochils Special Landscape Area.

### 2. Mapping

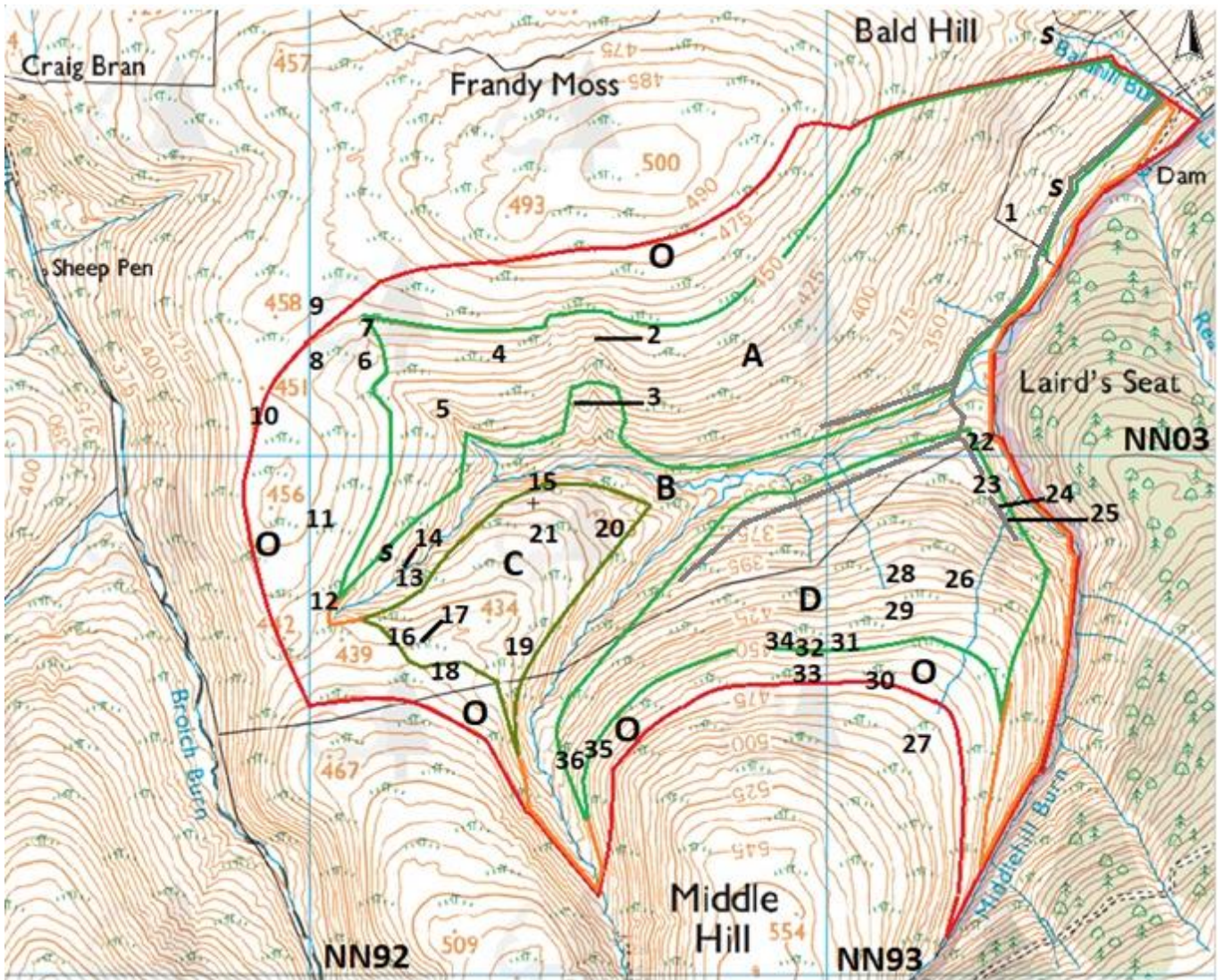
Map 1 is based on the map submitted to Forestry Commission Scotland by Bell Ingram entitled 'Gleneagles Estate Proposed New Planting Frandy' dated 12.7.18 and is at the OS scale of 1:50,000 with 10m between each contour. Mapping at the OS 1:25,000 scale with contours at every 5m is a better reflection of the topography; the steepness of slopes and depth of water bodies. Care has been taken to reproduce the original accurately, but some discrepancies may have arisen in the conversion between scales; however, the reproduction is considered reasonably accurate. Map 2 provides an overlay of annotations for sites and locations mentioned in the text of the comments.



Map 1. Base map for Gleneagles Woodland Creation Scheme at 1:25,000 scale.



Map1 and Map2 have been prepared from a base map on the Native Woodland Survey of Scotland website. This to provide a response to the proposals and for no other purpose. The following appears on the website. © Crown copyright and database rights 2018. Ordnance Survey Licence number 100021242. © Getmapping plc.



Map 2. Annotations for Gleneagles Woodland Creation Scheme at 1:25,000 scale to show areas identified in the following text.



Photo 1. Site A from the south-west. In the background Ben Shee is to the left, 516m AOD at the summit and Innerdownie to the right is 605m AOD at the summit, 20.8.18.

### 3. Landscape

Much of the area outlined in red on Map 2 is visible from the surrounding hills. These are recorded by name with heights in captions of photographs and in the text of the comments. The area outlined in red is visible from the highest hills; Ben Buck, 679m AOD at the summit and Ben Cleuch, 721m AOD at the summit. These hill routes are very popular with local residents and visitors and the views from the summits are held in high regard by all. Walks in the Ochils feature on many websites and in publications.

The Blackford to Tillicoultry right of way (route 21/29/1) asserted by Perth & Kinross District Council on 31.5.1978 passes below the west end of the proposal area and then ascends Skythorn Hill, bringing all of this area into view. More recently, the same route was established as a Core Path, AUCH/53/1 and signposted by Perth & Kinross Council. The route is exactly the same on Ordnance Survey Second Edition surveyed in 1899, which can be seen online from mapping provided by the National Library of Scotland.

[<https://maps.nls.uk/geo/explore/#zoom=17&lat=56.2111&lon=-3.7414&layers=6&b=1>].

### 4. Site Survey

#### 4.1 Site A and upper margins

##### Location A1

Just outside the area marked in red on Map 2, above the enclosed field and below an outcrop of rocks, is a spring that is the source of the Baldhill Burn. The dominant vascular plant of this and other springs in the area is *Montia fontana* (Blinks). Springs in Site A are marked 's' on Map 2, three are marked, with grid references in the text. The grid reference for this spring is NN 9340 0383 at 393m AOD. This spring is also dominated by bryophytes (mosses and liverworts). Springs on Site D are referred to by location number.

Within the enclosed field and within the red boundary, the vegetation is dominated by *Molinia caerulea* (Purple Moor-grass) often with *Trichophorum germanicum* (Deergrass) and with occasional to frequent patches of *Sphagnum capillifolium* (Red Bog-moss) reflecting the peaty and water retentive nature of the underling soil. The *Molinia/Trichophorum* community covers much of the enclosed field and is identifiable as the darker patch of vegetation in Photo 2.

At the top fence line, a patch of *Juncus effusus* (Soft-rush) marks the start of seepage that becomes a deep channel lower down, NN 9343 0356 at 339m AOD. This is visible on Map 2 where there is change in the contour lines. There is a *Montia fontana* (Blinks) spring down the channel with pools of flowing water, NN 9345 0353, at 329m AOD. In addition to the dominant Blinks are *Cardamine pratensis* (Cuckooflower) *Carex flacca* (Glaucous Sedge) *Carex nigra* (Common Sedge) - *Carex echinata* (Star Sedge) at the edge - *Epilobium palustre* (Marsh Willowherb) *Galium palustre* (Marsh-bedstraw) *Galium uliginosum* (Fen Bedstraw) *Holcus lanatus* (Yorkshire-fog) *Lotus pedunculatus* (Greater Bird's-foot-trefoil) *Myosotis laxa* (Tufted Forget-me-not) *Ranunculus acris* (Meadow Buttercup) *Rumex acetosa* (Common Sorrel) *Stellaria alsine* (Bog Stitchwort) and *Triglochin palustris* (Marsh Arrowgrass). The bryophytes present include *Calliargon cordifolium* (Heart-leaved Spear-moss) *Calliargonella cuspidata* (Pointed Spear-moss) and *Philonotis fontana* (Fountain Apple-moss). The pools form a running channel in which *Sphagnum palustre* (Blunt-leaved Bog-moss) is present.

The spring is present in an area of *Juncus acutiflorus* (Sharp-flowered Rush) rush-pasture, notable in the uplands for water channels that convey dissolved minerals containing calcium that enrich vegetation, raise biodiversity, provide habitats for invertebrates and food for

birds. Lists of plants are provided for the locations in the text, but none is a complete list and are intended to provide an impression of the underlying flora worth further study.

At the gate in the north-west corner of the field, NN 9332 0345, 354m AOD, the depth of peat was observed to be over 300mm in depth.



**Photo 2. Location A1, enclosed field, in the middle of the photograph, 20.8.18.**

There are successive channels running down the slope south of the enclosed field and can be identified in Photo 2. The deepest is a burn shown on Map 2. *Pteridium aquilinum* (*Bracken*) is present here, but the water channel supports other species; including, *Chrysosplenium oppositifolium* (Opposite-leaved Golden-saxifrage) *Cardamine pratensis* (Cuckooflower) and *Stellaria alsine* (Bog Stitchwort).

### **Location A2**

The burns of Location A2 and A3 are within the proposed planting of *Picea sitchensis* (Sitka Spruce). The catchment of the two burns is wide and can be identified by the surrounding contours on Map 2 and the channels in Photo 4. These burns are connected to active blanket bog on the higher slope. Photo 3 was taken at NN 9255 0315, 431m AOD.

The flow of water has cut deeply into the slope over the years and has exposed some of the bedrock. The flora at this location is dominated by species of rush (*Juncus* spp.). *Cirsium palustre* (Marsh Thistle) grows within this vegetation, a species that is characteristic of burn-sides and seepages in the Ochil Hills. These plants largely avoid being eaten by sheep and the nectar of their flowers provide a benefit for several insect species. Noted at this location were; 1 Peacock butterfly (*Aglais io*) 1 Silver Y moth (*Autographa gamma*) and two species of Bumble-bee (*Bombus* spp.). Like other species of thistle, Marsh Thistle requires a relatively open setting in which to grow and flower.

### **Location A3**

This is the second water-course, parallel to the burn of Location A3, and not identified on Ordnance Survey maps at 1:25,000 scale, but visible on aerial imagery and in Photo 4.



**Photo 3. Location A2, NN 9255 0315, burn with flowing water, 20.8.18.**



**Photo 4. Location A2 and A3 from Middle Hill, 25.8.18.**

#### **Location A4**

The grid reference for this location is NN 9241 0317 at 436m AOD, west of the two burns. In excess of 250mm of peat was observed below a cover of *Molinia caerulea* (Purple Moor-grass) and *Nardus stricta* (Mat-grass) with a little *Vaccinium myrtillus* (Blaeberry). *Juncus squarrosus* (Heath Rush) *Trichophorum germanicum* (Deergrass) and *Potentilla erecta* (Tormentil) were associates in the immediately surrounding area.

## Location A5 and A6

Further west is a deeper burn with a large catchment and extensive flora. The following photograph was taken at NN 9226 0308, 417m AOD. This location overlooks Site C to the south, surrounded by burns on both sides and overlooks part of Site D behind on the slopes of Middle Hill. Middle Hill is 556m AOD at the summit, part of Skythorn Hill is on the right, its summit is 601m AOD, and the summit of Tarmangie Hill in the distance to the left is 645m AOD.



**Photo 5. Location A5, burn at NN 9226 0308 with flowing water, 20.8.18.**



**Photo 6. Location A6, at branch in the burn, NN 9212 0319, 20.8.18.**

Photo 6 was taken higher up the slope than Photo 5 at a branch in the burn that is not obvious on Ordnance Survey mapping at 1:25,000 scale. This branch is located at NN 9212 0319, 443m AOD. A better view is from aerial photography, such as on Google Maps.

The National Library of Scotland provides an excellent layer of aerial imagery under a layer of Ordnance Survey mapping. This link is to the OS Six Inch Second Edition, surveyed in 1899 and published in 1901. [<https://maps.nls.uk/geo/explore/#zoom=17&lat=56.2111&lon=-3.7414&layers=6&b=1>]. OS mapping is superimposed on digital aerial mapping to provide a 'georeferenced' comparison.

The branch on the right in Photo 6 is fairly straight and connects the bottom of parallel ditches dug into Frandy Moss at some point. When the photograph was taken there was no water running in the right-hand branch, but there must be sub-surface flows when water is not running on the surface. There was an appreciable flow in the left-hand branch that continued upwards to NN 9207 0321 at 446m AOD, beyond which are pools of standing water. The georeferenced map provides a good view of the extent of Frandy Moss, which is blanket bog, and the channels that have been cut into it. Location A6 appears to be just outside the proposed area for planting Sitka Spruce.

Using georeferenced mapping, the grid reference for the middle of this ditch system where it meets the right-hand channel is NN 9211 0328, equivalent to 455m AOD. This is 5m above the extent of proposed planting of Sitka Spruce, but areas of deep peat immediately to the east and most of the catchment of the burn are within the area of proposed planting.

Photo 7 following illustrates the parallel system of drains on Frandy Moss. The continuation of the branch of the burn to the right in Photo 6 is below the line of exposed peat in Photo 7. There is exposed peat below the lowest drain of the parallel system and two extensive areas of exposed peat between the second and fourth lowest drains.



**Photo 7. Looking eastwards over the system of drains on Frandy Moss 20.8.18.**



## Location A7

The grid reference of this location is NN 9212 0326 at 454m AOD and marks an exposure of peat demonstrated in the following photographs.



**Photo 8. Location A7, NN 9212 0326, peat depth, 20.8.18.**



**Photo 9. Location A7, NN 9212 0326, peat depth on rule at top of exposure, 20.8.18.**

The bottom of the rule is situated on the contact between the bottom of the peat and a layer of fragmented rock that can be seen in Photo 8. The top of the exposure is below the top of the vegetation behind and brings the depth of peat to over 500mm.

Using NLS georeferenced mapping, this location can be identified as above the third lowest drain on the parallel system and also visible as the greatest extent of peat exposure in Photo 7. This appears to be the apex of the proposed planting of Sitka Spruce which would place the proposed area immediately to the east of this depth of peat.

### Location A8

The depth of peat increases higher up the slope, which is outside the proposed area of planting. A depth of peat of over 700mm was measured at an exposure on a hag at NN 9202 0331, 452m AOD. This is location A8 and is identified in the following photograph.

The bottom of the tape is situated on wet peat and there is an obvious depth of peat below this level. The top of the exposure is just below 700mm from the bottom of the tape.



**Photo 10. Location A8, NN 9202 0331, peat depth, rule at top of exposure (insert) 20.8.18.**

### Location A9

The peat hags are surrounded by pools filled with *Sphagnum fallax* (Flat-topped Bog-moss) that rest on the rounded ridge of the western extent of Frandy Moss. An example of an extensive pool is Location A9; NN 9201 0329 at 459m AOD.

The pool in Photo 11 overlooks the catchment of the burn to Location 10 and active bog that continues southwards. The hills in the background from left to right overlooking Location 9 are: Cairnmorris Hill, 606m AOD at the summit; Middle Hill, 556m AOD at the summit; Skythorn Hill 601m, Andrew Gannel Hill, 670m AOD at the summit and the shoulder of Grodwell Hill, 571m AOD at the summit.



**Photo 11. Location A9, NN 9201 0329, Sphagnum filled pool, 20.8.18.**

#### **Location A10**

Location 10, NN 9192 0331 at 452m AOD, is the furthest extent of the catchment to the south-west from Location A6. The catchment of both branches of the burn leading to this location is captured in Photo 12 and 13. The distance between Location A9 and A10 at the edges of the catchment is 230m. Location A10 is defined by a change in topographic level and level of the vegetation, as illustrated in Photo 14.



**Photo 12. Location A10, NN 9192 0331, edge of catchment, 20.8.18.**



**Photo 13. Reciprocal view of catchment from Middle Hill, 25.8.18.**



**Photo 14. Location A10, NN 9192 0331, transition, 20.8.18.**

### **Location A11**

The extent of continuation of the transition from the edge of the catchment at Location A10 continues southwards to A11; NN 9201 0291 at 455m AOD. The nature of the plant community between A10 and A11 is set out in the following section.

## Plant communities of Location A9 to A11

Most of this area is mapped as Dry modified bog (E1.8) in the *Gleneagles Woodland Creation Scheme Environmental Surveys*. This category and others are defined in the publication of the Joint Nature Conservation Committee: *Handbook for Phase 1 habitat survey A technique for environmental audit* (JNCC, 2010).

This is a useful tool, but it has its limitations, depending on the complexity of plant communities within an area and interpretation of them. In these circumstances the use of National Vegetation Classification is required as set out in the series *British Plant Communities* edited by Professor John Rodwell.

The approach to the assessment of the sites under discussion can be more easily understood by identifying and understanding the functionality of the plant communities present. These should be considered not only in current terms, but how they might change under different management and processes over a longer period of time.

The importance of peat in storing damaging greenhouse gases is an increasingly important consideration in helping to moderate the impacts of climate change. Initiatives have been undertaken in Britain to improve this holding capacity on bogs where erosion has taken place; to increase water retention to promote the growth of *Sphagnum* to lay down peat. The ability to store water to slow down rates of flow into lower catchments is recognised as an important consideration in flood control, the need for which is driven by climate change. These contributions have come to be known as 'Ecosystem Services'.

The plant communities on the broad ridge of Frandy Moss are fed by rainwater; there is no other input. Location 9 as shown Photo 11 is a bog pool with *Sphagnum fallax* (Flat-topped Bog-moss) and *Sphagnum cuspidatum* (Feathery Bog-moss) in deeper water. *Sphagnum fallax* (Flat-topped Bog-moss) forms mats, also referred to as 'lawns' over several hectares among the peat hags on this ridge. These mosses retain water, help to slow down run-off and initiate the restoration of bare peat to functioning bog. *Sphagnum capillifolium* (Red Bog-moss) is present, often as hummocks and *Sphagnum papillosum* (Papillose Bog-moss) is present in the wider area. They are peat builders and contribute to the growth of a bog, sequestering atmospheric carbon as they do so.

Although ericoid shrubs are present in the catchment area - *Calluna vulgaris* (Heather) *Vaccinium myrtillus* (Blaeberry) *Erica tetralix* (Cross-leaved Heath) - they are not dominants. Species of inundated soils in this upper and middle catchment include *Carex echinata* (Star Sedge) *Carex leporina* (Oval Sedge) *Carex nigra* (Common Sedge) *Eriophorum vaginatum* (Hare's-tail Cottongrass) *Juncus conglomeratus* (Compact Rush) *Juncus effusus* (Soft-rush) *Juncus squarrosus* (Heath Rush) *Molinia caerulea* (Purple Moor-grass) *Trichophorum germanicum* (Deergrass) and the moss *Polytrichum commune* (Common Haircap).

The plant community from Location A10 to A11 is more dominated by *Trichophorum germanicum* (Deergrass) but the two peat-building *Sphagnum* species mentioned are also present. *Calluna vulgaris* (Heather) *Vaccinium myrtillus* (Blaeberry) *Erica tetralix* (Cross-leaved Heath) and *Empetrum nigrum* (Crowberry) are present but none of these shrubs dominates the rest of the plant community. *Eriophorum angustifolium* (Common Cottongrass) and *Eriophorum vaginatum* (Hare's-tail Cottongrass) are present. *Deschampsia flexuosa* (Wavy Hair-grass) *Polytrichum commune* (Common Haircap) and *Rhytidiadelphus loreus* (Little Shaggy-moss) are present.

The grid reference for A11, NN 9201 0291, marks the southern extent of this community, but this is not on a straight line, more an uneven edge reflecting hydrology. Some of the members of the plant community between A10 and A11 are retained below this transition, where *Juncus squarrosus* (Heath Rush) becomes dominant and Sphagnum species are absent.

### Location A12

Photo 15 was taken at this location, NN 9203 0269 at 436m AOD to illustrate the steepness of the slope of the burnside on the upper reach between Site A and C. The slope was measured as 30° at this location.

### Summary of Site A

The ecosystem services plant communities provide in the upper catchment should not be reduced by future operations. The ability of bog habitat to regenerate naturally or assisted by future initiatives to restore eroding peat and lay down more carbon should not be compromised. Fencing off part of Frandy Moss may be beneficial by removing grazing, but what is not fenced off would come under increased pressure if grazing in this area is to continue.

The planting of *Picea sitchensis* (Sitka Spruce) within the upper catchment and close to water courses would be damaging; at the preparation stage, later by deep shading and most of all by harvesting. While the bulk of planting is restricted more to acid grassland, these slopes are fairly steep. Peat is present under *Molinia caerulea* (Purple Moor-grass) and *Trichophorum germanicum* (Deergrass) and no matter its depth, peat is bound to be lost or oxidised between preparation and harvesting.

These two species are also present in the enclosed field that is enhanced by ground water flows: *Picea sitchensis* (Sitka Spruce) is not the best option for this field. Having such a large block of Sitka Spruce would detract from the more naturalistic planting east of the Frandy Burn and from the viewpoints of several surrounding summits.



Photo 15. Location A12, NN 9203 0269, steepness of slope, 20.8.18.

## 4.2 Site B

Site B covers the burnside of the upper reach between Site A and Site C. Photo 15 also illustrates the dryness of the north side of the burn on the left with the wetter on the right. The darker vegetation on the right and bottom of the burn are occupied by species of Rush (*Juncus* spp.) and provide a continuum. *Juncus acutiflorus* (Sharp-flowered Rush) fills the gullies on the right and conveys dissolved minerals within the water it conducts down the slope. *Galium uliginosum* (Fen Bedstraw) is frequent throughout the rush community and other communities, reflecting enhancement of the soil pH.

### Location B13

Dissolved minerals are conveyed beyond the rushes into flushed open habitat above the burn. Location B13, NN 9220 0277 at 417m AOD is an example that includes *Carex flacca* (Glaucous Sedge) *Carex pulicaris* (Flea Sedge) *Galium uliginosum* (Fen Bedstraw) and *Selaginella selaginoides* (Lesser Clubmoss). The first is described as a “species of calcareous grasslands” and flushes: *Sedges of the British Isles* (Jermy *et al.*, 2007).

British Geological Survey online mapping identifies the underlying geology of Site C as ‘Basaltic-andesite’ at 1:50,000 scale. This is presumably the source of mineral enrichment. Types of ‘Basaltic-andesite’ also underly the north side of of the burn.



**Photo 16. Location B13 and B14, 20.8.18.**

Photo 16 shows the waterfall with Location B14 immediately above on the right and the flushed slope of Location B13 a little further upstream on the left of the burn.

### Location B14

This location is just above the falls on the burn at NN 9221 0279, 403m AOD. *Thymus polytrichus* (Wild Thyme) grows on the rock outcrop on the north bank, surrounded by *Linum catharticum* (Fairy Flax) with herb-rich grassland above. This includes flushed species: *Carex echinata* (Star Sedge) *Carex flacca* (Glaucous Sedge) *Carex nigra* (Common Sedge) *Galium uliginosum* (Fen Bedstraw) and *Selaginella selaginoides* (Lesser Clubmoss); the

grasses *Cynosurus cristatus* (Crested Dog's-tail) and *Festuca rubra* (Red Fescue) with some *Nardus stricta* (Mat-grass) and *Holcus lanatus* (Yorkshire-fog); and forbs *Cirsium palustre* (Marsh Thistle) *Galium verum* (Lady's Bedstraw) *Potentilla sterilis* (Barren Strawberry) *Prunella vulgaris* (Selfheal) *Ranunculus acris* (Meadow Buttercup) *Scorzoneroideis autumnalis* (Autumn Hawkbit) *Trifolium pratense* (Red Clover) and *Viola riviniana* (Common Dog-violet). Ants are nesting in this herb-rich grassland and grasshoppers scramble through the sward. Outcrops of rock lower down the burnside may have *Thymus polytrichus* (Wild Thyme) but there may be few or no other plants indicative of more calcareous conditions.

Location B is fed by a *Montia fontana* (Blinks) spring higher up the slope within Site A; NN 9217 0281 at 418m AOD and a connecting channel between. The spring is shown on Map 2.

### Location B15

This location is a large crag on the lower section of the burn between Site A and C; NN 9246 0295 at 389m AOD, the biggest rock outcrop within the proposal area. *Thymus polytrichus* (Wild Thyme) is present on the rock face, but the flora otherwise reflects fairly acidic conditions.

There are two trees at the top of the crag which have arisen from natural regeneration; a mature, spreading *Betula pubescens* (Downy Birch) and a younger, but mature *Sorbus aucuparia* (Rowan) which supports a large nest.



**Photo 17. Site B from the east, with the crag at Location B15, NN 9246 0295, 20.8.18.**

Plants of note on the crag face are two species of fern; *Phegopteris connectilis* (Beech Fern) and *Polypodium vulgare* (Polypody) *sensu stricto*. *Luzula sylvatica* (Great Wood-rush) adorns the top of the crag like a turf and several plants of one of the many species of *Hieracium* (Hawkweed) grow out of fissures in the rock. *Rubus saxatilis* (Stone Bramble) is represented by one plant and would have been bird-sown in the same way as the Rowan.

The crag is a refuge from grazing. Stone Bramble is a rare plant in the Ochils and last recorded in 1995. Beech Fern is distributed thinly in the Ochils and this is the first record for



this tetrad (2km x 2km square) NN90F. Only three of the other eight surrounding tetrads have records for this species.

### Summary of Site B

A native woodland planting would provide benefits, but water-flows from the rush pastures should not be interrupted: these are shown in Photo 18. Planting should be avoided on more neutral soils; the more base-rich flushes beside the burn as described and herb-rich grassland, such as Location B14 and its connection.

### 4.3 Site C



**Photo 18. The north-west facing slope of Site C, 20.8.18.**

Site C is a contrast between the steeper, drier grassy slopes where *Nardus stricta* (Mat-grass) is a dominant and the gentler slopes, hollows, channels and broad central axis of the site covered and filled by vegetation of wetter conditions that constitute the majority of the vegetation cover of the site, as reflected in Photo 18.

A first visit raised intriguing questions about the exact nature of the vegetation of the broad central axis. A subsequent visit confirmed this is blanket bog of a considerable extent.

Site C is the bottom of Skythorn Hill. There is a plateau between two higher features above the plateau and the blanket bog is situated between and behind these features. No bog is visible on the long slope of Skythorn Hill until just above Site C and the bog on site C is a continuation.

The expanse of the bog is visible for most of its extent in Photo 19. Also visible is the extension of the bog on to the slope among features of ancient erosion. This extension is linked to the rush pastures leading further down the slope and to the burn at the bottom.

On the higher level, features are shared with the vegetation of Frandy Moss where there are drops in level along straight lines, indicating removal of peat at some time in the past. Also shared are the water-filled hollows of *Sphagnum fallax* (Flat-topped Bog-moss).



**Photo 19. Site C, terminus of Skythorn Hill looking south with blanket bog extent, 25.8.18.**



**Photo 20. *Sphagnum fallax* soakway below bench of higher bog, 25.8.18**

#### **Location C16**

There are pockets of moss within the bog as well as soakways. Location C16 is at the western boundary of Site C, NN 9218 0265 at 435m AOD, where a pocket of *Sphagnum fallax* (Flat-topped Bog-moss) was probed to penetrate its depth. A depth of 550m was met before reaching an impenetrable layer. There are considerable patches of this moss at this

location among *Juncus squarrosus* (Heath Rush) with alternating tussocks of *Trichophorum germanicum* (Deergrass) and *Eriophorum vaginatum* (Hare's-tail Cottongrass).



**Photo 21. Sphagnum penetration at Location C16, NN 9218 0265, 20.8.18.**



**Photo 22. Sphagnum depth measurement at Location C16, NN 9218 0265, 20.8.18.**

Photo 23 demonstrates an exposed peat depth of over 500mm, just outside Site C, but within the boundary marked red on Map 2.



Photo 23. Exposure in excess of 500mm peat adjacent to western extent of Site C, 25.8.18.



Photo 24. Peat penetration at location 17, NN 9221 0265, 25.8.18.

**Location C17**

Location 17, NN 9221 0265 at 433m AOD is close to Location 16, but the nature of the vegetation is different. A peat depth of 400mm was obtained between two hummocks of *Sphagnum capillifolium* (Red Bog-moss) among other hummocks of similar age and tussocks of *Eriophorum vaginatum* (Hare's-tail Cottongrass). *Sphagnum papillosum* (Papillose Bog-moss) is present in the wider area.



Photo 25. Peat penetration at location 17, NN 9221 0265, 25.8.18.



Photo 26. *Sphagnum papillosum* (Papillose Bog-moss) surrounded by *Sphagnum capillifolium* (Red Bog-moss) interspersed with shoots of *Aulacomnium palustre* (Bog Groove-moss) 25.8.18.

## Location C18

*Sphagnum papillosum* (Papillose Bog-moss) and *Sphagnum fallax* (Flat-topped Bog-moss) are present in a pool at the head of a soakway at this location, NN 9225 0258 at 443m AOD. This is just outwith the proposed area of planting and within the red boundary marked on Map 2.



**Photo 27. Location 18, NN 9225 0258, bog pool and soakway, Middle Hill behind, 20.8.18.**

The pool is enriched with a flushing of dissolved mineral from bedrock. This is reflected by the considerable presence of *Carex panicea* (Carnation Sedge) with *Carex pulicaris* (Flea Sedge) indicating an enhanced pH and greater in cover than *Carex echinata* (Star Sedge) present. *Carex demissa* (Common Yellow-sedge) and *Selaginella selaginoides* (Lesser Clubmoss) also reflect the change in cover. Also present are *Drosera rotundifolia* (Round-leaved Sundew) *Erica tetralix* (Cross-leaved Heath) *Eriophorum angustifolium* (Common Cottongrass) and *Viola palustris* (Marsh Violet).

*Sphagnum papillosum* (Papillose Bog-moss) is also present below the soakway and *Sphagnum capillifolium* (Red Bog-moss) in addition. This cover of Sphagnum continues to the fence and beyond.

## Location C19

This channel was encountered at NN 9242 0262, 419m AOD. Its origin is slightly down the broad axis of the site and is visible as the lower of two channels in Photo 28. At this location the plant community comprises *Juncus effusus* (Soft-rush) and *Juncus squarrosus* (Heath Rush) with the moss *Polytrichum commune* (Common Haircap). *Molinia caerulea* (Purple Moor-grass) is scarce, but the following grasses are represented on drier parts; *Agrostis vinealis* (Brown Bent) *Anthoxanthum odoratum* (Sweet Vernal-grass) *Deschampsia flexuosa* (Wavy Hair-grass) and *Festuca ovina* (Sheep's-fescue). *Galium saxatile* (Heath Bedstraw) and *Potentilla erecta* (Tormentil) are present but scarce and *Carex nigra* (Common Sedge) is scarce, but becomes dominant lower down with *Trichophorum germanicum* (Deergrass).



**Photo 28. Channels of Location C18 and C19 on the south facing slope of Site C, 25.8.18.**

On the steep slopes there is a deep sward of *Nardus stricta* (Mat-grass) grassland that mixes with *Carex nigra* (Common Sedge) in the wetter channel and *Molinia caerulea* (Purple Moor-grass) is occasional below.

#### **Location C20**

This location is at the top of the long, deep post-glacial erosion channel at the foot of Site C, NN 9256 0283 at 389m AOD.



**Photo 29. The deep channel of Location C20 at the foot of Site C, 25.8.18.**

The vegetation is similar to Location C19, but with a little more *Molinia caerulea* (Purple Moor-grass). *Carex nigra* (Common Sedge) is also present and *Carex echinata* (Star Sedge) around the edge. Patches of *Juncus effusus* (Soft-rush) are also present and an open area dominated by Sphagnum with a little *Eriophorum vaginatum* (Hare's-tail Cottongrass).

### Location 21

This type of vegetation continues on the adjacent higher slope to the west until there is a marked change in the vegetation; NN 9248 0286 at 407m AOD. *Trichophorum germanicum* (Deergrass) becomes prominent in the stands and *Juncus squarrosus* (Heath Rush) and bryophytes become more dominant where *Sphagnum capillifolium* (Red Bog-moss) is occasional to frequent.

These communities are related to the middle slopes and upper main axis of Site C. The middle and upper slopes contribute to the hydrological regime of the lower slopes below and to the burn between Site A and C.



**Photo 30. The north facing middle slope of Site C, 25.8.18.**

### Summary of Site C

There are substantial areas of *Nardus stricta* (Mat-grass) grassland, particularly on the steepest slopes, but the area of blanket bog and connecting communities hold considerable interest. There are peat depths of over 500mm and the plant communities have a complex underlying hydrology. Disturbance of this hydrology could easily halt or reverse the natural processes taking place, the restoration of peat erosion and the laying down of carbon in new peat. These habitats require protection as those on Frandy Moss.

### 4.4 Site D

This encompasses the lower slopes of Middle Hill. Of the three sites, this provides the most neutral to basic soils of all three. There are reflections of more acidic soils. At the bottom of the eastern extremity below the fence and between the converging burns within Site B,



*Molinia caerulea* (Purple Moor-grass) is dominant with some *Trichophorum germanicum* (Deergrass).

### Location D22

This is at the fence and boundary of the proposed planting of *Picea sitchensis* (Sitka Spruce) NN 9330 0303, 347 AOD. The mosses at this location that give under foot reflect the underlying soft nature of the peat; *Calliergonella cuspidata* (Pointed Spear-moss) *Polytrichum commune* (Common Haircap) and *Sphagnum capillifolium* (Red Bog-moss).

The vegetation changes further up this shoulder to *Nardus stricta* (Mat-grass) grassland.

The following explores a number of channels on the east facing slope. None is shown on 1:25,000 Ordnance Survey mapping; only the longest channel, Location D25 to D27, is shown at 1:50,000 scale. These channels provide habitats for considerable plant biodiversity.



**Photo 31. East facing slopes of Site D, 25.8.18.**

### Location D23

This is on the first channel encountered; NN 9331 0295 at 351m AOD, within which there is no observable flow, but the vegetation reflects flushing and enrichment of a basic nature. The location appears on 1:25,000 scale mapping as a change in the contour line.

Species included at this location are; *Cardamine pratensis* (Cuckooflower) *Carex flacca* (Glaucous Sedge) *Carex hostiana* (Tawny Sedge) *Carex nigra* (Common Sedge) *Carex panicea* (Carnation Sedge) *Carex pulicaris* (Flea Sedge) *Cerastium fontanum* (Common Mouse-ear) *Juncus articulatus* (Jointed Rush) *Pinguicula vulgaris* (Common Butterwort) *Plantago lanceolata* (Ribwort Plantain) *Ranunculus acris* (Meadow Buttercup) *Scorzoneroidea autumnalis* (Autumn Hawkbit) *Trifolium repens* (White Clover) and *Cynosurus cristatus* (Crested Dog's-tail) was the most notable of the few grasses present. *Calliergonella cuspidata* (Pointed Spear-moss) and *Philonotis fontana* (Fountain Apple-moss) are also

present and *Carex echinata* (Star Sedge) just beyond this location. The wider community of this channel continues upwards for 10 metres or so.

*Carex hostiana* (Tawny Sedge) is described as a plant “where the water contains a fairly high proportion of bases and has a pH of 5.5-6.5” (Jermy *et al.* 2007). This may be encountered frequently on the richer schistose soils of Highland Perthshire, but it is not common in the Ochil Hills, recorded from only 17 locations, of which only five are recent.

#### **Location D24**

The next channel encountered, NN 9335 0291 at 355m AOD has flowing water. This is just short of the longer channel of Location D25. Conditions at Location D24 are less basic than D23, but Sphagnum species are present and *Philonotis fontana* (Fountain Apple-moss). *Lysimachia nemorum* (Yellow Pimpernel) is present, which is not common on the north side of the Ochils watershed.

#### **Location D25 to D27**

Location D25 is preceded by a minor channel after Location D24 and between this minor channel and Location D25 there is much Sphagnum. Location D25 is the longest of all the channels present and was encountered below, NN 9336 0289 at 353m AOD. Immediately south of Location D25 is a dry channel, NN 9338 0287 at 356m AOD; between both channels Sphagnum is frequent and *Carex* flushes are beyond the dry channel.

The strong flow of water was traced to a branch; Location D26, NN 9329 0276 at 414m AOD. The channel here is covered with *Chrysosplenium oppositifolium* (Opposite-leaved Golden-saxifrage) in a taller cover of *Juncus effusus* (Soft-rush). Location D26 is to the left of the main channel in Photo 32.

The nature of this slope is steep, which was measured as 30° at NN 9331 0277 at 409m AOD.



**Photo 32. Location D26, NN 9329 0276, 25.8.18.**

The main channel continues up the slope and was traced to Location D27, NN 9318 0247 at 484m AOD, beyond which it continues for at least another 100m towards the summit. The upper reach arises within a braided network of flushed smaller channels with Sphagnum species, *Carex echinata* (Star Sedge) *Carex nigra* (Common Sedge) and *Carex panicea* (Carnation Sedge) among tussocks of *Juncus effusus* (Soft-rush).

On the north-west facing slope of Middle Hill, Site D, there are a series of springs and channels. Much of their extent is caught in Photo 33, but the depth of these channels is lost in the scale of the image.



**Photo 33. The north-west facing slopes of Middle Hill with channel series fed from springs above, 25.8.18.**

#### **Location D28**

Present in an area of *Juncus effusus* (Soft-rush) is a channel of *Philonotis fontana* (Fountain Apple-moss) with *Chryso-splenium oppositifolium* (Opposite-leaved Golden-saxifrage) *Cardamine pratensis* (Cuckooflower) and other species; NN 9313 0278 at 405m AOD.

The grassland around this location is typical of much of the north facing slope, which is acidic/neutral grassland with little *Nardus stricta* (Mat-grass). The main species are *Agrostis capillaris* (Common Bent) *Anthoxanthum odoratum* (Sweet Vernal-grass) and *Festuca rubra* (Red Fescue).

#### **Location D29 to D30**

At Location D29, NN 9133 0271 at 427m AOD, there is a *Montia fontana* (Blinks) - *Philonotis fontana* (Fountain Apple-moss) spring that is rich in bryophytes with *Cardamine pratensis* (Cuckooflower) *Ranunculus flammula* (Lesser Spearwort) and other species. Adjacent to this is fast running water in a channel with considerable flushing on adjacent ground. Location D30 is where this channel arises, NN 9314 0258 at 465m AOD and a flow can be heard from

NN 9312 0264, 454m AOD. This is one of several channels arising at a similar level along the slope.

#### **Location D31 to D34**

*Montia fontana* (Blinks) - *Philonotis fontana* (Fountain Apple-moss) springs arise at:

Location D31; spring, NN 9302 0262 at 449m AOD, with channel below.

Location D32; two springs, NN 9299 0261 at 452m AOD, with *Juncus effusus* (Soft-rush) in channel of running water leading to rush pasture below fence.

Location D33; spring, NN 9296 0260 at 455m AOD, with *Juncus effusus* (Soft-rush) in channel of running water leading to rush pasture below fence.

Location D34; spring, NN 9293 0265 at 451m AOD, with *Juncus effusus* (Soft-rush) in channel of running water leading to rush pasture above fence.



**Photo 34. Some of the rush pasture fed by springs and channels on site D slopes, 25.8.18.**

West of these channels the slopes are free-draining and dominated by *Nardus stricta* (*Mat-grass*) grassland. This is followed by a transition to richer grassland, similar to the acid/neutral grassland described earlier. Within this area there are two *Montia fontana* (Blinks) - *Philonotis fontana* (Fountain Apple-moss) springs.

#### **Location D 35**

Location D35, NN 9258 0244 at 457m AOD is a spring with seepage below, but no channel. Included in the flora are *Chrysosplenium oppositifolium* (Opposite-leaved Golden-saxifrage) *Cardamine pratensis* (Cuckooflower).

#### **Location D 36**

Location D36, NN 9255 0253 at 427m AOD is a spring with a strong flow of water in a channel that meets the burn below. Included in the flora are *Chrysosplenium oppositifolium*

(Opposite-leaved Golden-saxifrage) *Cirsium palustre* (Marsh Thistle) *Rumex acetosa* (Common Sorrel) and *Stellaria alsine* (Bog Stitchwort).

The outstanding member of this community is *Epilobium alsinifolium* (Chickweed Willowherb) that is distributed around the spring-head and all the way down the channel. This is a member of our montane flora, restricted to the uplands of North Wales, England and Scotland and found only in County Sligo in Ireland. This species has not been re-recorded at several of its previous sites within the Ochils.

There is flushing above the main burn at the west end of the site. The slopes above are very steep, measured as 30° at NN 9256 0236 at 463m AOD.



**Photo 35. The middle of the north facing slopes of Middle Hill, Site D, 25.8.18.**

### **Summary of Site C**

There are a number of springs and channels on the steep slopes providing run-off or seepage on a large scale. The run-off in these natural seepages and on the slopes is slowed down by vegetation which is controlling erosion. There is erosion at the bottom of one of the channels towards the bottom end of the north facing slope that was identified on a photograph after the survey, but not investigated at the time. The types of vegetation controlling erosion are rush pastures, sedge communities and Sphagnum communities. The Sphagnum communities identify underlying peat in these areas. Some of the sedge communities are rich in biodiversity.

Mapping of this site is far from complete in the *Gleneagles Woodland Creation Scheme Environmental Surveys*. None of the springs, rush pastures and more base-rich plant communities are mapped.



**Photo 36. A shoot of *Epilobium alsinifolium* (Chickweed Willowherb) having been uprooted by sheep, Site D, 25.8.18. Most of the cover opposite is *Chrysosplenium oppositifolium* (Opposite-leaved Golden-saxifrage).**

## 5. Vegetation types

Within the proposed area of planting and fencing are two blanket bogs. There are only two references to National Vegetation Classification (NVC) in the *Gleneagles Woodland Creation Scheme Environmental Surveys*. The blanket bogs and other communities have not been assessed at this level, which is required to be able to understand the complexity and extent of these habitats.

The following NVC communities were observed from a walkover. The community names follow *An Illustrated Guide to British Upland Vegetation* (Averis et al. 2004): M2 *Sphagnum cuspidatum/fallax* bog pool community; M17 *Trichophorum cespitosum-Eriophorum vaginatum* blanket mire; M20 *Eriophorum vaginatum* blanket and raised mire and the M25 *Molinia caerulea-Potentilla erecta* mire.

Also present are both sub-communities of M23 *Juncus effusus/acuteiflorus-Galium palustre* rush-pasture, present on the flushed slopes of Site A and Site D. The presence of *Sphagnum* and *Carex echinata* (Star Sedge) in some of these stands reflect a continuum with the *Juncus effusus/acuteiflorus* sub-communities of the M6 *Carex echinata-Sphagnum fallax/denticulatum* mire.

The authors of *British Upland Vegetation* provide useful comments in relation to M23 *Juncus effusus* (Soft-rush) /*Juncus acuteiflorus* (Sharp-flowered Rush) *Galium palustre* (Marsh-bedstraw) communities. “Even without rare species, mires of this type contribute to the diversity of flora and vegetation structure around the upland fringes, and they add colour and texture to the landscape. The herb-rich stands of the *Juncus acuteiflorus* sub-community are valuable centres of genetic diversity because the vascular plants are usually able to flower and set seed.”

The authors say these mires are probably derived from woodland or scrub. “If stands were fenced against livestock they might well be colonised by trees, perhaps initially by *Salix cinerea* [Rusty Willow] and *Salix aurita* [Eared willow]. They conclude on the effects of drainage on rush-pasture: “many stands must have been lost in this way.”

The stands of *Carex nigra* (Common Sedge) with other sedge species have not been covered within the *Gleneagles Woodland Creation Scheme Environmental Surveys*. These are extensive in places, such as the south-facing slope of Site A opposite Site C and the slopes of Site D.

## **6. Environmental Impacts**

### **6.1 Landscape**

The centre of the area outlined in red on Map 2 is visible from the majority of the hill summits within a radius of 3.5km from each. The proposed planting of single species *Picea sitchensis* (Sitka Spruce) follows the 450m contour. This would create a very hard edge within and outwith the area outlined in red.

The deer fence accompanying the planting, the red line on the map, would also be conspicuous from some summits. The fence line is also very close to the Core Path AUCH/53 29/1, ‘Backhills to Maddy Moss & Tillicoultry, Clacks’. The closest proximities on OS 1:25,000 scale, as on Map 2, are near the spot heights 456m AOD, NN 9192 0290 and 442m AOD, NN 9204 0242 at the western extent of the proposals. Immediately south of this, the fence and planting proposals would come increasingly into view as height is gained on the Core Path on the slope of Skythorn Hill.

At the north-eastern extent of the proposals the line of the proposed fencing would come very close to the line of the existing fence on the other side of the Baldhill Burn. Currently, this area offers access to Bald Hill, which has been restricted by extensive planting on Corim Hill immediately to the north. During the survey visit on 25.8.18, a walker was seen taking access to Bald Hill from the line of the burn.

There is no assessment of the possibility of bird strikes from this fence on birds of prey or Black Grouse (*Tetrao tetrix*). The *Surveys* record a “single black grouse heard within some forestry to the east of the survey area (near Laird’s Seat).” “For black grouse, the site may form a part of its foraging area, or indeed, there is potentially suitable habitat for black grouse to breed.”

The forestry mentioned near Laird’s Seat is the area of adjacent woodland owned by The Woodland Trust. This woodland provides an attractive setting within the Ochil Hills. The proposed planting is presented as block planting of single-species, mixed broadleaves of unknown species and two blocks of open land. The proposed block planting and uniformity of the design would look out of place next to the woodland owned by The Woodland Trust.

### **6.2 Birds**

The *Gleneagles Woodland Creation Scheme Environmental Surveys* states there is a recommendation of three to four visits during the breeding season; but, “if timed appropriately and undertaken in suitable weather conditions, one visit is sufficient to give an overview of species present and if any breeding behaviours are observed, the likelihood that they will breed/are breeding at the site.”

However, this is contradicted later: “Furthermore, it is possible that some individual meadow pipits recorded during the April surveys were passage birds. Therefore, it is

possible that the relative abundance of breeding meadow pipits is actually lower than predicted and fewer breeding individuals will be displaced.” Only one visit is said to have taken place: 28<sup>th</sup> April, 2018. In questioning the results of their survey, the authors cannot say one visit was sufficient.

There are generalised comments on the impact of loss of breeding numbers from the proposals in relation to local populations. However, the numbers and locations of local populations are not provided. One of the species affected by the proposals is Meadow Pipit (*Anthus pratensis*). Its UK conservation status is amber set against declining numbers from the mid-1970s. One of the other species affected is Skylark (*Alaunda arvensis*). Its UK conservation status is red; “its recent and dramatic population declines make it a Red List species.” This information is drawn from the RSPB website. The conservation status of these two species is recognised, but the connection is not recognised towards the end of the *Surveys* that numbers of two species of conservation status will be reduced and these numbers are not quantified.

### **6.3 Vegetation, hydrology and soils**

Vegetation and soils would be affected during three stages of the proposals; the first at establishment by the formation of forest roads, fencing, ground preparation and drainage. The second stage at development and closure of the canopy and the third stage at harvesting, by the formation of additional forest roads and exposure of soils after felling.

#### **6.3.1 Forest Roads**

Map 2 indicates the lines of the proposed forest roads as set out in *Gleneagles Estate Proposed New Planting Frandy*. These would cut through drainage, channels and seepage along the foot of Site A and the foot of Site D. There would be loss of considerable wetland vegetation, alteration to drainage and erosion of soils.

Most affected would be Site D, the lower section of Middle Hill. Vegetation of Sphagnum, flushes and rush pasture would be lost that have stabilised the lower slopes and control the flow of water in the connecting higher channels. Soil would be lost, loose underlying rock debris accumulated from the higher slopes would be destabilised and run-off would be increased.

Site A would be affected significantly, especially the enclosed field. There would be some drying out of vegetation with underlying peat, resulting in the release of greenhouse gases to the atmosphere. From both sites there would be a significant loss of biodiversity.

The forest roads indicated would appear to be insufficient to harvest the proposed crop and more roads would be expected later. New roads would increase the amount of damage and therefore additional roads expected for harvesting should be included at this stage as part of the Environmental Impact Assessment.

#### **6.3.2 Ground preparation and drainage**

The blanket bogs on Site A and Site C have peat depths in excess of 500mm. The blanket bogs are connected to surrounding vegetation on more sloping ground. This vegetation is on peat soils of a depth of 300mm - 400mm or greater. *Gleneagles Woodland Creation Scheme Environmental Surveys* reports “There has been no peat depth survey on the site.”

The hydrology of the peat bogs is linked to adjacent vegetation. Ground preparation or drainage would likely interrupt the hydrology between the connecting vegetation and significant changes in the hydrology would lead to the degradation of peat and release of



greenhouse gases. Run-off from the blanket bogs would be increased, leading to drying out that would slow down their natural repair and potential for growth with a consequential loss of sequestering more atmospheric carbon.

### **6.3.3 Fencing**

Fencing off and leaving areas unplanted may assist the peat bogs and other vegetation to improve from the release of grazing. However, if grazing persists on unfenced sections of bog the pressure from grazing will be increased due to the reduction in grazing available.

### **6.3.4 Canopy development and closure**

At this stage, vegetation underlying the tree crop is subject to shading. The amount of shading depends on planting density and crop selection. Some trees shade more densely than others, but the shading from the less densely shading trees can be increased by closing the spacing between trees to be planted. *Picea sitchensis* (Sitka Spruce) falls into the first category and *Pinus sylvestris* (Scots Pine) falls into the second.

When the canopy closes at higher planting density the ground vegetation is completely or almost completely shaded out. The vegetation holding the soil is lost and compensation from tree roots may not be sufficient to prevent soil loss, especially on steeper slopes.

### **6.3.4 Harvesting**

Removal of the tree crop, especially on peaty soils on steep slopes can lead to loss of soils and peat. Loss of peat or drying out of peat on exposed soils lead to emissions of greenhouse gases. One molecule of released carbon dioxide remains in the atmosphere for around a century. One molecule of released methane remains in the atmosphere for about a decade, but in that time absorbs 20 -25 times more infrared energy than carbon dioxide in a century. These gases reduce the natural cooling effect in the earth's atmosphere.

### **6.3.5 Research and Advice**

New planting can sequester carbon, but this requires retention of the "carbon reservoir once it has been created" (Channell, 1999). This review paper provides further relevant information. Faster growing trees such as *Picea sitchensis* (Sitka Spruce) sequester more carbon than others. Planting on fertile soils with very little carbon provides a greater benefit in sequestering carbon. By contrast, the benefit of sequestering carbon in soils from forest litter can be cancelled out where conifer plantations have been established on carbon rich soils and the organic material already in the soil is lost to decomposition.

National guidance sets out principles. "Where effects due to afforestation or deforestation are likely to be significant, an Environmental Impact Assessment will be required. Existing semi-natural habitats are likely to have a high value for biodiversity and this will need to be compared with the value of new woodland. Moreover, there is a specific presumption against the conversion of some priority habitats, such as deep peat or active raised bogs. This is for reasons of climate change in addition to biodiversity" (Forestry Commission, 2017).

Guidance is provided on planting and peatland. Sites A and C have active blanket bog with connecting vegetation on peat soils. Site A encompasses part of Frandy Moss that in total is about 30ha. Guidance indicates the proposals should be reappraised with further investigation (Patterson & Anderson, 2000).

Further guidance defines deep peat as 500mm depth or greater (Forestry Commission, 2016). There is a principle of avoiding net carbon loss from deep peat. “A net carbon loss occurs when the carbon locked up in the peat, and trees growing on it, is less than the carbon released from the soil during establishment.”

Guidance on woodland creation is unambiguous: “In accordance with the UK Forestry Standard, avoid establishing new forests on soils with peat exceeding 50 cm depth and on sites that would compromise the hydrology of adjacent bog habitats.” “A proposal for a site that may have significant areas of peat will require a survey to demonstrate the distribution of shallow and deep peat, and an assessment of the level of hydrological connectivity with adjacent peatland.” While reference to soil maps can be included in an assessment, they cannot demonstrate the depth of peat and hydrological connectivity.

In relation to water: “A buffer area is fundamental to both existing and new forests. Key aspects of the design of the buffer area are width, structure, choice of species and management regime” (Forestry Commission, 2017). “Factors such as climate, altitude, slope and soil type all have a bearing on the effectiveness of the buffer area and therefore on the desired width”. The recommended minimum widths of buffer areas are: (i) “10 m along permanent watercourses with a channel less than 2 m wide. (Narrower widths of buffer area may be allowable along minor watercourses with a channel less than 1 m wide, especially on steep ground.)” (ii) 20 m along watercourses with a channel more than 2 m wide and along the edge of lakes, reservoirs, large ponds and wetlands.”

Reduction of the buffer margin within the proposal area would have a detrimental effect for reasons mentioned.

Most of the watercourses within the area outlined in red on Map 2 fall under category (i). Part of the lower catchment that forms the Frandy Burn may exceed 2m in width. While there are no obvious abstractions for private water supplies within this area, its catchment contributes to the River Devon that flows into Castlehill Reservoir, which is managed by Scottish Water for the abstraction of water for public consumption.

A briefing note sets out the background on the most recent guidance for Groundwater Dependent Terrestrial Ecosystems (Forestry Commission Scotland, 2018): *Practice guide for forest managers to assess and protect Groundwater Dependent Terrestrial Ecosystems when preparing woodland creation proposals.*

This guidance sets out procedures for identifying the risks to GWDTE from forestry operations. The illustrated diagram *Typical Distribution of Groundwater Dependent Terrestrial Ecosystems (GWDTE) habitats in an upland landscape* within the guidance indicates the types of habitat which fall into this category. In comparison to the area within the red boundary on Map 2, much of the vegetation is groundwater dependent.

In relation to “botanically rich areas” the guidance states: “springs and flushes are always botanically rich and should be protected and maintained open.” Planting depends on an evaluation of the botanical richness. Botanically rich communities can be planted with low density native species, if this has the potential to enhance the wetland habitat. This guidance must be read with the guidance on planting on peat soils.

The guidance requires an audit that includes identification of GWDTE and National Vegetation Classification surveys of wetlands. If surveys are not carried out, GWDTE “areas should be avoided or protected by buffer areas according to the UKFS.” Risk areas should be assessed and guidance applied in a detailed planting proposal.

In principle, “tracks, borrow pits, quarries and drainage requiring excavation deeper than 0.5m should be sited away from GWDTE.” Any deviation should be addressed in a detailed planting proposal.

Of the two documents presented to Friends of the Ochils by the applicant’s agent, neither the *Gleneagles Woodland Creation Scheme Environmental Surveys* nor the *Gleneagles Estate Proposed New Planting Frandy* meet the GWDTE guidance requirements.

### References

Cannell, M.G.R. 1999. Growing trees to sequester carbon in the UK: answers to some common questions. *Forestry: An International Journal of Forest Research*, 72 (3) 237-247. Oxford: Oxford University Press.

Forestry Commission. 2016. *Forestry on peatland habitats: Supplementary guidance to support the FC Forests and Peatland Habitats Guideline Note (2000)*. Edinburgh: Forestry Commission.

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Patterson, G. & Anderson, R. 2000. *Forests and Peatland Habitats*. Edinburgh: Forestry Commission.



**Photo 37. M23 *Juncus effusus/acuteiflorus-Galium palustre* rush-pasture, 25.8.18.**

Photo 37 was taken near the start of Site A looking over woodland owned by The Woodland Trust. The dark patch is a stand of the *Juncus acuteiflorus* sub-community of the M23 community: *Juncus effusus* (Soft-rush) *Juncus acuteiflorus* (Sharp-flowered Rush) and *Galium palustre* (Marsh-bedstraw). This is within the definition of GWDTE and has been left open.

## **7. Alternatives and Conclusions**

Friends of the Ochils is an organisation sensitive to the needs of land management and the difficulty of making land economically viable in a challenging environment. The Ochils have been selected for development, almost by default, due to topography, natural resources,

relative remoteness, but at the same time relatively close to settlements connected by the road infrastructure. Changes have resulted from the construction of reservoirs, large scale afforestation and more recently wind farms.

The Ochils are also an inspiring place to visit; its history, walking and superb views have attracted many over several generations. The continuing impacts in this sensitive area led local residents, their councillors and other supporters to seek a recognition and balance of these impacts, which resulted in Perth and Kinross Council declaring the *Ochil Hills Special Landscape Area*. The planting proposals fall within this area.

This designation is accompanied by *Landscape Supplementary Guidance 2015* adopted by Perth & Kinross Council, which states it is “statutory supplementary guidance to the Adopted Local Development Plan.”

The ‘Statement of Significance’ in the guidance observes: “The Ochils are the most significant hill range in Central Scotland.” The ‘Objectives’ are to “Continue expansion and management of native woodlands, or other appropriate species, and seek sensitive restructuring of coniferous plantations where opportunities arise”.

Friends of the Ochils are not seeking to be obstructive to this proposal, but from the survey undertaken and an examination of the results in relation to the proposals, their conclusion is that the proposals would be extremely damaging in several respects and that this area is not suitable for commercial forestry.

The requirement for an Environmental Impact Assessment is governed by *The Forestry (Environmental Impact Assessment) (Scotland) Regulations 2017*. This is derived from *Directive 2011/92/EU of the European Parliament and of The Council on the assessment of the effects of certain public and private projects on the environment*. The Directive requires an examination of alternatives. None is provided by the applicant, but the following are suggested. These take account of guidance mentioned, research and all the foregoing issues raised.

1. The location of the upper fence line should be reconsidered.
2. The abrupt division of species planting should be reconsidered to provide more natural lines and integration.
3. Forest roads would be extremely damaging, even with mitigation. The type of woodland should be reconsidered and establishment by less intrusive techniques, such as the use of low ground pressure vehicles.
4. Woodland for permanent retention should be considered, which would provide a permanent carbon sink and considerable biodiversity. This and use of guidance would mitigate all of the impacts identified and meet forestry standards. The results would also complement woodland belonging to The Woodland Trust.
5. On the Native Woodland Survey of Scotland (NWSS) website [<https://scotland.forestry.gov.uk/supporting/strategy-policy-guidance/native-woodland-survey-of-scotland-nwss>] in terms of Climatic Site Suitability, Native Upland Birch W4 woodland is considered “very suitable” for most of the proposal area; a higher rating than any other species, broadleaf or conifer. Native Scots Pine W18 woodland is considered suitable on much of the plantable area. There are possibilities for establishing native woodland as an alternative to commercial forestry.

6. The broadleaved native woodland proposed for the lower sections could be incorporated into planting mixes and buffer planting. This would leave the lower burn-sides open for natural regeneration, a consideration covered in Section 5, p. 31. Open ground could be distributed throughout the site and applied as a buffer where required.
7. Alternatives would be in keeping with the Objectives of Perth & Kinross Council's *Landscape Supplementary Guidance 2015* for the Ochil Hills. All of the proposal area is within Perth & Kinross.

There appear to be several alternatives to the proposal offered. Friends of the Ochils commend these alternatives for consideration by the applicants and Forestry Commission Scotland.

Friends of the Ochils, 3<sup>rd</sup> September, 2018.

