

Ecological Baseline Survey
prepared for
Carrigeenduff Commonage
as part of the Commonage Management Plan for SUAS



Final Report

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1. Introduction

This very large commonage (674 ha) extends from an elevation of 210m adjoining the local track beside Lough Dan in the Inchavore Valley rising to the summit of Mullaghcleevaun East Top at 795m. The commonage also includes the unnamed summit (780m) east of Mullaghcleevaun East Top and the ridge between it and the summit of Duff Hill at 720m. The ridge leading south east from Mullaghcleevaun East Top and the summit of Carrigshouk Mountain at 571m is also included. The commonage continues to extend south east, crossing the Military Road over the saddle north of Glenmacnass Waterfall before running in an east-west direction and including the ridge and summit of Kanturk/Brown Mountain at 523m as shown on **Figure 1** below.

The commonage is bounded by Coillte conifer plantations on the lower slopes of Duff Hill and Carrigshouk, and the Carrigeenduff conifer plantation to the north east of the Military Road.

An older mixed conifer planting is located within the commonage and is associated with the former 'Mountain Lodge' which is located east of Carrigshouk adjacent to the Military Road.

Lands within the commonage are under the ownership of the state and are included within the boundaries of the Wicklow Mountains National Park.

The lands within the commonage are of international importance for the habitats and species they contain and hence are included within the boundaries of the Wicklow Mountains SAC and Wicklow Mountains SPA.

A number of watercourses rise within the commonage on the ridge between Duff Hill and Mullaghcleevaun East Top. These are from north to south – Lavarnia Brook, two tributaries of the Cornagrainya Brook and Cywock Brook. These watercourses are all tributaries of the Inchavore River, which flows into Lough Dan. The Inchavore Brook and Duff Brook rise on the slopes of Kanturk Mountain and also flow into Lough Dan.

The commonage is predominantly underlain by Caledonian granite, although a band of Ordovician dark blue-grey slate, phyllite & schist associated with the Maulin Formation occurs on Kanturk Mountain. The summit of Kanturk has outcropping quartzite.

The soils of the slopes of the commonage are described as the Carrigvahanagh association and consist of peat over lithoskeletal acid igneous rock, while the upper portions of the commonage near the ridge and summits is covered in blanket peats of varying depths.

The commonage is owned by National Parks and Wildlife Service. There are 7 grazing rights on this commonage, with 4 farmers actively grazing stock on the commonage.

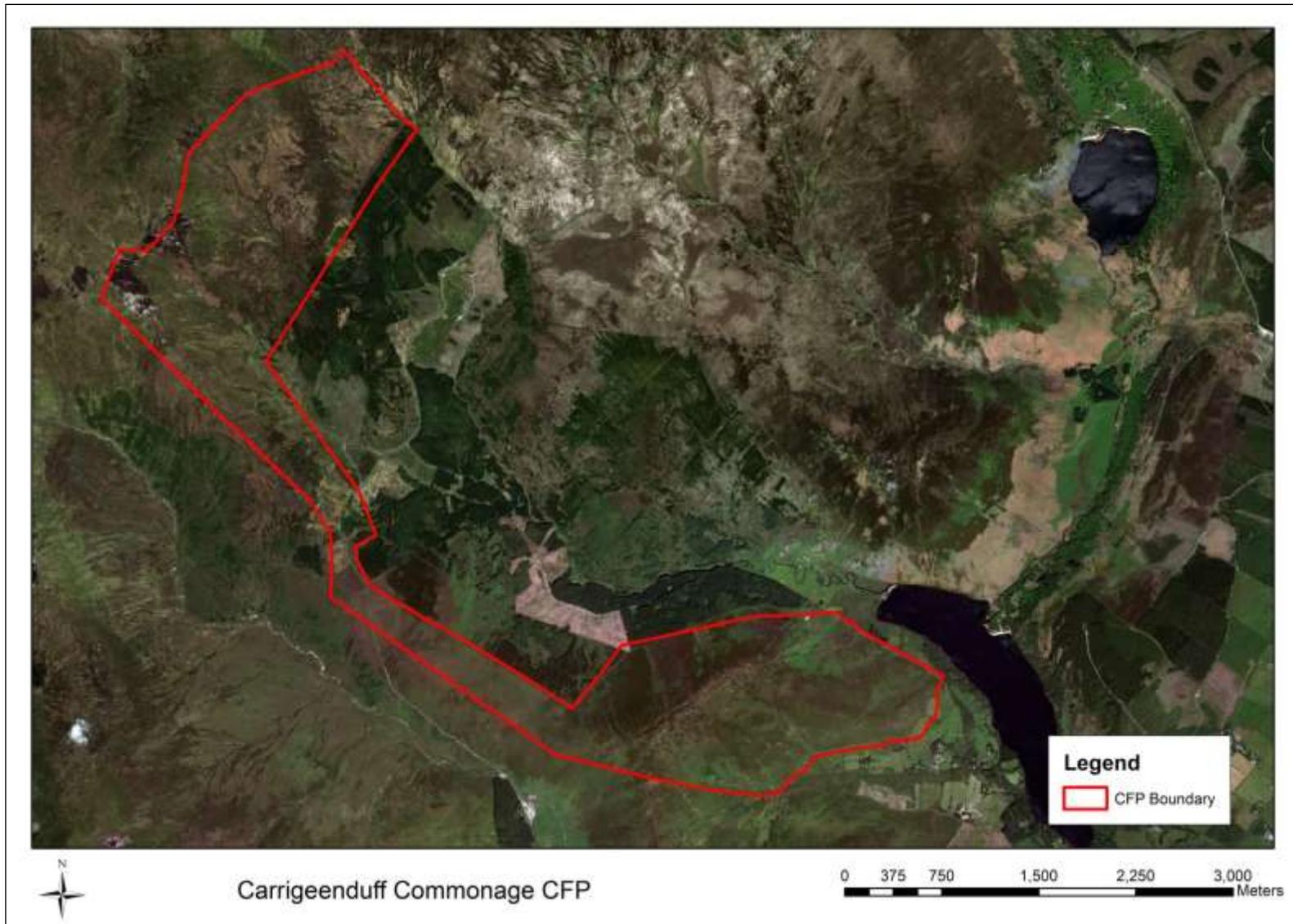


Figure 1. Carrigeenduff Commonage.

This commonage was assessed as part of the joint NPWS/Department of Agriculture commonage framework plans, which were drawn up in the early 2000s as shown on the maps from that survey in **Figures 2, 3, 4, 5, 6** and **7** below. The commonage was divided into three areas:

- WI4a – this area included Duff Hill and the ridge south west to Mullaghcleevaun East Top and extended south to the fence line, which is still extant on the col between Carrigshouk and Mullaghcleevaun East Top.
- WI4b – this area included all the lands south of the fence line which is still extant on the col between Carrigshouk and Mullaghcleevaun East Top, the ridge and summit of Carrigshouk Mountain and was bounded by the military road.
- WI4e – this area included all lands east of the Military Road, the saddle south of Carrigeenduff Conifer Plantation, the ridge and summits of Kanturk Mountain down to Lough Dan, and the northern slopes of Scarr Mountain.

The habitats were roughly classified in the commonage framework plan as blanket bog, wet heath, dry heath, upland acid grassland, dense bracken, other or a mosaic of each as shown on **Figure 8** below. The plateau, sheet and gully erosion on the summits and ridges was noted at that time.

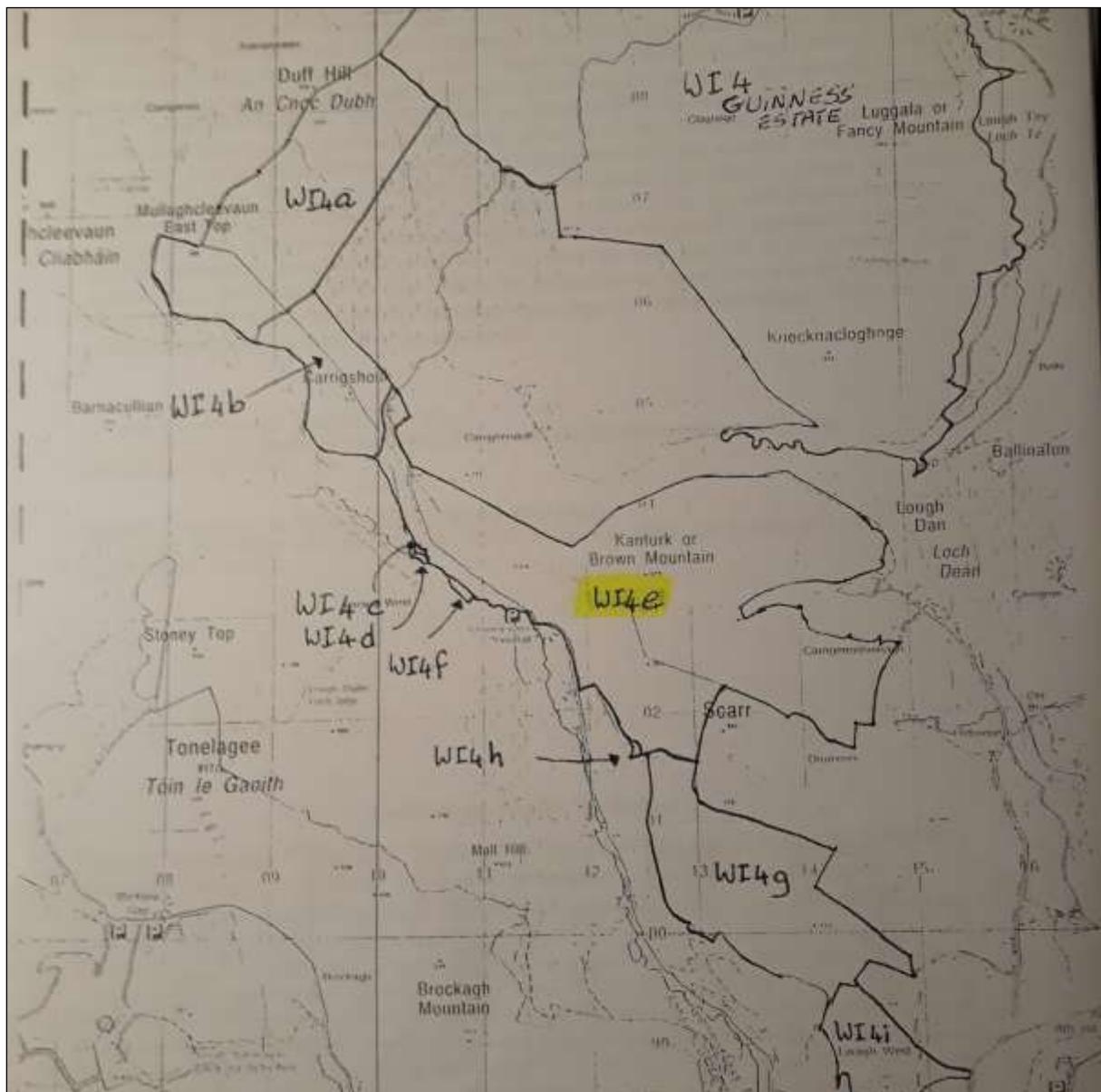


Figure 2. Commonage Framework Plan Map - overview (2001).

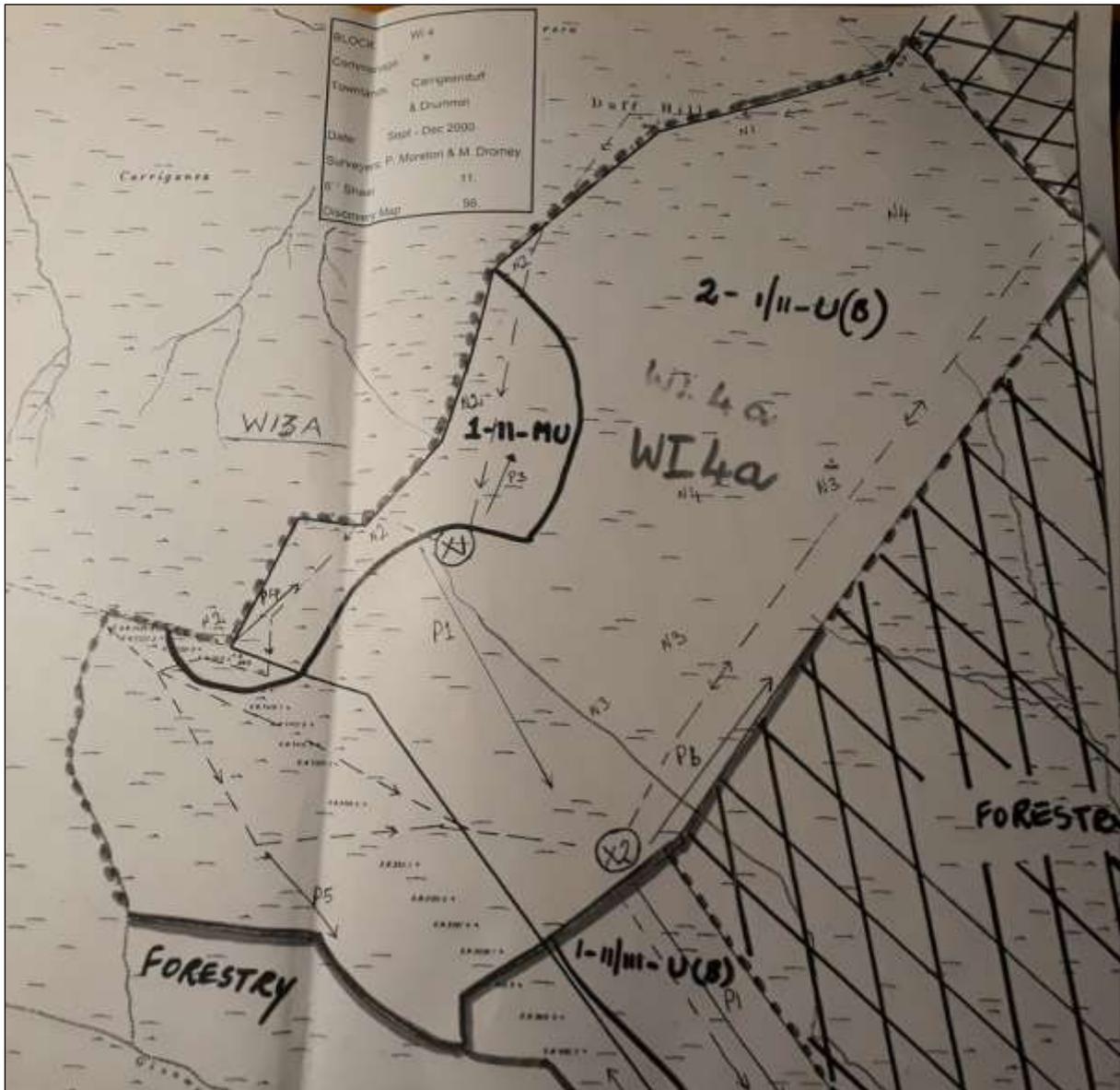


Figure 3. Commonage Framework Plan Map - WI4a (2001).

This assessment identified that the commonage damaged from recent burns and recommended that a destocking rate as set out below for each area was required to allow recovery.

- WI4a - majority of the area was assessed as undamaged, but burning, sheep grazing and walking noted as issues on the ridge and summits where sheet, plateau and gully erosion was noted and these areas were assessed as MU - moderate to undamaged. Recommended a destocking rate of 2%.
- WI4b - parts of this area (the ridge and summit) were assessed as MS - moderate to severely damaged on account of plateau erosion, other areas were assessed as undamaged but recent burning was noted. Recommended a destocking rate of 35.2%.
- WI4e - parts of this area were assessed as MM - moderately damaged on account of burning, while other areas were assessed as undamaged. Recommended a destocking rate of 1.5.1%.

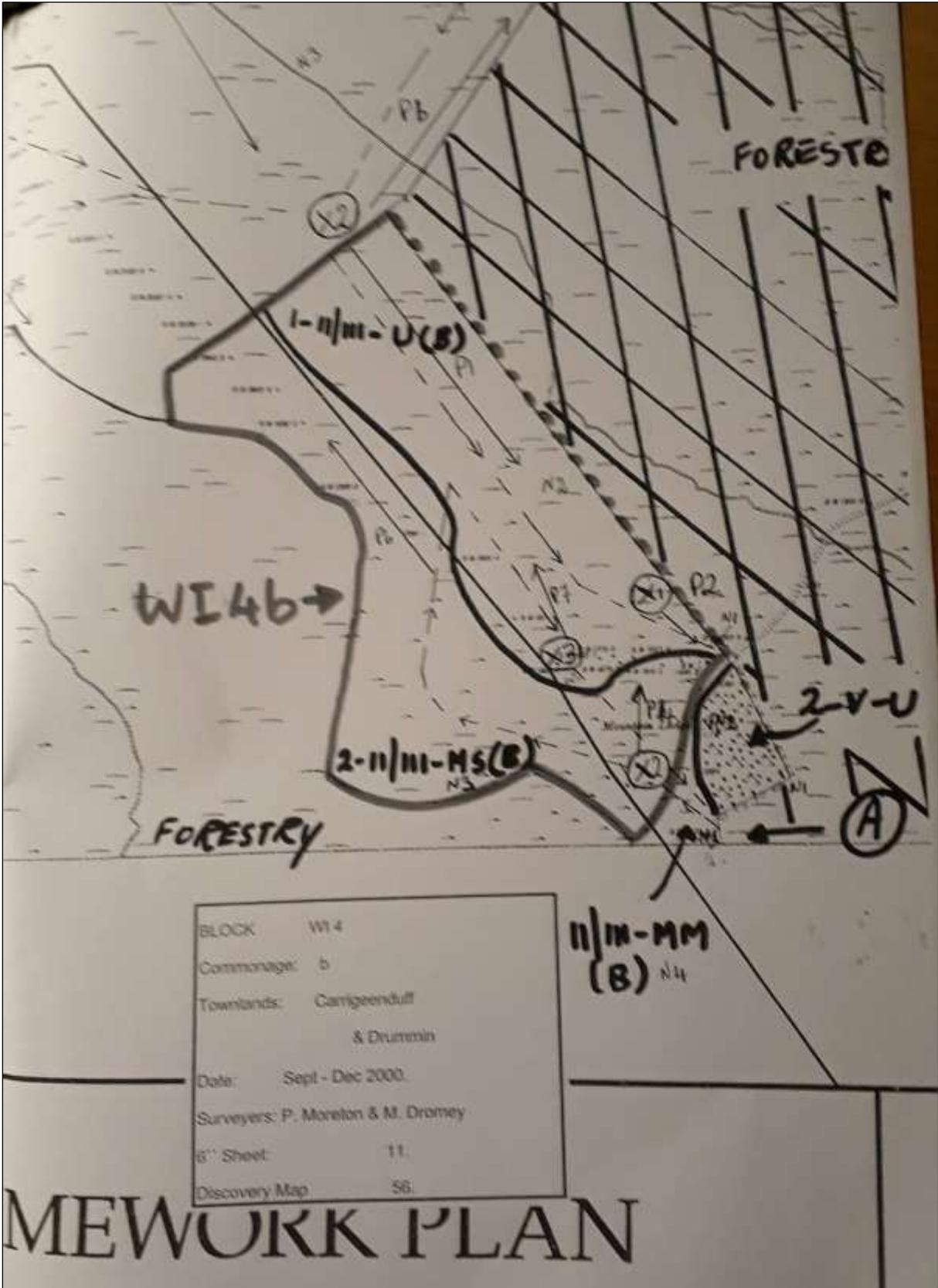


Figure 4. Commonage Framework Plan Map - WI4b (2001).

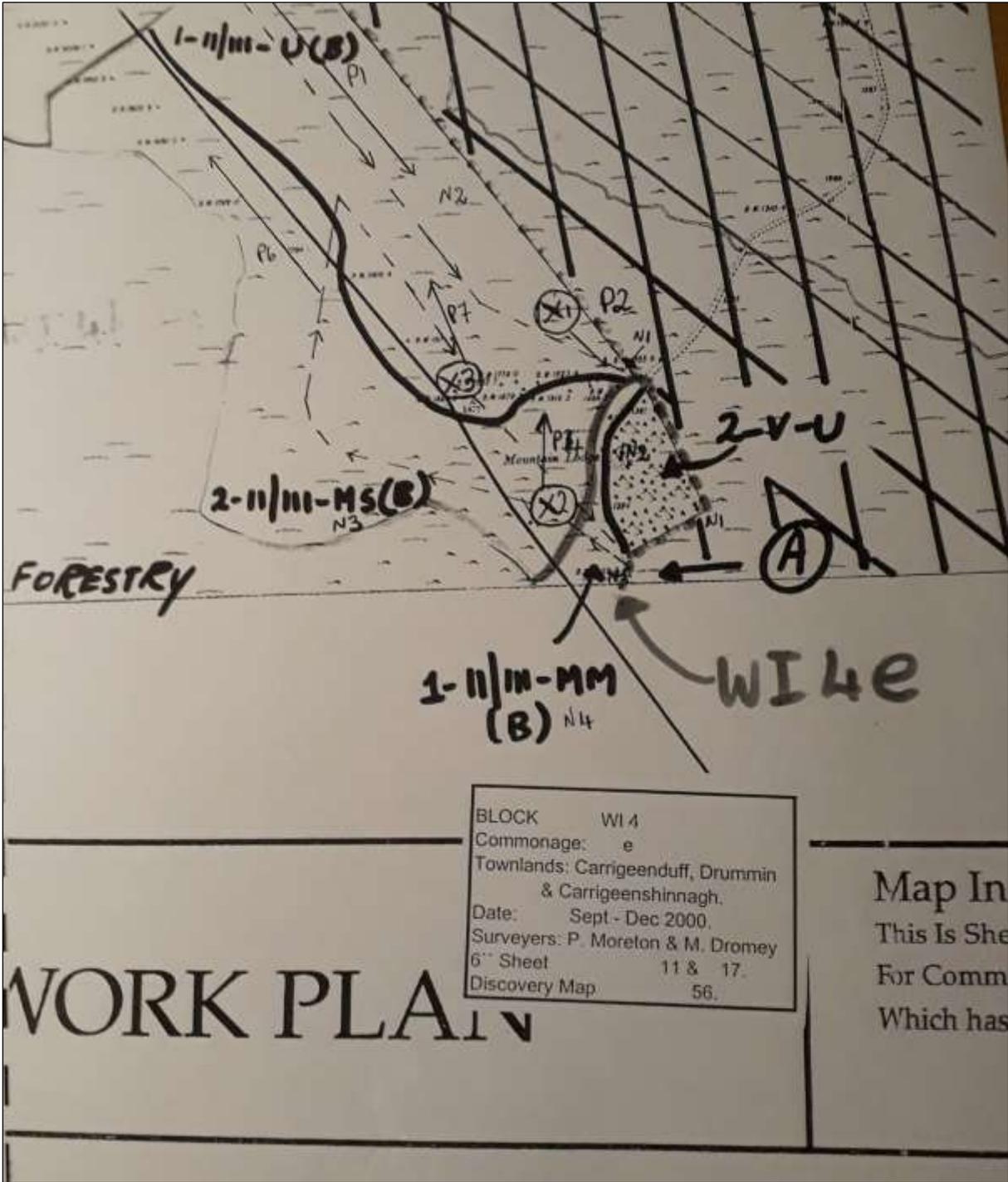


Figure 5. Commonage Framework Plan Map - WI4e (2001).

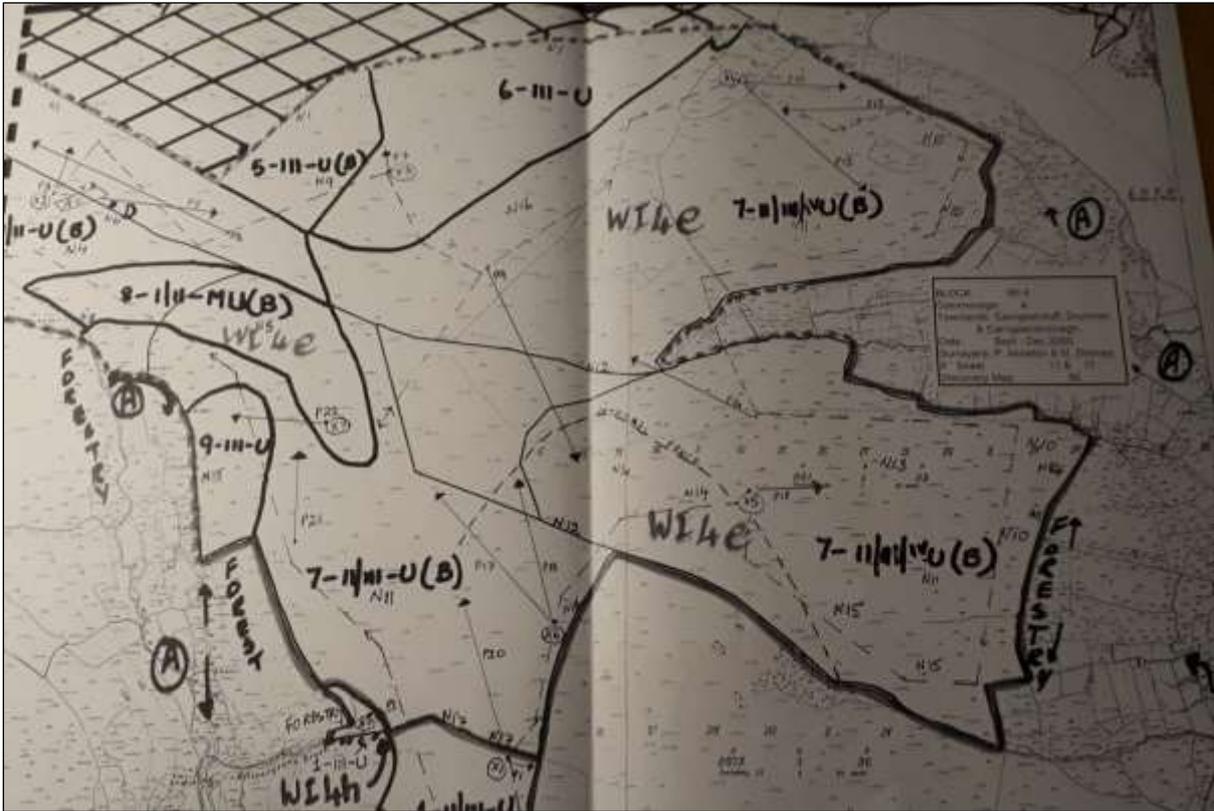


Figure 7. Commonage Framework Plan Map - WI4e (2001).

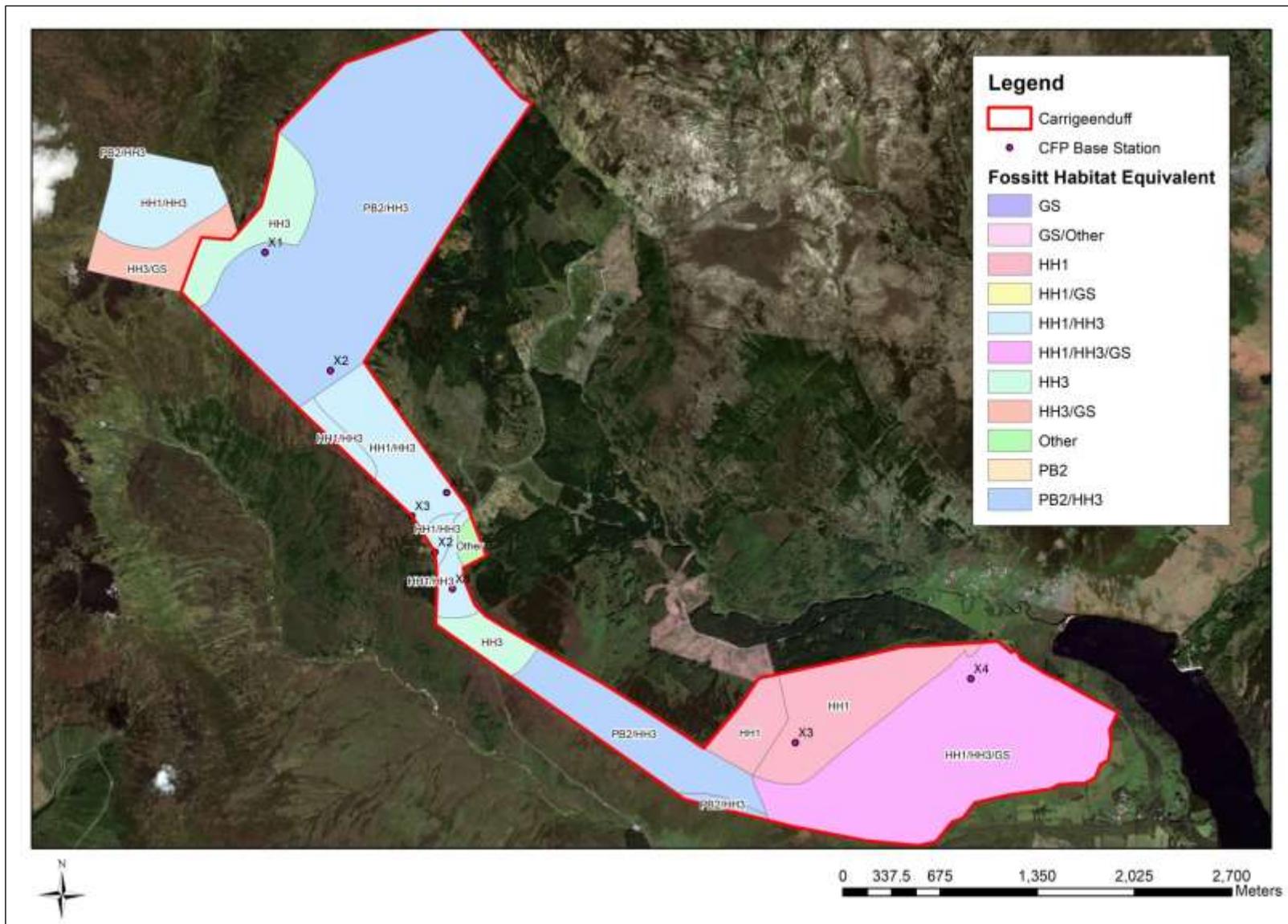


Figure 8. Commonage Framework Plan Habitat Map showing monitoring locations in each area.

2. Receiving Environment - 2019

2.1 Habitats Present

Under Fossitt's (2000) habitat classification scheme the dominant habitat within much of the Carrigeenduff commonage is that of **Dry Heath HH1**, which in some locations forms a mosaic with **Dry Humid Acid Grassland GS3** and more rarely, localised areas of **Wet Heath HH3**. The summits and ridge between Carrigshouk Mountain, Mullaghcleevaun East Top and Duff Hill support areas of **Upland Blanket Bog PB2** and **Montane Heath HH4**. Large areas of this habitat are eroding forming large tracts of land covered by **Eroding Blanket Bog PB5**.



Plate 1. Dry Heath HH1, Exposed Siliceous Rock ER1 and Dry Humid Acid Grassland GS3 becoming invaded by bracken on the slopes of Carrigshouk Mountain.

The summit and ridge of Kanturk consists of a series of outcropping rocky knolls which support **Dry Heath HH1** on **Exposed Siliceous Rock ER1**. Between these are peats of varying depths including pockets of **Upland Blanket Bog PB2**, **Wet Heath HH3** and near where the watercourses rise areas of **Poor Fen and Flush PF2**. Some of the blanket bog was previously cut for turf forming areas of **Cutover Bog PB4**. Some of the slopes have areas of **Dense Bracken HD**, which also forms a mosaic with **dry heath** and **acid grassland** often with outcropping rocks. Remnants of Upland Gully Woodland which would correspond to **Oak Birch Holly Woodland WN1** are found along watercourses. Watercourses within the commonage are all **Upland Eroding Watercourses FW1**.

Areas of dry heath correspond to the habitat **4030 European Dry Heaths**, as listed under Annex I of the EU Habitats Directive. Large areas of this habitat have been lost and damaged as a result of burning or inappropriate grazing.

On the east and north east facing slopes of Carrigshouk Mountain **Dry Heath HH1** forms a mosaic with **Exposed Siliceous Rock ER1** with **Dry Acid Grassland GS3**. This area has become invaded by **Bracken HD1** forming dense stands in some places. Species present include Purple Moor-grass (*Molinia caerulea*), Ling heather (*Calluna vulgaris*), Bilberry (*Vaccinium myrtillus*), Tormentil (*Potentilla erecta*), Deergrass (*Trichophorum cespitosum*), Cross-leaved Heath (*Erica tetralix*), Lousewort (*Pedicularis sylvatica*), Soft Rush (*Juncus effusus*), Round-leaved Sundew (*Drosera rotundifolia*) and the bog moss *Sphagnum papillosum*. Ling heather (*Calluna vulgaris*) 50-75cm high and Purple Moor-grass (*Molinia caerulea*) has not formed tussocks. There is no evidence of recent burning, erosion, or overgrazing, but scattered Sitka Spruce (*Picea sitchensis*) saplings need to be removed. Bilberry (*Vaccinium myrtillus*) and Bracken (*Pteridium aquilinum*) dominate exposed rock on the upper slopes.

Dry Acid Grassland GS3 on the steep slopes of Carrigshouk Mountain has Red Fescue (*Festuca rubra*), Sweet vernal-grass (*Anthoxanthum odoratum*), Common Bent-grass (*Agrostis capillaris*) and Purple Moor-grass (*Molinia caerulea*) with Tormentil (*Potentilla erecta*), Heath Bedstraw (*Galium saxatile*), Sheep sorrel (*Rumex acetosella*), Hard Fern (*Blechnum spicant*), Bilberry (*Vaccinium myrtillus*) and scattered Ling heather (*Calluna vulgaris*). **Dry Heath HH1** is found on the northern slopes of Carrigshouk Mountain and fragments of upland woodland survive here out of reach of browsing animals on outcropping rocks.



Plate 2. Dry heath on the northern slopes of Carrigshouk Mountain. Note remnant woodland species on outcropping rock.

The top of Carrigshouk Mountain consists of **Eroding Blanket Bog PB5**. There are deep gullies eroded to the bed rock over 1m deep. Dry peat hags are dominated by Ling heather (*Calluna vulgaris*),

Cross-leaved Heath (*Erica tetralix*), Common cottongrass (*Eriophorum angustifolium*), Glaucous Sedge (*Carex flacca*), Bilberry (*Vaccinium myrtillus*), Deergrass (*Trichophorum cespitosum*), Crowberry (*Empetrum nigrum*) and the mosses *Racomitrium lanuginosum* and *Hypnum jutlandicum* and the bog moss *Sphagnum papillosum*. There is a network of erosion gullies, some of which are revegetating. Tear pools with the bog mosses *Sphagnum papillosum* and *S. cuspidatum* have good potential for regeneration.



Plate 3. Eroding Blanket Bog on the summit of Carrigshouk Mountain.

There is a deer trampled area, between Carrigshouk and Mullaghcleevaun East Top, which is beginning to erode. This is overgrazed with Bog Asphodel (*Narthecium ossifragum*) and Deergrass (*Trichophorum cespitosum*) dominant. Ling heather (*Calluna vulgaris*), Cross-leaved Heath (*Erica tetralix*), Common cottongrass (*Eriophorum angustifolium*), Hare's tail cottongrass (*Eriophorum vaginatum*) Deergrass (*Trichophorum cespitosum*) and the moss, *Racomitrium lanuginosum* were recorded. An old fence line and ditch/bank associated with the former planting of the lower slopes of Carrigshouk extends east to west across the ridge between Carrigshouk and Mullaghcleevaun East Top. The ground above this has been badly burnt in the past and has still not recovered.

The summit of Mullaghcleevaun East Top consists of peat substrate eroded to **gravel bed rock (ER1)** over 75% with scattered **eroding peat hags (PB5)**. Peat hags 2m tall, 25% cover with vegetated tops and eroding bare peat flanks. Area is heavily deer and sheep grazed. Common Bent-grass (*Agrostis capillaris*), Ling heather (*Calluna vulgaris*), Bilberry (*Vaccinium myrtillus*), Mat-grass (*Nardus stricta*), Purple Moor-grass (*Molinia caerulea*), Soft Rush (*Juncus effusus*), Sheep's Fescue (*Festuca ovina*) and the moss *Polytrichum commune* remain on peat depths of <20cm. Vegetation on top of the peat hags consists of tightly cropped Ling heather (*Calluna vulgaris*), Bilberry (*Vaccinium myrtillus*), Crowberry (*Empetrum nigrum*), *Racomitrium lanuginosum*, Hare's tail cottongrass (*Eriophorum vaginatum*). There are numerous sheep tracks - the area is totally overgrazed and eroding. There is some trampling from walkers.



Plate 4. Tear pools on the summit and ridge of Carrigshouk Mountain.



Plate 5. Looking north west along the ridge between Carrigshouk Mountain to Mullaghcleevaun East Top.



Plate 6. Areas of burnt dry heath on the lower slope of Mullaghcleevaun East Top.



Plate 7. Dry heath on eroding blanket bog.



Plate 8. Eroding bare peat and exposed underlying bedrock on the upper slopes of Mullaghcleevaun East Top.



Plate 9. Overgrazed montane heath and acid grassland between eroding peat hags on the upper slopes of Mullaghcleevaun East Top.



Plate 10. Summit of Mullaghcleevaun East Top. Sheep and deer congregating and grazing in this area delay vegetation recovery. Some trampling from walkers. Note badly eroding slopes of Mullaghcleevaun in background.



Plate 11. Areas of intact montane heath on Mullaghcleevaun East Top.

The summit of Mullaghcleevaun East Top, the adjoining unnamed summit and the ridge between them and Duff Hill formerly supported **Upland Blanket Bog PB2** (which would have corresponded to the habitat **7130 Blanket Bog** as listed under Annex I of the EU Habitats Directive prior to damage). This habitat has been so badly damaged through illegal burning and overgrazing that it is now best described as **Eroding Bog PB5**. In some areas the peat has completely eroded exposing the underlying granitic bedrock and gravels.

In between areas of peat hags, which have escaped burning and erosion small patches of **Montane Heath HH5** remain, which correspond to the habitat **4060 Alpine and Boreal Heaths** as listed under Annex I of the EU Habitats Directive. These support *Agrostis canina*, Ling heather (*Calluna vulgaris*), Bilberry (*Vaccinium myrtillus*), Heath Rush (*Juncus squarrosus*), Mat-grass (*Nardus stricta*), the moss *Rhytidiadelphus squarrosus*, scattered Crowberry (*Empetrum nigrum*), the moss *Racomitrium lanuginosum*, Hare's tail cottongrass (*Eriophorum vaginatum*), Alpine Clubmoss (*Diphasiastrum alpinum*) and Fir Clubmoss (*Huperzia selago*).



Plate 12. Eroding bare peat.

The ridge between the unnamed summit and east to Duff Hill also supports **Upland Blanket Bog PB2**, much of which is eroding following several burns. Peat hags and shallower areas along the ridge support **Dry Heath HH1** habitat.

On the lower slopes there are areas of **Dry Heath HH1** dominated by Ling Heather (*Calluna vulgaris*) and Bilberry (*Vaccinium myrtillus*) with Common Cottongrass (*Eriophorum angustifolium*), Soft Rush (*Juncus effusus*), Purple Moor-grass (*Molinia caerulea*), Tormentil (*Potentilla erecta*) and the mosses *Hylocomium splendens* and *Hypnum jutlandicum*. Uniform Ling heather with burnt wood indicates past burning. The burn extends almost to the top of Duff Hill with bare peat patches and deer tracks contributing to the damage.



Plate 13. Burnt slopes below Duff Hill.

The summit of Duff Hill has **eroding peat hags PB5** with **Dry Heath HH1** habitat in between. Ling heather (*Calluna vulgaris*), Hare's tail cottongrass (*Eriophorum vaginatum*), Bilberry (*Vaccinium myrtillus*), Purple Moor-grass (*Molinia caerulea*) and the moss *Hypnum jutlandicum*. The margins of the peat hags are steep and eroding and are further damaged by sheep and deer. There are also sections of good quality **Dry Heath HH1** on top of the peat hags. Ling heather (*Calluna vulgaris*), Hare's tail cottongrass (*Eriophorum vaginatum*) and Common cottongrass (*Eriophorum angustifolium*), dominate with Bilberry (*Vaccinium myrtillus*), Crowberry (*Empetrum nigrum*) and the mosses *Hylocomium splendens*, *Hypnum jutlandicum* and *Racomitrium lanuginosum* and the bog moss *Sphagnum subnitens*. There are subsidence hollows indicating slippage. Need to protect with wooden dams and re-seed.

Lawns of the moss *Racomitrium lanuginosum* occur with Hare's tail cottongrass (*Eriophorum vaginatum*), Ling heather (*Calluna vulgaris*), Bilberry (*Vaccinium myrtillus*), Heath Rush (*Juncus squarrosus*), Mat-grass (*Nardus stricta*), Crowberry (*Empetrum nigrum*), Alpine Clubmoss (*Diphasiastrum alpinum*) and the moss *Campylopus introflexus* (indicating previous burning) in areas of Montane Heath **HH4**. Off the slope there is a mosaic of **Montane HH4** and **Dry Heath HH1** with erosion channels and tear pools.

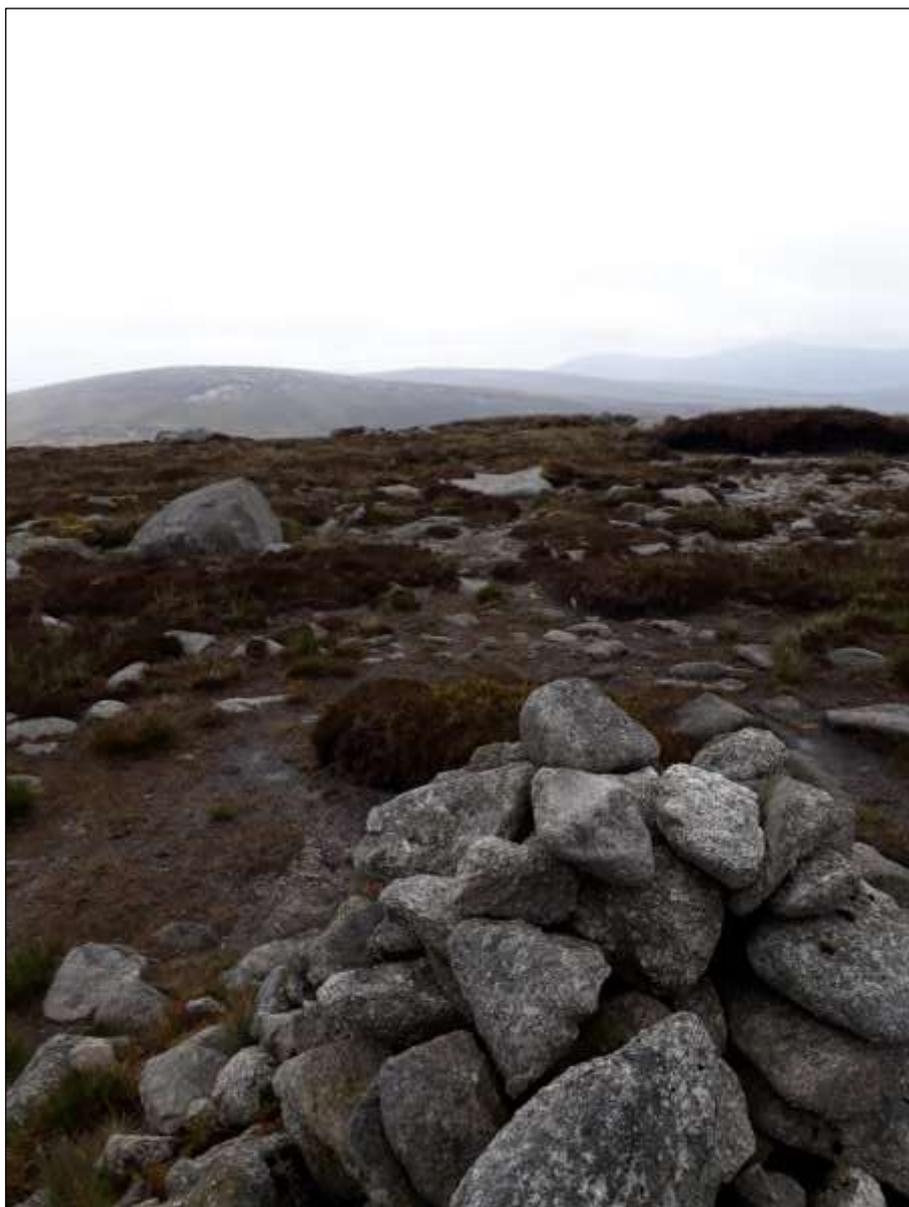


Plate 14. Summit of Duff Hill.

Areas of Dry Heath with Hare's tail cottongrass (*Eriophorum vaginatum*), Ling heather (*Calluna vulgaris*), Bilberry (*Vaccinium myrtillus*), Heath Rush (*Juncus squarrosus*), Carnation Sedge (*Carex panicea*), Heath Bedstraw (*Galium saxatile*), Purple Moor-grass (*Molinia caerulea*), Heath Woodrush (*Luzula multiflora*) and the moss *Polytrichum commune*. There is a mosaic of Heath Rush (*Juncus squarrosus*) in erosion channels and Ling heather (*Calluna vulgaris*), on peat hags. Deer tracks present. Peat hags cover 60% with Ling heather (*Calluna vulgaris*), Purple Moor-grass (*Molinia caerulea*), Bilberry (*Vaccinium myrtillus*), Heath Woodrush (*Luzula multiflora*) and Hare's tail cottongrass (*Eriophorum vaginatum*). Hollows cover 40% and are vegetated with Hare's tail cottongrass (*Eriophorum vaginatum*), Heath Rush (*Juncus squarrosus*), and the moss *Polytrichum commune*. Wet flushes occur with *Sphagnum cuspidatum* and *Sphagnum papillosum*.

There is very tightly grazed grassland of Common Bent-grass (*Agrostis capillaris*), Mat-grass (*Nardus stricta*), Purple Moor-grass (*Molinia caerulea*), Heath Woodrush (*Luzula multiflora*), and Tormentil (*Potentilla erecta*) with bare peat on the ridge. All grazing should be removed.



Plate 15. Dry Heath on the summit of Duff Hill.



Plate 16. Eroding blanket bog on saddle ridge between Duff Hill and Mullaghcleevaun East Top.



Plate 17. Wet flushes on the lower slopes of Duff Hill near the forestry.

Kanturk Mountain is dominated by **Dry Heath HH1**, which has been repeatedly burnt over many years. As a result much of the habitat on the ridge and slopes is of uniform age and structure and is dominated by ling (*Calluna vulgaris*), with scattered Purple-moor grass (*Molinia caerulea*), Hare's-tail cottongrass (*Eriophorum vaginatum*), and Deergrass (*Trichophorum cespitosum*). Heath rush (*Juncus squarrosus*), Green-ribbed Sedge (*Carex binervis*) and Bilberry (*Vaccinium myrtillus*) were occasional. The moss component of the habitat is often missing as a result of burning.



Plate 18. Burnt and uniform dry heath on the shoulder of Kanturk, looking across the Inchavore valley.

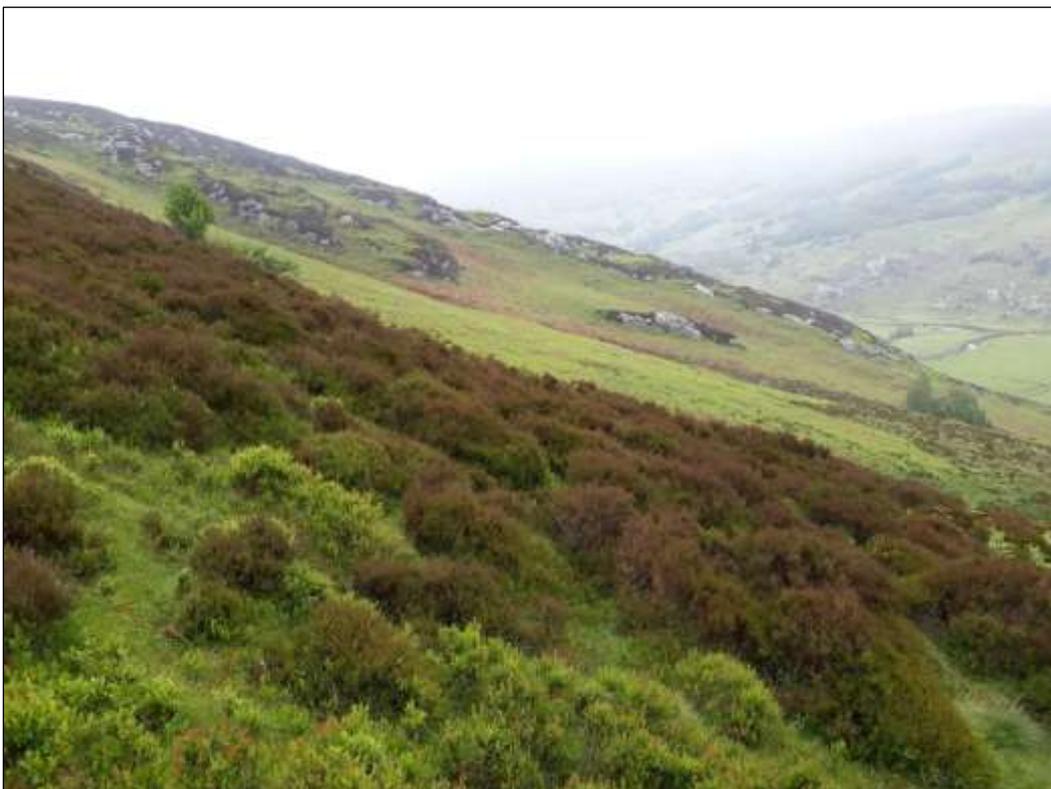


Plate 19. Dry heath, acid grassland and dense bracken on the slopes east of the Inchavore Brook. Note remnant gully woodland on the slopes.



Plate 20. Bracken beginning to invade dry heath.

The lower slopes of the commonage near the track at Lough Dan consist of **Exposed Siliceous Rock ER1** with dry heath, wet heath, acid grassland and bracken. Species present include Purple Moor-grass (*Molinia caerulea*), Ling heather (*Calluna vulgaris*), Bilberry (*Vaccinium myrtillus*), Tormentil (*Potentilla erecta*), Deergass (*Trichophorum cespitosum*), Cross-leaved Heath (*Erica tetralix*), Lousewort (*Pedicularis sylvatica*), Soft Rush (*Juncus effusus*), Round-leaved Sundew (*Drosera rotundifolia*) and the bog moss *Sphagnum papillosum*. Ling heather (*Calluna vulgaris*) 50-75cm high and Purple Moor-grass (*Molinia caerulea*) has not formed tussocks. There is no evidence of recent burning, erosion, or overgrazing, but scattered Sitka Spruce (*Picea sitchensis*) saplings need to be removed. Bilberry (*Vaccinium myrtillus*) and Bracken (*Pteridium aquilinum*) dominate exposed rock on the upper slopes.

Further west towards the Inchavore Brook there are under grazed areas dominated by Ling heather (*Calluna vulgaris*) with encroaching Common Gorse (*Ulex europaeus*). Remaining habitat consists of Bilberry (*Vaccinium myrtillus*), Tormentil (*Potentilla erecta*), Soft Rush (*Juncus effusus*), Glaucous Sedge (*Carex flacca*), Red Fescue (*Festuca rubra*) and the moss *Hypnum jutlandicum*. Large clumps of encroaching Gorse Scrub need to be controlled and the old heather grazed. Bracken has formed dense stands here and the red list bird species Whinchat was previously recorded here on the steep ground west of the Inchavore Brook.

Above the old ruined house, which is being renovated, is an area of **Wet Grassland GS4** with Soft Rush (*Juncus effusus*), Purple Moor-grass (*Molinia caerulea*), White Clover (*Trifolium repens*), Creeping Buttercup (*Ranunculus repens*), Heath Bedstraw (*Galium saxatile*), Marsh thistle (*Cirsium palustre*) along the seepage area.

A large flushed area is found on the ridge where the Inchavore Brook rises on the north eastern slopes. This is dominated Purple moor-grass (*Molinia caerulea*), Bog Asphodel (*Narthecium ossifragum*), Hare's tail cottongrass (*Eriophorum vaginatum*), Common cottongrass (*Eriophorum angustifolium*), the

sedges; star sedge (*Carex echinata*), Carnation Sedge (*Carex panicea*) and Common sedge (*Carex nigra*), Deergrass (*Trichophorum cespitosum*), Tormentil (*Potentilla erecta*), Lesser Spearwort (*Ranunculus flammula*), Heath Rush (*Juncus squarrosus*), Cross-leaved Heath (*Erica tetralix*), and Lousewort (*Pedicularis sylvatica*) and the mosses *Polytrichum commune*, *Sphagnum papillosum*, *Sphagnum capillifolium*, *Sphagnum subnitens*. An old peat/earthen bank is located along the margins of the flush and may be a townland boundary.

The upper northern slopes of Kanturk have areas of dry heath. Ling heather (*Calluna vulgaris*), Cross-leaved Heath (*Erica tetralix*) and Tormentil (*Potentilla erecta*) dominate with Purple Moor-grass (*Molinia caerulea*) and the moss *Hypnum jutlandicum*. There are bog mosses *Sphagnum papillosum*, *Sphagnum subnitens* present. There is erosion on the lower slopes with exposed rock, due to heavy grazing. There is some bracken encroachment.

Upslope there is more erosion and signs of past burning and the ridge consist of tightly grazed Ling heather (*Calluna vulgaris*), Bilberry (*Vaccinium myrtillus*) and the moss *Hypnum jutlandicum* with the lichens *Cladonia pyxidata* and *Cladonia floerkeana* indicating burning.

In between knolls of outcropping **Siliceous Rocks ER1** and **Dry Heath HH1** on the ridge of Kanturk are areas of either **Upland Blanket Bog PB2** or **Wet Heath HH3** depending on the depth of the underlying peat. There are signs of old peat cutting in this area with areas of **Cutover Bog PB4** present. The walking route is causing erosion and trampling in much of this area. Areas of vegetation out of browsing reach on exposed rocky boulders and outcrops are indicative of what less damaged habitat should look like.



Plate 21. Flushed area near the source of the Inchavore Brook. Numerous deer congregate here.



Plate 22. Erosion and trampling from hillwalkers on Bracket Rocks ridge.



Plate 23. Areas of old cutover bog on Kanturk Ridge.



Plate 24. Old cutover now dominated by dry heath on the drier peats.



Plate 25. Recently burnt areas on the slopes above Duff Brook - currently grazed by sheep.



Plate 26. Badly burnt slopes of Kanturk Mountain.

The southern slopes of Kanturk extending down to the edge of the commonage along Duff Brook are dominated by **Dry Heath HH1**, which has been subject to repeated burning. Much of this area is now dominated by **Acid Grassland GS3**, which is species poor and dominated by Mat grass (*Nardus stricta*) and Deer grass (*Trichophorum cespitosum*), both of which are unpalatable to sheep.

The ridge and saddle between Kanturk Mountain and the Military Road is dominated by deeper peats, which support areas of **Upland Blanket Bog PB2**. Many of these areas were cut for peat in the past and these areas of **Cutover Bog PB4** have for the most part revegetated and are beginning particularly near the Military Road to regenerate with good lawns of *Sphagnum* mosses. The cutover areas are dominated by Cross-leaved Heath (*Erica tetralix*), Common cottongrass (*Eriophorum angustifolium*), Deergrass (*Trichophorum cespitosum*), Purple Moor-grass (*Molinia caerulea*), Bog Asphodel (*Narthecium ossifragum*), Lousewort (*Pedicularis sylvatica*), Soft Rush (*Juncus effusus*), Round-leaved Sundew (*Drosera rotundifolia*) and the bog mosses *Sphagnum capillifolium*, *Sphagnum papillosum* and *Sphagnum subnitens*. There is a large drain along the boundary of this habitat with the forestry and a recently excavated drain adjoining the Military Road, which will be impacting this habitat. These drains should be blocked.

On the drier banks within the areas of cutover bog Ling heather (*Calluna vulgaris*), Bilberry (*Vaccinium myrtillus*), Common cottongrass (*Eriophorum angustifolium*), Deergrass (*Trichophorum cespitosum*), Purple Moor-grass (*Molinia caerulea*), Bog Asphodel (*Narthecium ossifragum*), Tormentil (*Potentilla erecta*), and the lichens *Cladonia portentosa* and *Cladonia uncialis* were present. This area is well used by large numbers of deer – numerous tracks noted.



Plate 27. Crickgarr Brook - a tributary of Duff Brook.

On the northern side of the saddle the hydrology of the bog has been affected by the adjoining forestry and the vegetation for much of this area is more akin to dry heath on the deeper peats.

A small flushed area (**Poor fen and flush PF2**) adjacent to the forestry was dominated by tussocks of Purple Moor-grass (*Molinia caerulea*), with the moss *Polytrichum commune*, marsh bedstraw (*Galium palustre*), Jointed rush (*Juncus articulatus*), Soft rush (*Juncus effusus*), Marsh pennywort (*Hydrocotyle vulgaris*), Marsh thistle (*Cirsium palustre*), and the sedges; Common sedge (*Carex nigra*) and Glaucous sedge (*Carex flacca*). The grass Crested dog's-tail (*Cynosurus cristatus*), Bilberry (*Vaccinium myrtillus*), and Heath Woodrush (*Luzula multiflora*) were also recorded on the drier margins.



Plate 28. Areas of cutover bog near the Military Road.



Plate 29. Areas of intact upland blanket bog on the saddle between Kanturk and the Military Road.



Plate 30. Deer were common in this part of the commonage.



Plate 31. Remnant planting of larch and Scot's pine at Mountain Lodge, Carrigshouk.

The commonage has been subject to various damaging activities in the past including frequent illegal burning, over grazing, natural erosion and some trampling from walkers. A number of landslide events have been noted in the commonage and these were mapped by the Geological Survey of Ireland as shown on **Figure 15**. This area is at high risk of continued landslide events as shown on **Figure 16**.

This area was historically managed for deer stalking and shooting of grouse. But, more recently grazing by sheep has escalated and large numbers of animals have been stocked here. In 30 years, there has been a very marked degradation in the vegetation cover on all of the peaks and ridges stretching from Sally Gap to Tonelagee and significant erosion has taken place resulting in much bare peat and the exposure of the underlying bedrock. This is now eroding away and is being mineralised. It would seem that the primary impetus to erosion has come from direct grazing by animals and from them using the remaining hags for shelter. The frequency of burning has also increased and the most recent burn was extremely extensive across an area of approximately 30km square. Hill walking has also increased in the area.

The commonage has been subject to ongoing and regular illegal and uncontrolled burns in the last twenty years as evidenced by the condition of the vegetation and the National Parks and Wildlife Service history of site management files as shown on **Figure 9**. These burns have been documented since the 1990s, occurring in 1999, 2000, 2004, 2006 and 2007. There has been little opportunity for the recovery of the moss and lichen communities in the habitats in this commonage as a result of the intensity of these burns coupled with the ongoing presence of sheep and deer on these hills as their grazing pressure reduces the opportunity for the hill to recover and exacerbates erosion.

Consultation with the commonage group members reported a severe burn, which took place in 1977. A fire started in the adjoining forestry, escaped uncontrolled onto the hill and burnt the entire ridge. As it was a summer fire the peat itself burnt and it was reported that it burned for several weeks, which would explain the severity of the peat erosion on the ridge.

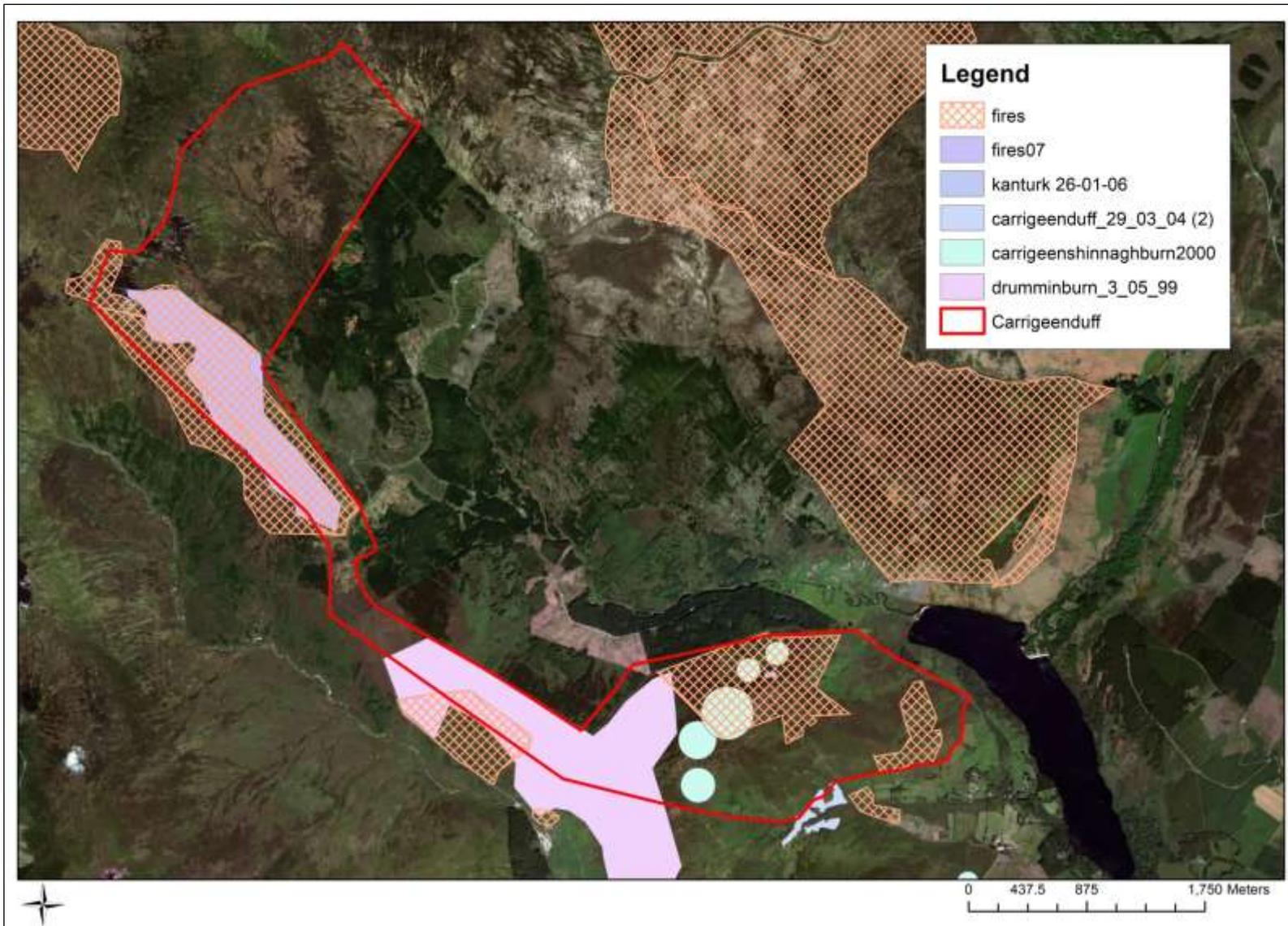


Figure 9. Indicative burn history and extent on Carrigeenduff as recorded by National Parks and Wildlife. The burns on Duff Hill were not recorded.

The various stream and watercourses, which rise within the commonage are described as **Eroding Upland Rivers FW1** and have little in the way of any instream vegetation beyond mosses.

The Annex I habitats present within the commonage include:

- 4010 Northern Atlantic Wet Heaths with *Erica tetralix*
- 4030 Dry Heath
- 4060 Alpine and Boreal Heaths
- 7130 Blanket Bog

The majority of the areas of upland blanket bog are now so badly damaged from burning and over grazing that they no longer correspond to the habitat **7130 Blanket Bog** and are best described as **Eroding Blanket Bog PB5**. Large areas of the habitat **4060 Alpine and Boreal Heaths** are also at risk of erosion and are damaged by burning and overgrazing. The areas of **4030 Dry Heath** have been burnt so frequently followed by inappropriate grazing that in some places these areas are now dominated by unpalatable grasses.

2.2 Rare Plants

Alpine species previously recorded from here include; *Lycopodium clavatum*, *Huperzia selago*, *Hymenophyllum wilsonii*, *Salix herbacea*, *Saxifraga stellaris*, *Vaccinium vitis-idaea*, *Vaccinium myrtillus*, *Empetrum nigrum*, *Carex bigelowii*, and *Listera cordata*. The clubmosses *Lycopodium clavatum* and *Huperzia selago* are species listed under Annex V of the EU Habitats Directive.



Plate 31. Fir clubmoss (*Huperzia selago*) amidst montane heath on the summit of Mullaghcleevaun East Top.

The Montane Flora of Wicklow Survey¹ conducted in 2009 found only the following species; *Huperzia selago*, *Vaccinium vitis-idaea*, *V. myrtillus* and *Empetrum nigrum* and reported that:

‘Only 4 of the 10 alpine plants noted from the area were re-located and it is clear that species such as *Carex bigelowii*, which was formerly recorded from the summit of Mullaghcleevaun has gone due to over-grazing and possibly trampling. The filmy fern, *Hymenophyllum wilsonii* is known from around Cleevaun Lough which was not visited whilst *Listera cordata*, as at other sites, could be located in season under the still intact areas of tall heather. *Saxifraga stellaris* was not located even though suitable habitat for it exists along the streams draining Mullaghcleevaun. *Salix herbacea* was previously known from East Top where it is probably gone due to erosion’.

These alpine species have been lost as a result of repeated burning and over grazing.

2.3 Rare Fauna

The commonage is within the known range of Merlin (*Falco columbarius*) and Kestrel (*Falco tinnunculus*) was recorded during the site surveys.

The Irish Hare (*Lepus timidus* subsp. *hibernicus*) was recorded and herds of deer (red/Sika hybrids) graze the commonage – 17 were seen during one of the site visits. Other faunal records recorded during this survey include Common Frog (*Rana temporaria*), Red Grouse (*Lagopus lagopus*), Meadow Pipit (*Anthus pratensis*), skylark (*Alauda arvensis*), Stonechat (*Saxicola rubicola*) and Raven (*Corvus corax*). Cuckoo (*Cuculus canorus*) was heard and hunting Kestrel (*Falco tinnunculus*) was seen. Whinchat (*Saxicola rubetra*) was recorded from the lower slopes of Kanturk during the Bird Atlas 2007 – 2011. Common Lizard (*Zootoca vivipara*) would also be expected.

Red Grouse were recorded during the present survey. Indicative estimates of the population of Red Grouse within the Wicklow Mountains SPA is extracted below in **Table 1** from the 2011 survey².

Table 1. Figures given below are crude estimates of the populations of Red Grouse in some protected areas of blanket bog throughout the country. These figures were derived using calculated suitability factors for each region (which are not site specific), the mean density of birds (adjusted using the correction factor*) and the total area of each SAC / SPA. (The Wicklow figures were thought to be an underestimate).

Area	Designation	Region	Suitability Factor	Each Region Mean Males ± CL's	Total Males ± CL's	Population Estimate (correction factor*) ± CL's
Wicklow Mts.	SAC	E & S	0.27	1.22 0.96-1.49	45.5 36-55.7	96.4 76.4-113.3

Species such as Otter (*Lutra lutra*) and Kingfisher (*Alcedo atthis*) may occur on Lough Dan.

2.4 Fisheries and Water Quality

The commonage is located within the Eastern River Basin District within the Ovoca - Vartry catchment (010) and the Avonmore Sub-catchment (SC010).

¹ Curtis, T.G.F and F. Wilson (2009). The Montane Flora of County Wicklow. Unpublished report for The Heritage Council.

² Cummins, S., Bleasdale, A., Douglas, C., Newton, S., O'Halloran, J. & Wilson, H.J. (2010) The status of Red Grouse in Ireland and the effects of land use, habitat and habitat quality on their distribution. Irish Wildlife Manuals, No. 50. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.

Lavarnia Brook, two tributaries of the Cornagrainya Brook and Cywock Brook all rise on the slopes below Mullaghcleevaun East Top and Duff Hill. These watercourses are all tributaries of the Inchavore River, which flows into Lough Dan. The Inchavore Brook and Duff Brook rise on the slopes of Kanturk Mountain and also flow into Lough Dan.

Water sampling on the Avonmore River at Oldbridge, just downstream of Lough Dan (and downstream of the commonage) indicates that the Avonmore River at this location is currently assigned a Q value of 4.

The Avonmore River (and its tributaries within the commonage) were deemed to be 'High Status' watercourses in 2007 – 2009 and in 2010 – 2012. They dis-improved in water quality since then and were assessed as 'Good Status' watercourses in 2010 - 2015. Under the Water Framework Directive the watercourses within the commonage were deemed 'at risk' of not achieving 'good' status.

Downstream of the commonage Lough Dan formerly held a population of Arctic Charr (*Salvelinus alpinus*). The Eastern Regional Fisheries Board³ report that this species:

'Was historically present in the lake (Went, 1945 and 1971; Tierney et al., 2000); however, the last authenticated record was validated in 1988 by the Natural History Museum of Ireland (Tierney et al., 2000). The lake was previously surveyed in 1985 and 1989 by the Central Fisheries Board (CFB, The Central and Regional Fisheries Boards 3 unpublished data). The Eastern Regional Fisheries Board surveyed the lake in May and October 1994 and also resurveyed it in association with University College Dublin in 1996. No Arctic char were recorded during any of these surveys (Bowman, 1991; Igoe and Kelly-Quinn, 2002) and it was concluded that the population was extinct, probably as a result of acidification'.

Surveys by Inland Fisheries Ireland (formerly the Central and Regional Fisheries Board) in 2009 recorded Brown trout (*Salmo trutta*) and European eel (*Anguilla anguilla*) in Lough Dan. Other known native species include stickleback (*Gasterosteus aculeatus*).

Lough Dan (IE_EA_10_29) was assessed as a lake waterbody of 'Moderate Status' under the Water Framework Directive in 2007 – 2009 and in 2010-2015.

2.5 Recreation/Amenity

The commonage provides hillwalking access to several popular walking routes in the Wicklow uplands including the summits of Carrigshouk Mountain and Mullaghcleevaun East Top, and the ridges south to Mullaghcleevaun, Barnacullia, Stoney Top and Tonelagee and north east to Duff Hill, Gravale and Conavalla. The summits of Kanturk and Scarr are a popular route from Lough Dan.

3. 2019 Ecological Assessment

3.1 Field Survey

Following the background review and desktop research the site was visited in June and July 2019 when the extent of habitats present within the commonage and their affinities to either Fossitt (Level 3) or Annex I habitats or commonly named habitat types were mapped as shown on **Figures 10, 11, 12 and 13** below and as described above.

³ Central and Regional Fisheries Board (2009). Lough Dan - Sampling Fish for the Water Framework Directive - Lakes 2009.

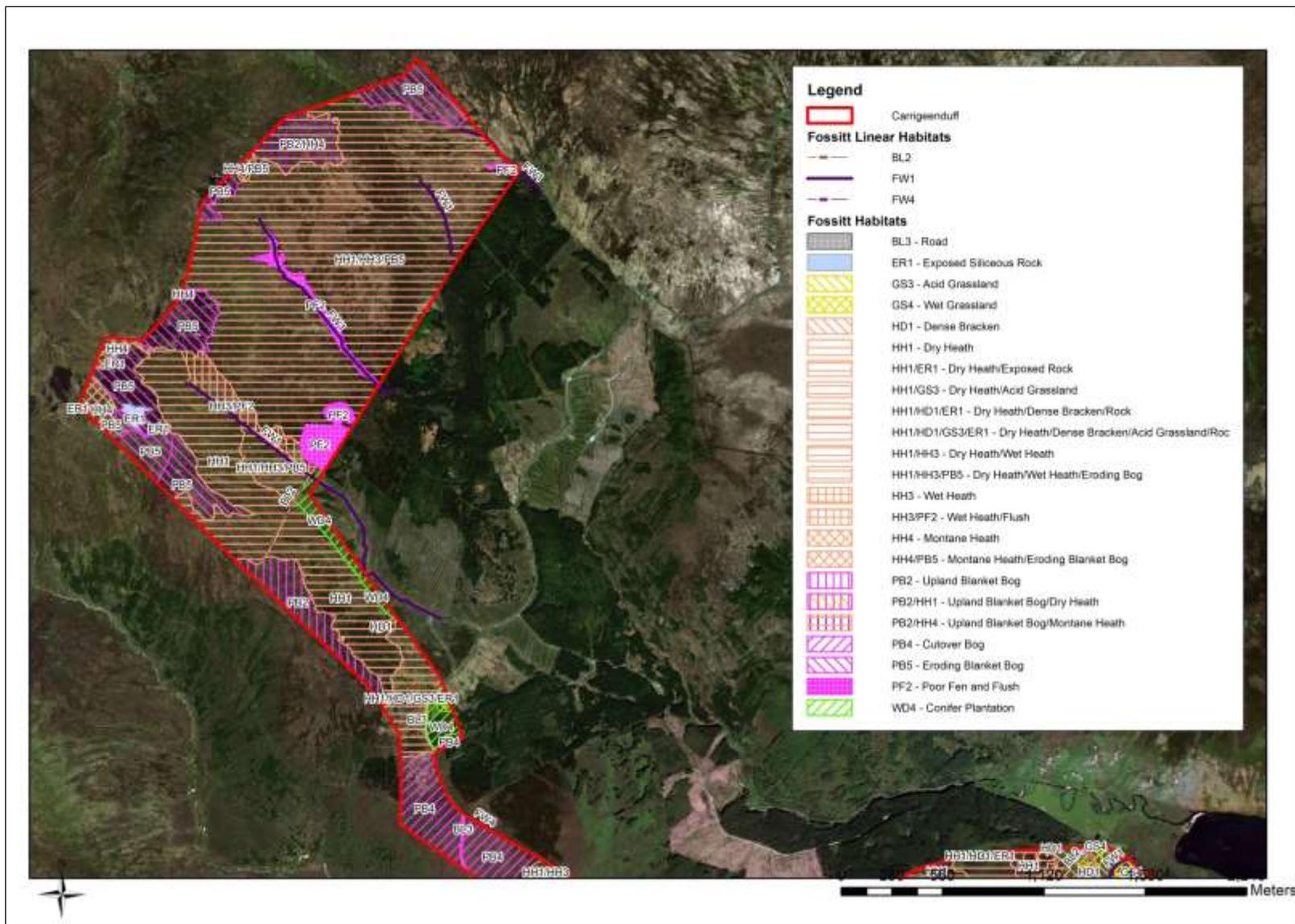


Figure 10. Habitats mapped to Level Three (Fossitt, 2000) within the Carrigeenduff commonage – western section.

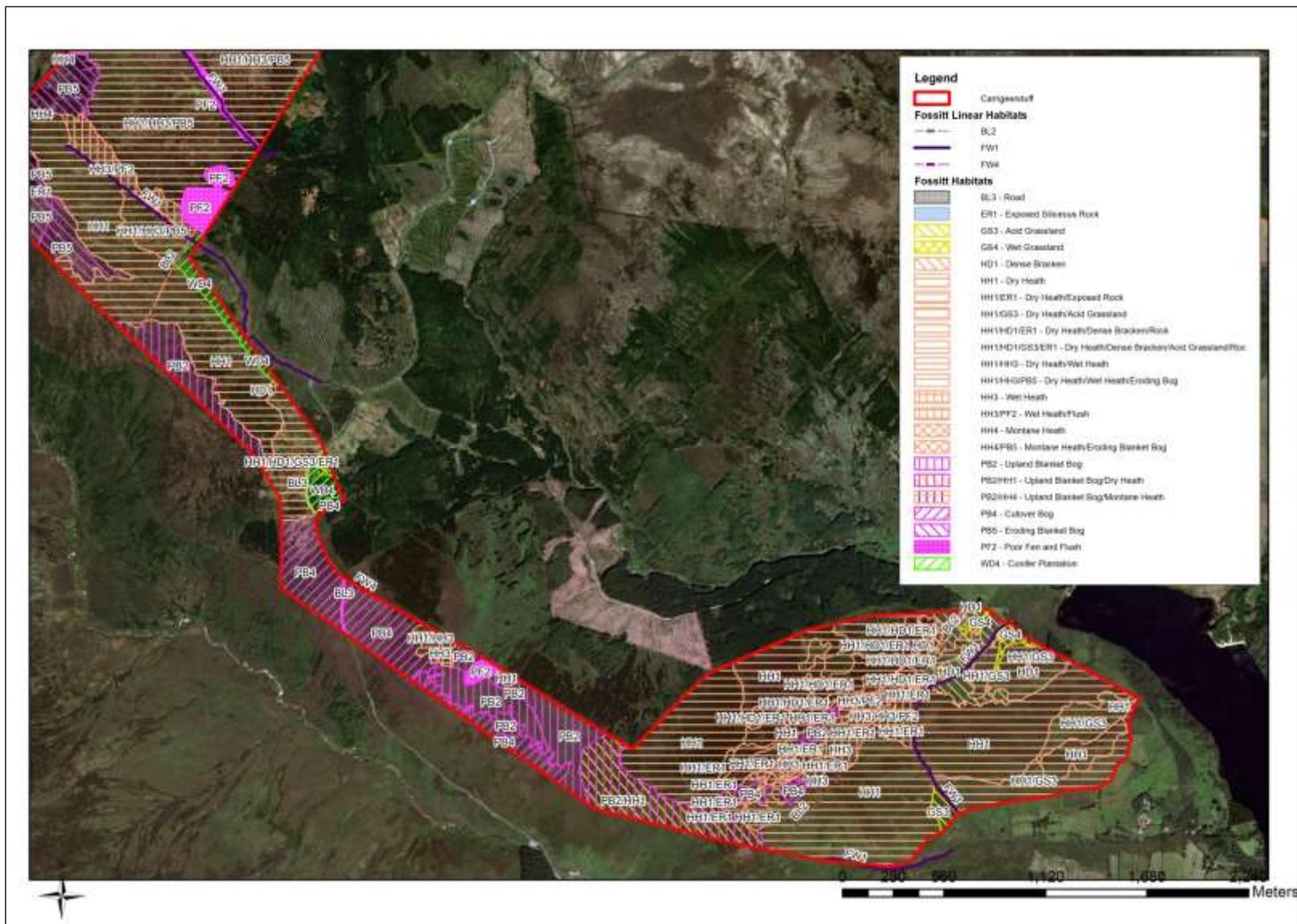


Figure 11. Habitats mapped to Level Three (Fossitt, 2000) within the Carrigeenduff commonage – eastern section.

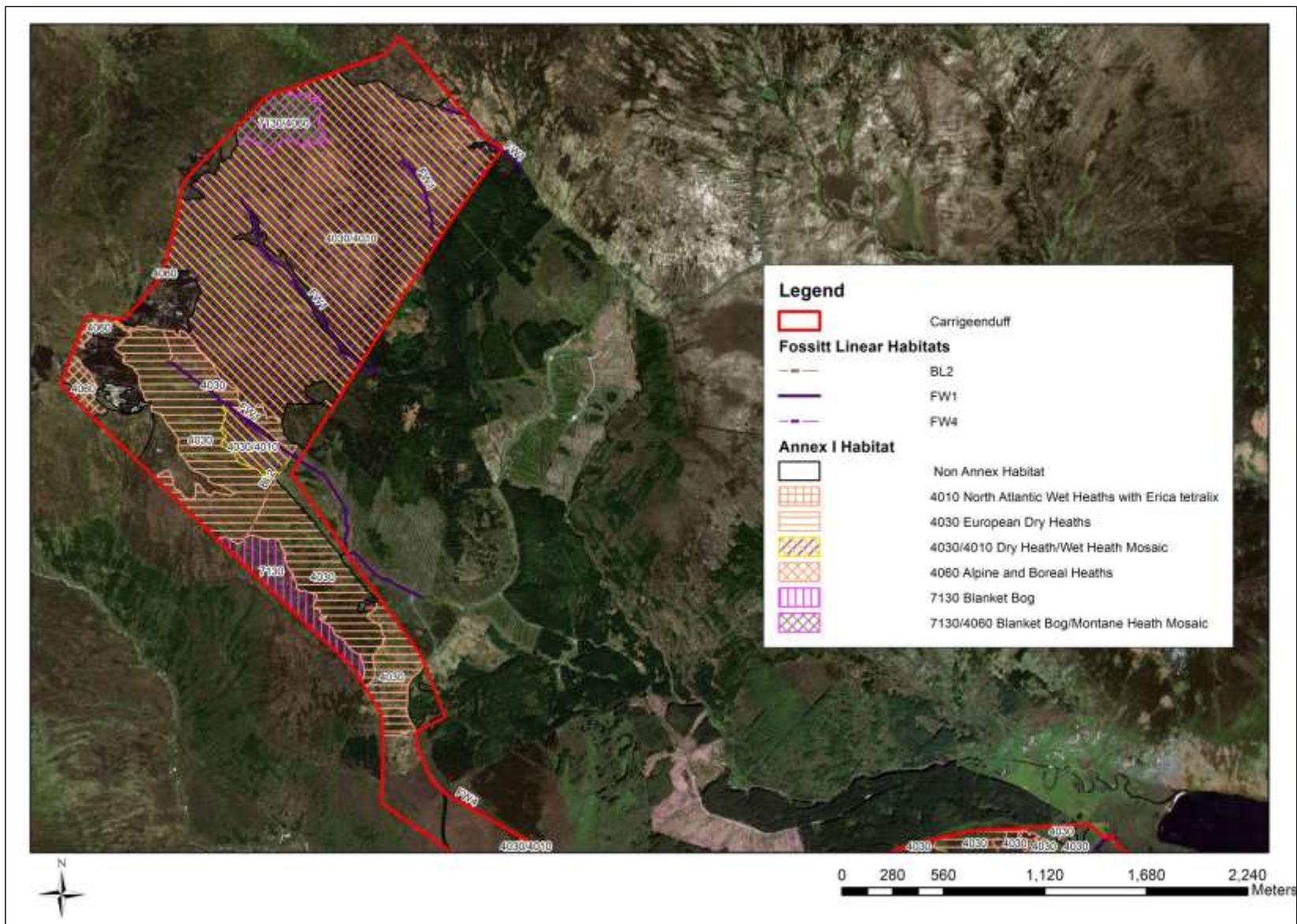


Figure 12. Habitats mapped according to their correspondence with Annex I habitats within the Carrigeenduff commonage - western section.

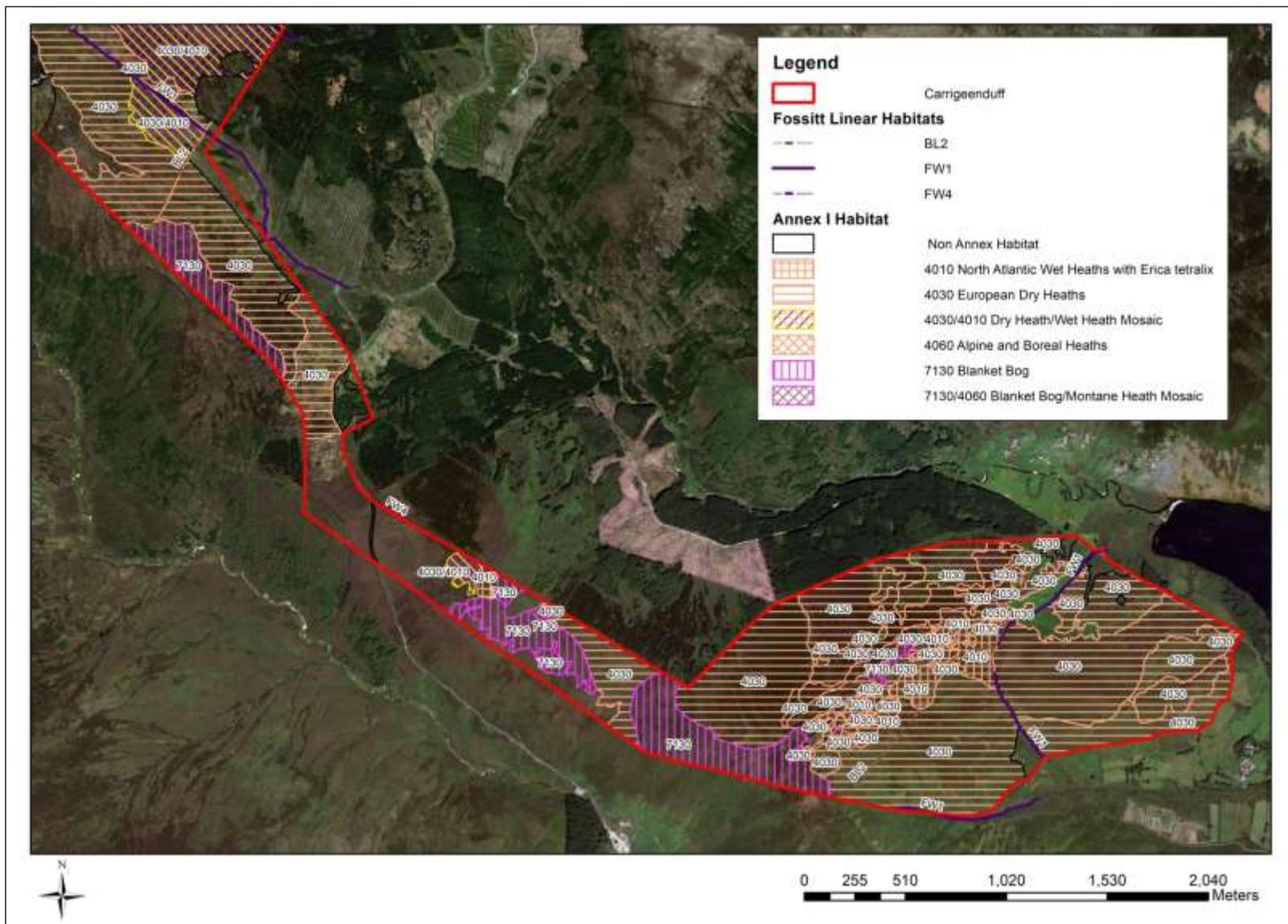


Figure 12. Habitats mapped according to their correspondence with Annex I habitats within the Carrigeenduff commonage – eastern section.

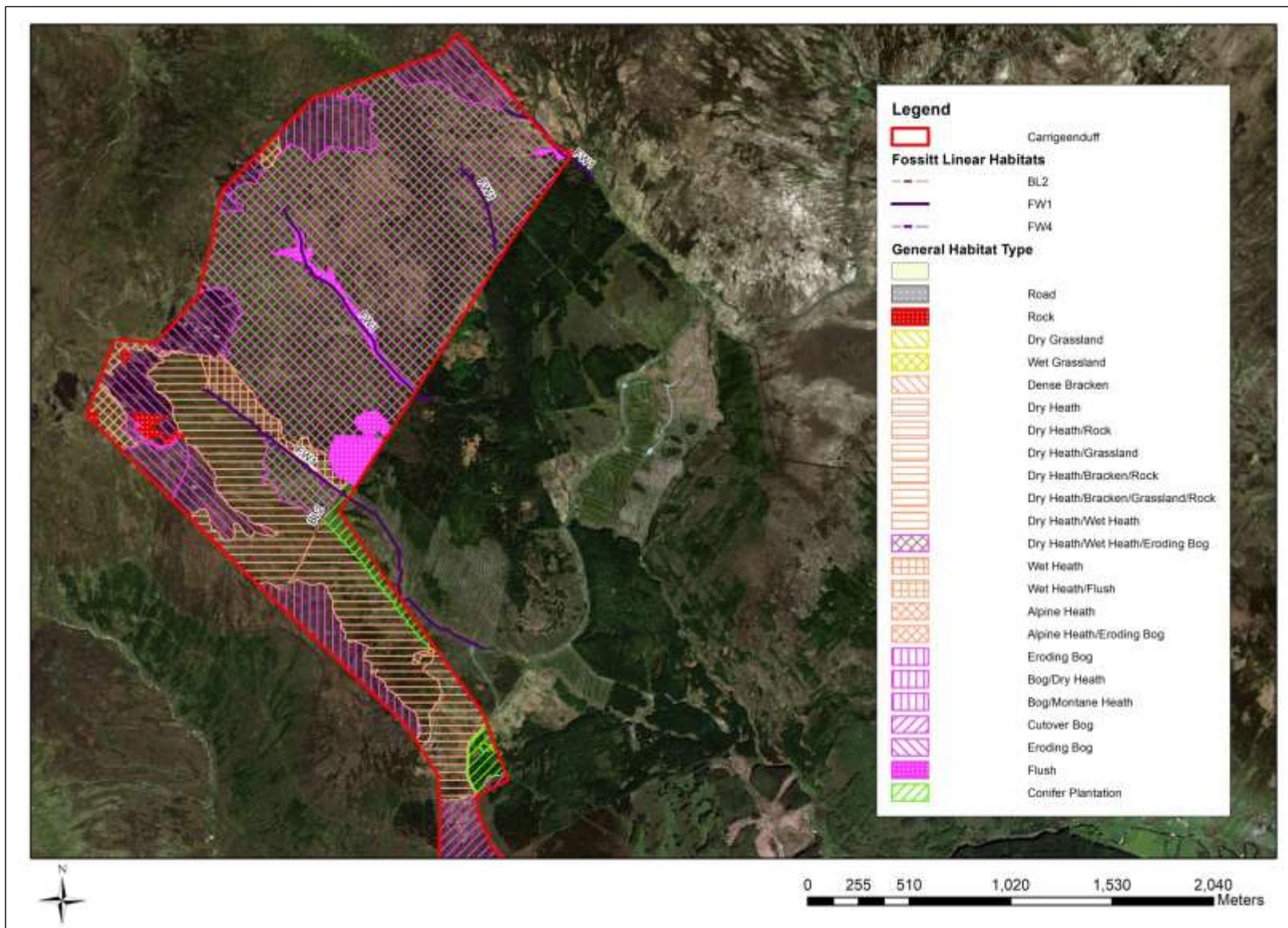


Figure 13. Habitats mapped using general vegetation descriptions - western section.

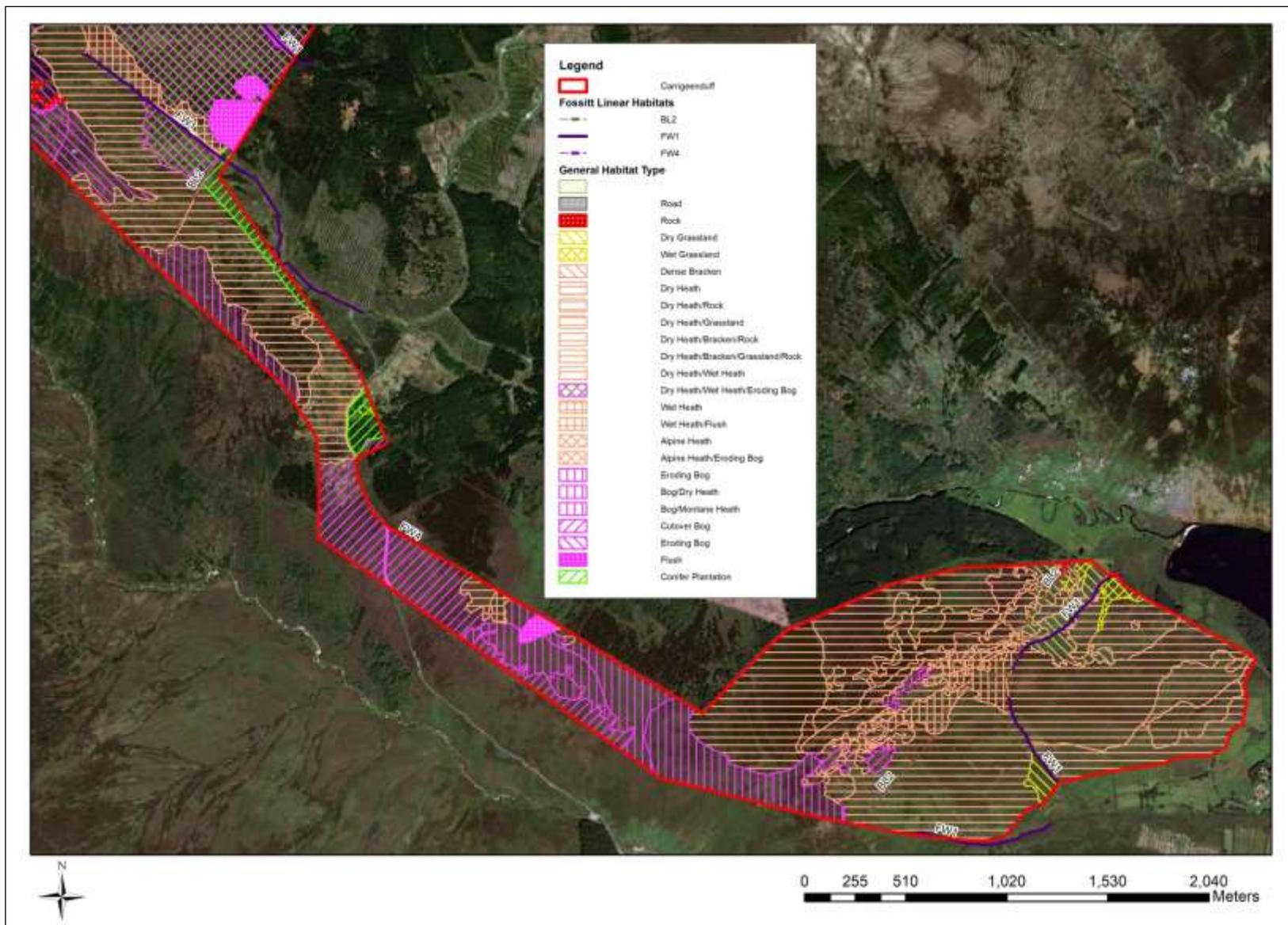


Figure 14. Habitats mapped using general vegetation descriptions - eastern section.

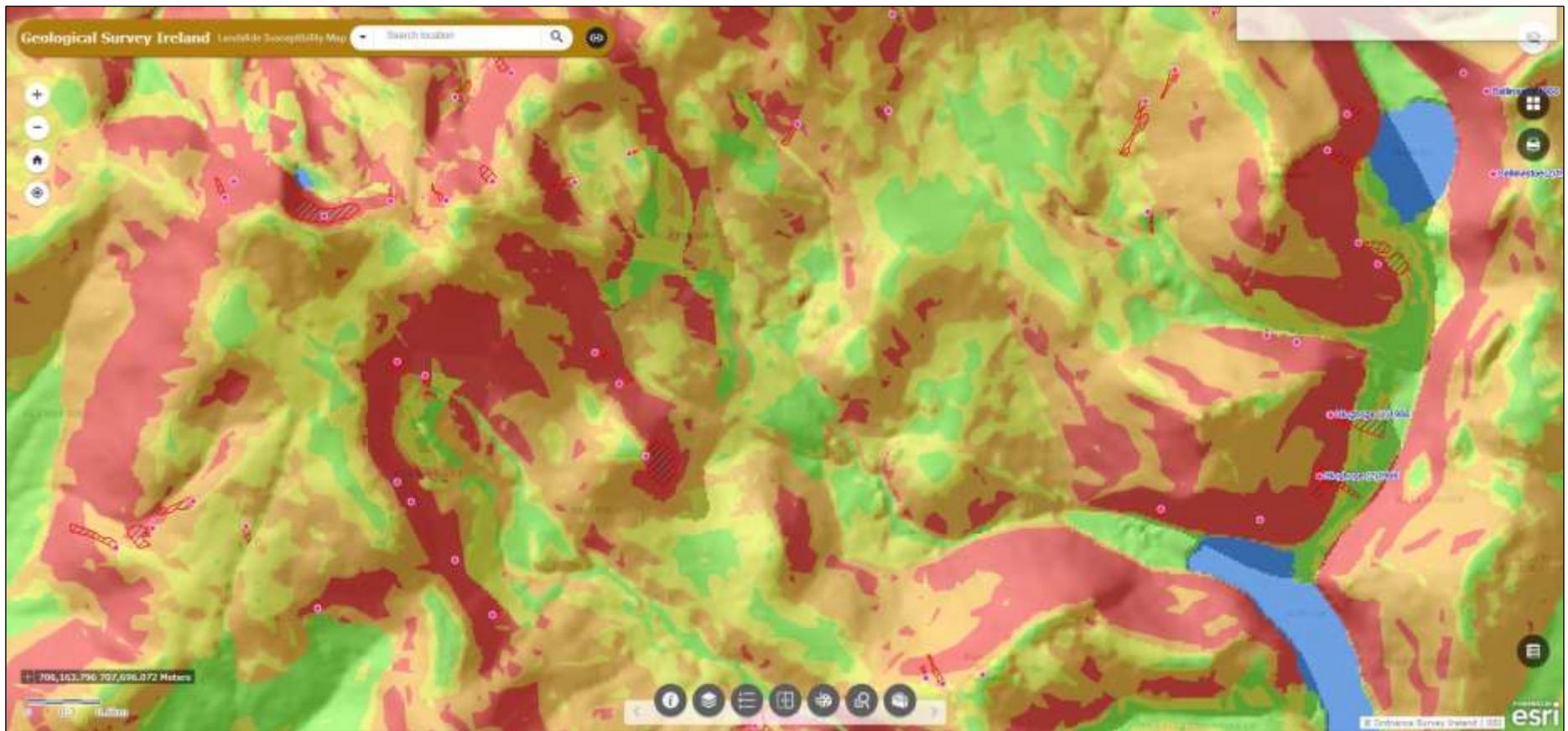


Figure 16. Landslide susceptibility mapping prepared by the Geological Survey of Ireland.

3.2 Habitat Condition Assessments

A standardised protocol for assessing the habitat condition of those habitats listed under Annex I of the EU Habitats Directive was developed. Member states across the European Union must conduct monitoring of the habitats in their jurisdiction and report on the national condition of each habitat under Article 17 of the EU Habitats Directive on a six year basis.

The conservation status of a habitat is defined in Article 1 of the EU Habitats Directive as the sum of the influences acting on a natural habitat and its typical species that may affect its long-term natural distribution, structure and functions as well as the long-term survival of its typical species.

The conservation status of a natural habitat will be taken as favourable when:

- its natural range and the areas it covers within that range are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The Overall Conservation Status Assessment for each habitat is listed as either:

- Favourable
- Unfavourable inadequate (change in management or policy is required to return the habitat to favourable status but there is no danger of extinction in the foreseeable future)
- Unfavourable bad (serious danger of becoming extinct, at least regionally)

There is also an 'Unknown' class which can be used where there is insufficient information available to allow an assessment.

Achieving Favourable Conservation Status (FCS) is the overall objective to be reached for all Annex I habitat types and Annex II species of European Community interest listed in the EU Habitats Directive 92/43/EEC. **It is defined in positive terms such that a habitat type must be prospering and have good prospects of continuing to do so.**

There have been two rounds of monitoring of habitats in Ireland which date from the period 2001 – 2007 and 2007 – 2013. The habitats of relevance to the Wicklow Uplands were assessed at a national level in 2007 and 2013 as shown in **Table 2** below. There have been very few detailed assessments of the habitats in the Wicklow Mountains to date. In general the upland habitats of Ireland, when assessed at a national level are in very poor condition. The next round of monitoring results is due in 2019.

Table 2. Condition of upland habitats in Ireland (those habitats of relevance to the Wicklow uplands are shown).

Habitat	Area		Structure & Functions		Future Prospects		Overall Status	
	2007	2013	2007	2013	2007	2013	2007	2013
4010 Wet heaths	Unknown	Unfavourable – Inadequate	Unfavourable – Bad					
4030 Dry heaths	Favourable	Unfavourable – Inadequate	Unfavourable – Inadequate	Unfavourable – Bad	Unfavourable – Inadequate	Unfavourable – Bad	Unfavourable – Inadequate	Unfavourable – Bad
4060 Alpine and Boreal heaths	Unfavourable – Inadequate	Favourable	Unfavourable – Inadequate	Unfavourable – Bad	Unfavourable – Inadequate	Unfavourable – Bad	Unfavourable – Inadequate	Unfavourable – Bad
6230 Nardus grasslands*	Unfavourable – Bad							
7130 Blanket bogs (* if active bog),	Unfavourable – Bad	Unfavourable – Bad	Unfavourable – Inadequate	Unfavourable – Bad				
8110 Siliceous screes	Unfavourable – Inadequate	Favourable	Unfavourable – Inadequate					
8210 Calcareous rocky slopes	Unfavourable – Inadequate	Favourable	Unfavourable – Inadequate					
8220 Siliceous rocky slopes	Unfavourable – Inadequate	Favourable	Unfavourable – Inadequate					

The main pressures, damaging activities and threats to the upland habitats which have been identified in the most recent national assessments are presented below:

Wet Heath - There are ongoing losses in habitat Area due to afforestation and agricultural improvement. The quality of the habitat has been impacted by overgrazing and trampling, burning, invasive non-native species, drainage and erosion. Stock reductions implemented through commonage framework plans have led to an increase in height and cover of dwarf shrubs and reduction in extent of bare peat at many sites. Nevertheless, the Overall Status of this habitat is assessed as Bad due to the continued impact of the pressures listed above. The overall trend is considered to be stable due to the improvements resulting from stock reductions that balance out losses in Area.

Dry Heath - There have been ongoing losses in Area due to afforestation and agricultural improvement. Although the quality of the habitat has been impacted by overgrazing, burning, invasive non-native species and drainage, destocking brought about from the commonage framework plans has led to recovery in many upland areas. The Overall Status is assessed as Bad due to the impacts of the pressures listed. The overall trend is considered to be stable, the losses in Area balanced by the improvements in quality. The 2007 assessment was not underpinned by extensive survey and expert judgement was used to give an Overall Status of Inadequate. In light of current data it is likely that the 2007 assessment should have also been Bad.

Alpine & Sub-alpine Heath - Sheep grazing is widespread in uplands where alpine and subalpine heath occurs and, where levels of grazing are high, is problematic within this habitat. Hill walking is often concentrated on the ridges and summits where this habitat is found and can cause trampling and erosion of the habitat. Abandonment, scrub encroachment and decline in traditional farming methods are widely viewed to have negative effects on the conservation status of habitats in the Burren. For these reasons the Overall Status of this habitat is considered to be Bad. Conservation measures undertaken in the uplands and the Burren to address grazing problems have resulted in an improving trend. The 2007 assessment was not underpinned by extensive survey and expert judgement was used to give an Overall Status of Inadequate. In light of current data it is likely that the 2007 assessment should have also been Bad.

Species-rich Nardus Grassland - The Overall Status is assessed as Bad due to ongoing losses caused by forestry planting and agricultural improvement (fertilisation and re-seeding of the habitat) and also succession to heath and scrub. Due to ongoing losses to this habitat there is a declining trend for the habitat since the 2007 assessment.

Blanket Bog - The main threats to blanket bog include overgrazing and trampling, drainage, afforestation, mechanical peat-extraction, burning and windfarm and other infrastructural development. Reductions in sheep numbers on upland commonages over the last decade has had a major positive impact on overgrazed areas, however recovery is a slow process and restoration measures are required to prevent further erosion of blanket bog. The Overall Status of this habitat is assessed as Bad with an ongoing decline of extent and quality.

Siliceous Scree - This habitat that may be threatened by ecologically unsuitable grazing levels, recreational activities such as rock-climbing and invasive non-native species. The Overall Status is assessed as Inadequate, but with an improving trend. This trend is brought about by the implementation of the Commonage Framework Plans which address ecologically unsuitable grazing levels.

Calcareous Rocky Slopes - This habitat is threatened by ecologically unsuitable grazing levels, recreational activities such as rock climbing, quarrying and invasive non-native species. The Overall Status of this habitat is assessed as Inadequate with no major changes since 2007.

Siliceous Rocky Slopes - This habitat is threatened by ecologically unsuitable grazing levels, recreational activities such as rock-climbing, and invasive non-native species. For these reasons the Overall Status of this habitat is assessed as Inadequate with no major changes since 2007.

For a habitat to be deemed in Favourable Conservation Status an assessment is made on the following criteria:

- **Area** - there should be no decrease in the area of the habitat. For example areas of heathland habitat may have been lost to grassland as a result of overgrazing/animals congregating in one area or by the invasion of a species such as bracken.
- **Structure and Functions** - Structure and functions relates to the physical components of a habitat ("structure") and the ecological processes that drive it ("functions"). For blanket bogs and associated habitats, these include a range of aspects such as soil chemistry, vegetation composition, hydrological regime, community diversity, habitat quality, species occurrence, indicators of local distinctiveness, disturbed ground, evidence of burning and negative species occurrence.
- **Future Prospects** - The impacts of pressures and threats on the habitat coupled with the general condition of the habitat are used to determine the Future Prospects (i.e. the long term viability of the habitat).
- **Overall Status** - For a "favourable" Overall Assessment for the habitat all parameters must be assessed as "favourable" (with one "unknown" acceptable); if any one of the parameters is assessed as "unfavourable - bad", the Overall Assessment is also "bad"; any other combination would result in an "unfavourable - inadequate" Overall Assessment.

Under the SUAS project the habitats that correspond to the Annex I habitats have been assessed using the methodology outlined in Perrin *et al* (2014).

A number of monitoring stops were completed in each of the Annex I habitats present within the commonage (4010 Northern Atlantic Wet Heaths with *Erica tetralix*, 4030 European Dry Heaths, 4060 Alpine and Boreal Heath and 7130 Blanket Bog). The number of monitoring stops completed depended on the size of the habitat. These are detailed below.

For those habitats which are not Annex I habitats such as acid grassland, mosaics of habitat, areas of dense bracken or fens and flushes the habitat condition is based on best expert judgement or in some cases from the perspective of the hill farmer.

The results of these habitat condition assessments for the various parts of the commonage are presented on **Figure 17** below.

3.2.1 4010 Northern Atlantic Wet Heaths with *Erica tetralix*

A total of 3 monitoring stops were recorded within the 4010 Northern Atlantic Wet Heaths with *Erica tetralix* habitat within the commonage. The results of the 3 monitoring stops conducted are presented below in Table 3.2.1.

Table 3.2.1. Monitoring criteria and failure rates for 4010 Northern Atlantic Wet Heaths with *Erica tetralix* (n = 3).

Criteria	Scale of assessment	Number of assessments	Number of failures	Failure rate (%)
Vegetation composition				
1. <i>Erica tetralix</i> present	20m radius	3	0	0
2. Cover of positive indicator species ≥ 50%	Relevé	3	1	33
3. Total cover of <i>Cladonia</i> species, <i>Sphagnum</i> species, <i>Racomitrium lanuginosum</i> and pleurocarpous mosses ≥ 10%	Relevé	3	0	0
4. Cover of ericoid species and <i>Empetrum nigrum</i> ≥ 15%	Relevé	3	1	33
5. Cover of dwarf shrub species < 75%	Relevé	3	0	0
6. Cover of the following negative indicator species: <i>Agrostis capillaris</i> , <i>Holcus lanatus</i> , <i>Phragmites australis</i> , <i>Ranunculus repens</i> collectively < 1%	Relevé	3	0	0
7. Cover of non-native species < 1%	Relevé	3	0	0
8. Cover of non-native species < 1%	Local vicinity	3	0	0
9. Cover of scattered native trees and scrub < 20%	Local vicinity	3	0	0
10. Cover of <i>Pteridium aquilinum</i> < 10%	Local vicinity	3	0	0
11. Cover of <i>Juncus effusus</i> < 10%	Local vicinity	3	0	0
Vegetation structure				
12. Crushed, broken and/or pulled up <i>Sphagnum</i> species < 10% of <i>Sphagnum</i> cover	Relevé	3	0	0
13. Last complete growing season's shoots of ericoids, <i>Empetrum nigrum</i> and <i>Myrica gale</i> showing signs of browsing collectively < 33%	Relevé	3	2	66
14. No signs of burning into the moss, liverwort or lichen layer, or exposure of peat surface due to burning	Local vicinity	3	1	33
15. No signs of burning inside boundaries of sensitive areas ⁴	Local vicinity	3	1	33
Physical structure				
16 Cover of disturbed bare ground < 10%	Relevé	3	1	33
17 Cover of disturbed bare ground < 10%	Local vicinity	3	1	33
18 Area showing signs of drainage resulting from heavy trampling or tracking or ditches < 10%	Local vicinity	3	2	66

Area

A review of the aerial photography from the 1990s and other data sources for the commonage including the commonage framework plan data indicate that there has been a reduction in the area of wet heath. Areas of what was mapped as wet heath in the Commonage Framework Plan along the slopes of the Carrigshouk Ridge and below the Mullaghcleevaun East Top to Duff Hill ridge have been burnt and as a result the peat has dried and now supports areas of poor quality dry heath. Similarly areas of habitat on the slopes of Kanturk above Duff Brook were also mapped in the Commonage Framework Plan as a mosaic of wet heath/dry heath and acid grassland. These areas have been repeatedly burnt. These slopes are now vegetated with damaged burnt dry heath or species poor grassland habitats dominated by either purple moor grass or deer grass as a result of

⁴ Sensitive areas

- (a) Vegetation severely wind-clipped, mostly forming a mat less than 10 cm thick.
- (b) Areas where soils are thin and less than 5 cm deep.
- (c) Slopes greater than 1 in 3 (18°) and all the sides of gullies.
- (d) Ground with abundant, and/or an almost continuous carpet of *Sphagnum*, liverworts and/or lichens.
- (e) Pools, wet hollows, hags and erosion gullies, and within 5 - 10 m of the edge of watercourses.
- (f) Areas above 400 m in altitude.
- (g) Areas within 50 m of functioning drains.

burning. For these reasons the overall area of **4010 Northern Atlantic Wet Heaths with *Erica tetralix*** within the commonage was therefore assessed as **Unfavourable – Inadequate**.

Structure and Functions

In the assessment of structure and functions, two monitoring stops failed one criterion or more. The structure and functions of **4010 Northern Atlantic Wet Heaths with *Erica tetralix*** were therefore generally assessed as **Unfavourable – Bad**.

The vegetation composition of **4010 Northern Atlantic Wet Heaths with *Erica tetralix*** was generally good with 1 monitoring stop failing. This stop failed as a result of burning and grazing.

The vegetation structure of **4010 Northern Atlantic Wet Heaths with *Erica tetralix*** was bad as a result of intensive and frequent uncontrolled burns coupled with grazing pressure which lead to trampling and bare peat in some locations.

The effects of this impact are apparent in the vegetation composition, vegetation structure and physical structure of this habitat. Areas of **4010 Northern Atlantic Wet Heaths with *Erica tetralix*** within the commonage are damaged from burning and inappropriate grazing. This will require active management/ intervention through destocking the hill to reduce grazing pressure and no further burning to ensure that the vegetation composition of **4010 Northern Atlantic Wet Heaths with *Erica tetralix*** in previously burnt areas recovers.

Future Prospects

The future prospects for the habitat are assessed as **Unfavourable – Inadequate** in the absence of active management of the commonage. There should be no more uncontrolled burns in the commonage and areas which have been damaged will require destocking and active shepherding of trespassing sheep to move the sheep out of these areas. Deer numbers will also need to be controlled.

Overall the conservation status assessment for **4010 Northern Atlantic Wet Heaths with *Erica tetralix*** habitat within the commonage is currently assessed as **Unfavourable – Bad**.

3.2.2 4030 Dry Heath

A total of 22 monitoring stops were recorded within the **4030 Dry heath** habitat within the commonage. The results of the monitoring stops are presented below in **Table 3.2.2**.

Table 3.2.2: Monitoring criteria and failure rates for 4030 Dry heath ($n = 22$).

Criteria	Scale of assessment	No. of Assessments	No of Failures	Failure Rate (%)
Vegetation composition				
1. Number of bryophyte or non-crustose lichen species present, excluding <i>Campylopus</i> spp. and <i>Polytrichum</i> spp. ≥ 3	Relevé	22	19	86.36
2. Number of positive indicator species present ≥ 2 (Appendix VI)	Relevé	22	3	15.79
3. Siliceous heaths: cover of positive indicator species $\geq 50\%$ (Appendix VI)	Relevé	22	0	0
4. Proportion of dwarf shrub cover composed of <i>Myrica gale</i> , <i>Salix repens</i> , <i>Ulex gallii</i> collectively $< 50\%$	Relevé	22	0	0
5. Cover of the following weedy negative indicator species: <i>Cirsium arvense</i> , <i>C. vulgare</i> , <i>Ranunculus repens</i> , large <i>Rumex</i> species (except <i>R. acetosa</i>), <i>Senecio jacobaea</i> , <i>Urtica dioica</i> collectively $< 1\%$	Relevé	22	0	0
6. Cover of non-native species $< 1\%$	Relevé	22	0	0
7. Cover of non-native species $< 1\%$	Local vicinity	22	1	4.55
8. Cover of scattered native trees and scrub $< 20\%$	Local vicinity	22	0	0

Criteria	Scale of assessment	No. of Assessments	No of Failures	Failure Rate (%)
9. Cover of <i>Pteridium aquilinum</i> < 10%	Local vicinity	22	1	4.55
10. Cover of <i>Juncus effusus</i> < 10%	Local vicinity	22	1	4.55
Vegetation structure				
11. Senescent proportion of <i>Calluna vulgaris</i> cover < 50%	Relevé	22	2	9.09
12. Last complete growing season's shoots of ericoids and <i>Empetrum nigrum</i> showing signs of browsing collectively < 33% (Assess a minimum of 10 shoots distributed across the plot)	Relevé	22	7	31.82
13. No signs of burning inside boundaries of sensitive areas ⁵	Local vicinity	22	8	36.36
14. Outside boundaries of sensitive areas, all growth phases of <i>Calluna vulgaris</i> should occur throughout, with ≥ 10% of cover in mature phase ⁶	Local vicinity	22	9	40.91
Physical structure				
15. Cover of disturbed bare ground < 10%	Relevé	22	2	9.09
16. Cover of disturbed bare ground < 10%	Local vicinity	22	2	9.09

Dry heath is found across much of the slopes of the commonage, often surrounding outcropping boulders, in a mosaic with dry acid grassland and bracken, and occasionally in a mosaic with wet heath. Large areas of what would have been dry heath habitat within the commonage on the slopes of Kanturk now consist of dry acid grassland as a result of repeated burning and grazing and further areas are being lost as a result of the invasion of dense bracken. In some areas species above the Duff Stream poor grassland dominated by Mat grass or Deer grass is developing following burning. Some areas of dry heath occur on the edge of old eroding peat hags and in burnt areas - these areas were not generally assessed as part of this assessment.

Area

A review of the aerial photography from the 1990s and other data sources for the commonage indicate that there has been a probable loss in the overall area of dry heath in the commonage.

There is a lack of detailed information on what the previous extent of acid grassland habitat in the commonage was particularly on the southern slopes of Kanturk. The Commonage Framework Plan map would indicate this section of the hill was heath habitat (dry heath/wet heath mosaic) with acid grassland. This area has been repeatedly burnt over many years and as a result of burning the overall extent of dry heath has decreased and large areas are now dominated by acid grassland into which dense bracken is beginning to encroach from the adjoining fields.

⁵ Sensitive areas

- (a) Areas where soils are thin and less than 5 cm deep.
- (b) Hill slopes greater than 1 in 2 (26°), and all the sides of gullies.
- (c) Ground with abundant, and/or an almost continuous carpet of *Sphagnum*, liverworts and/or lichens.
- (d) Areas of H21 and H22 heath as defined by the NVC (Rodwell 1991a). These are heaths primarily composed of mixtures of *Calluna vulgaris* and *Vaccinium myrtillus* over a moist carpet of bryophytes that often has a high *Sphagnum* content. Within the provisional classification, these communities are comparable to DH4 and damper elements of DH6 respectively.
- (e) Areas with noticeably uneven structure, at a spatial scale of around 1 m² or less. The unevenness (e.g. more commonly found in very old heather stands) will relate to distinct, often large, spreading dwarf-shrub bushes. The dwarf-shrub canopy will not be completely continuous, and some of its upper surface may be twice as high as other parts. Layering is likely to be present and may be common.
- (f) Pools, wet hollows, hags and erosion gullies, and within 5 - 10 m of the edge of watercourses.

⁶ *Calluna vulgaris* growth phases

1. Pioneer < 10 cm
2. Building 10 - 30 cm
3. Mature > 30 cm



Plate 32. Burning has been severe and frequent on the slopes of Kanturk. Note Mat grass (*Nardus stricta*) becoming established following burns and heavy grazing.



Plate 33. Mat grass (*Nardus stricta*) is the dominant grass on the hill following burning and grazing.

Systematic and repeated burning of the hill at Kanturk over many years followed by sheep grazing has resulted in significant losses of heath habitat in the commonage.

For this reason the overall area of **4030 Dry heath** within the commonage was therefore assessed as **Unfavourable - Bad**.

Structure and Functions

In the assessment of structure and functions, all 22 monitoring stops failed. 4 stops failed on only one criterion, which related to bryophytes, which were lost following burning. Following a review of the ecological condition of those stops, expert judgement determined that no changes should be made, resulting in an overall failure rate of 100%. The structure and functions of **4030 Dry heath** were therefore assessed as **Unfavourable - Bad**.

The vegetation composition of **4030 Dry heath** was poor and 100% of the monitoring stops failed – the majority of them on account of lack of bryophytes or lichens as a result of burning (86%), 32% on account of grazing pressure, 37% on account of burning, 41% lacked all growth phases of *Calluna* (as a result of burning and grazing) and c.10% had some areas of exposed bare peat. These impacts would all appear to be as a result of previous burning followed by unsustainable grazing.

The vegetation structure of **4030 Dry heath** was generally poor with many areas showing signs of damage from burning or overgrazing.

In some parts of the commonage bracken (*Pteridium aquilinum*) is starting to invade and dominate.

A lack of appropriate management (uncontrolled and illegal burning resulting in severe damage and inappropriate grazing) appears to be the most significant impact on the structure and functions of **4030 Dry heath** in the commonage. The effects of this impact are apparent in the vegetation composition, vegetation structure and physical structure of this habitat.

Future Prospects

The future prospects for the habitat are assessed as **Unfavourable - Bad** unless the hill is destocked and no further burning takes place allowing the hill to recover. These measures may be required for a minimum of ten to fifteen years or more.

Conservation Status Assessment

Overall the conservation status assessment for dry heath habitat within the commonage is assessed as **Unfavourable - Bad**.

3.2.3 4060 Alpine and Boreal Heath

A total of 2 monitoring stops were recorded within the **4060 Alpine and Boreal Heath** habitat within the commonage. Neither of these passed as shown below in Table 3.2.3.

Table 3.2.3: Monitoring criteria and failure rates for 4060 Alpine and Boreal Heath (n = 2).

Criteria	Scale of assessment	No. of Assessments	No of Failures	Failure Rate (%)
Vegetation composition				
1. Number of bryophyte or non-crustose lichen species present ≥ 3	Relevé	2	1	50
2. Cover of positive indicator species $\geq 66\%$ (Appendix VI)	Relevé	2	0	0
3. Cover of dwarf shrubs $\geq 10\%$	Relevé	2	0	0
4. Cover of the following negative indicator species: <i>Agrostis capillaris</i> , <i>A. vinealis</i> , <i>Anthoxanthum odoratum</i> , <i>Deschampsia flexuosa</i> , <i>Festuca ovina</i> , <i>F. vivipara</i> , <i>Galium saxatile</i> , <i>Potentilla erecta</i> and <i>Poa</i> spp. (except <i>Poa alpina</i>) collectively $< 10\%$	Relevé	2	0	0
5. Cover of non-native species $< 1\%$	Relevé	2	0	0
Vegetation structure				
6. Live leaves of <i>Carex bigelowii</i> , <i>Deschampsia flexuosa</i> , <i>Festuca ovina</i> , <i>F. vivipara</i> showing signs of grazing collectively $< 10\%$	Relevé	2	1	50
7. Last complete growing season's shoots of ericoids and <i>Empetrum nigrum</i> showing signs of browsing collectively $< 33\%$ (Assess a minimum of 10 shoots distributed across the plot)	Relevé	2	0	0
8. No signs of burning inside feature	Local vicinity	2	1	50
Physical structure				
9. Cover of disturbed bare ground $< 10\%$	Relevé	2	0	0
10. Cover of disturbed bare ground $< 10\%$	Local vicinity	2	1	50

Area

A review of the aerial photography from the 1990s and other data sources for the commonage indicate that there has been a loss in the overall area of montane heath in the commonage. This loss is on the summits of Mullaghcleevaun East Top and Duff Hill arising from burning, grazing (from deer and sheep), minor trampling from walkers, and natural erosion. For this reason the area of **4060 Alpine and Boreal Heath** within the commonage was therefore assessed as **Unfavourable - Inadequate**.

Structure and Functions

In the assessment of structure and functions, both monitoring stop failed one criterion or more. Following a review of the ecological condition of those stops, expert judgement determined that no changes in the assessment should be made, resulting in an overall failure rate of 100%. The structure and functions of **4060 Alpine and Boreal Heath** were therefore assessed as **Unfavourable - Bad**. The vegetation composition of **4060 Alpine and Boreal Heath** was often poor on account of the lack of bryophytes or lichens and other key species resulting from historic burns.

In many areas on the summits, grazing pressure was high and the vegetation structure of the habitat which was damaged from historic burning has been further compromised from erosion resulting in exposure of the siliceous subsoil and granite bedrock beneath. Much of this activity has been exacerbated by the presence of grazing animals and is further compounded by natural erosion. There are localised impacts from walking tracks on the summits. The loss of several key indicator species of **4060 Alpine and Boreal Heath** (as documented by Curtis & Wilson, 2008) is also indicative of the poor condition of this habitat.

Future Prospects

The future prospects for the habitat **4060 Alpine and Boreal Heath** are assessed as **Unfavourable - Bad** in the absence of active management of the erosion of peat by the commonage group given

projected increased rainfall and storm events associated with climate change which will increase and exacerbate natural erosion.

Conservation Status Assessment

Overall the conservation status assessment for the habitat **4060 Alpine and Boreal Heath** within the commonage is assessed as **Unfavourable - Bad**.



Plate 34. Alpine clubmoss (*Diphasiastrum alpinum*) amidst areas of intact montane heath on the summit of Mullaghcleevaun East Top.

3.2.4 7130 Blanket Bog

A total of 13 monitoring stops were recorded within the **7130 Blanket Bog** habitat within the commonage. The results of the 13 monitoring stops are presented below in **Table 3.2.4**. The areas of eroding and cutover bog were not assessed as part of this assessment.

Table 3.2.4: Monitoring criteria and failure rates for 7130 Blanket Bog ($n = 13$).

Criteria	Scale of Assessment	No. of Assessments	No of Failures	Failure Rate (%)
Vegetation composition				
1. Number of positive indicator species present ≥ 7 (Appendix VI)	20m radius	13	2	15
2. Cover of bryophyte or lichen species, excluding <i>Sphagnum fallax</i> $\geq 10\%$	Relevé	13	3	23
3. Cover of each of the following species: <i>Calluna vulgaris</i> , <i>Eleocharis multicaulis</i> , <i>Eriophorum vaginatum</i> , <i>Molinia caerulea</i> , <i>Schoenus nigricans</i> , <i>Trichophorum germanicum</i> individually $< 75\%$	Relevé	13	0	0
4. Cover of the following negative indicator species: <i>Agrostis capillaris</i> , <i>Holcus lanatus</i> , <i>Phragmites australis</i> , <i>Pteridium aquilinum</i> , <i>Ranunculus repens</i> collectively $< 1\%$	Relevé	13	0	0

5. Cover of non-native species < 1%	Relevé	13	0	0
6. Cover of non-native species < 1%	Local vicinity	13	0	0
7. Cover of scattered native trees and scrub < 10%	Local vicinity	13	0	0
Vegetation structure				
8. Crushed, broken and/or pulled up <i>Sphagnum</i> species < 10% of <i>Sphagnum</i> cover	Local vicinity	13	6	46
9. Last complete growing season's shoots of ericoids, <i>Empetrum nigrum</i> and <i>Myrica gale</i> showing signs of browsing collectively < 33% (Assess a minimum of 10 shoots distributed across the plot)	Relevé	13	6	46
10. No signs of burning into the moss, liverwort or lichen layer or exposure of peat surface due to burning	Relevé	13	1	8
11. No signs of burning inside boundaries of sensitive areas ⁷	Local vicinity	13	2	15
Physical structure				
12. Cover of disturbed bare ground < 10%	Relevé	13	5	38
13. Cover of disturbed bare ground < 10%	Local vicinity	13	5	38
14. Area showing signs of drainage resulting from heavy trampling or tracking or ditches or peat cutting < 10%	Local vicinity	13	0	0
15. Cover of erosion gullies and eroded areas within the greater bog mosaic ⁸ < 5%	Local vicinity	13	7	54

Area

A review of the aerial photography from the 1990s and other data sources for the commonage indicate that there has been no significant change in the overall area of blanket bog in the commonage since designation. However the landslide data gathered by the Geological Survey of Ireland indicates that there have been slips and landslides on the main ridge, which would have resulted in localised losses of blanket bog habitat (see **Figure 15**). The field surveys confirmed that erosion is ongoing in these areas as evidenced by the extensive areas of bare peat, cracks, gullies, tear pools and erosion of the peat surface on the ridge. The situation has worsened since the Montane Flora of Wicklow Survey in 2008 (pers. obs). For this reason the overall area of **7130 Blanket Bog** within the commonage was therefore assessed as **Unfavourable - Bad** as large areas of habitat are being eroded.

Structure and Functions

In the assessment of structure and functions, 10 of the 13 monitoring stops failed one criterion or more. Following a review of the ecological condition of those stops, expert judgement determined that no changes should be made, resulting in an overall failure rate of 77%. The structure and functions of **7130 Blanket Bog** were therefore assessed as **Unfavourable - Bad**.

The vegetation composition of **7130 Blanket Bog** was often relatively good and two of the monitoring stops failed on account of lack of indicator species, and three failed on account of lack of bryophytes or lichens. This is on account of the intensity, frequency, severity of the burns experienced by the habitat on the ridge coupled with grazing pressure from sheep (and deer).

The vegetation structure of **7130 Blanket Bog** was failed in many stops (46%) on account of grazing pressure, while burning caused 8 and 15% of stops to fail. The physical structure of the bog with significant areas of bare eroding peat, eroding gullies and physical cracks in the bog structure caused 54% of stops to fail while bare peat caused the failure of 38%.

⁷ Sensitive areas

- Slopes greater than 1 in 3 (18°), and all the sides of gullies.
- Ground with abundant and/or an almost continuous carpet of *Sphagnum*, other mosses, liverworts and/or lichens.
- Patterned areas i.e. with pools, wet hollows, hags and erosion gullies.
- Areas within 5-10 m of watercourses.
- Areas above 400 m in altitude.
- Areas within 50 m of functioning drains.

⁸ The greater bog mosaic incorporates the Annex I Blanket bog itself and associated vegetation types and non-vegetation cover types that appear to have been derived from former blanket bog, including, but not limited to, HW2, bare peat, loose rock, gravel and running water.

A history of uncontrolled burns, coupled with grazing pressure from sheep and deer, along with natural erosion and exposure, appears to be the most significant impact on the structure and functions of **7130 Blanket Bog** in the commonage. The effects of these impacts are apparent in the vegetation composition, vegetation structure and physical structure of this habitat.

The worst affected areas were those on the summits and ridge between Mullaghcleevaun East Top and Duff Hill where a legacy of burning, inappropriate grazing, exposure and natural erosion as resulted in large areas of damaged and eroding blanket bog with remnant peat hags some 2m above surrounding areas. This area was assessed as **Unfavourable - Bad**.

The blanket bog habitat on the saddle between the Military Road and Kanturk was in favourable condition outside of areas of old peat cutting (3 out of 4 stops conducted here passed) however in the long term this area is probably compromised by this historic peat cutting, the hydrological impacts of the adjoining forestry and the high risk of uncontrolled burns from the Military Road – a very large recent fire left much of the lands on the slopes of Scarr Mountain (further south of here in the valley below the Glenmacnass Waterfall) including some areas of conifer plantation badly damaged. This area of the commonage was therefore assessed as **Unfavourable - Inadequate**.

Whilst the CFP recommended reductions in stock (varying from 2% in WI4a, which was assessed as MU – moderate to undamaged, to 35.2% in WI4b where the ridge and summit was assessed as MS – moderate to severely damaged on account of plateau erosion while other areas were assessed as undamaged but recent burning was noted, to 1.5.1% in WI4e, part of which was assessed as moderately damaged on account of burning) it is unclear if this occurred. Continued burning, coupled with trespass from other commonages and an increasing deer population in the area may have negated any destocking effects. The current condition of the habitat in much of the commonage is overall in very poor condition. There is some damage from walkers but in light of that caused by burning and inappropriate grazing it is minor in nature.

Future Prospects

The future prospects for the habitat are assessed as **Unfavourable - Bad** in the absence of active management to begin habitat restoration on the ridges to stop the peat here further eroding.

Conservation Status Assessment

Overall the conservation status assessment for blanket bog habitat within the commonage is assessed as **Unfavourable - Bad**.

3.2.5 Acid Grassland

Large areas of acid grassland on the hill, particularly on Kanturk, have been damaged as a result of burning and inappropriate grazing and the grass species which are beginning to dominate are mat grass and deer grass, which are unpalatable to sheep. The condition of this habitat although not assessed using any formal assessment technique would be assessed as **Unfavourable - Inadequate**.

The results of these assessments are presented on Figure 17 below. Active measures by the members of the commonage groups as set out in the management recommendations will assist in beginning to improve the conservation status of the habitats within Carrigeenduff. However it should be recognised that it may take in some instances over twenty to thirty years for habitats to begin to recover following over two decades of severe uncontrolled burning coupled with the effects of natural erosion and will require active measures to reverse this.

A combination of parameters will need to be addressed to see a move towards habitat recovery (e.g. restoration of hydrological condition, appropriate grazing levels (sheep/deer/sheep in combination with deer, reintroduction of seed material where a species has been lost/has declined to such an extent that seed production is low, etc.) and in some instances factors outside the site (and beyond the control of the commonage group) may be having a negative effect (such as the deposition of atmospheric nitrogen, drainage measures associated with adjacent forestry, etc.).

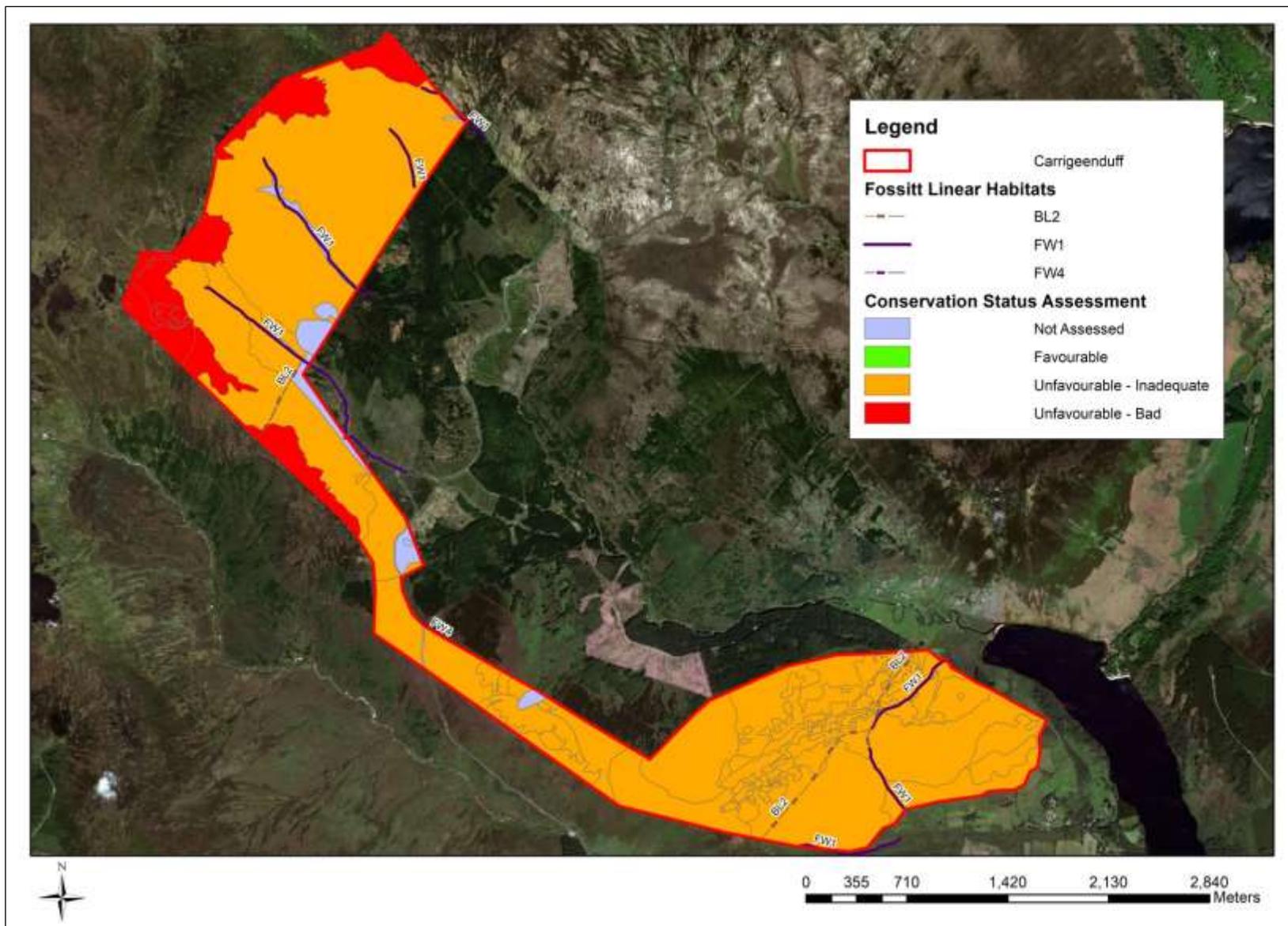


Figure 17. Habitat Condition Assessment for the Annex I habitats within Carrigeenduff Commonage.

4. Management Recommendations for Carrigeenduff

4.1 General Management Measures

A Commonage Management group has been established for the commonage and a management plan will be developed by the members, which will utilise and be informed by the information provided in this report and assessment.

The management prescriptions in the plan need to address the impacts highlighted in this report if progress is to be made towards attaining **Favourable status** for the Annex I habitats present on the site – principally severely damaged Blanket Bog, Dry Heath, Wet Heath and Alpine and Boreal Heath in the long term as well as protection of the existing acid grassland resource.

The major impacts arise from a legacy of decades of uncontrolled burning resulting in extensive areas of peat erosion along the summits and ridges (impacting on upland blanket bog and montane heath) with subsequent severe peat erosion, damage and losses to dry heath habitat with subsequent invasion by dense bracken, inappropriate grazing (from sheep and also from deer) which has not allowed burnt areas to recover, and has also favoured the development of species poor acid grassland over heath. Overgrazing is also contributing to erosion on the ridges and summits coupled with natural exposure and erosion following burning activities.

The levels of livestock grazing (by sheep) were initially assessed through the Commonage Management Plan drawn up in the early 2000s. The CFP recommended reductions in stock (varying from 2% in WI4a, which was assessed as MU – moderate to undamaged, to 35.2% in WI4b where the ridge and summit was assessed as MS - moderate to severely damaged on account of plateau erosion while other areas were assessed as undamaged but recent burning was noted, to 1.5.1% in WI4e, part of which was assessed as moderately damaged on account of burning – see **Figure 18** below.

It is unclear if this destocking occurred. Continued burning, ongoing grazing coupled with trespass from other commonages and an increasing deer population in the area have negated any destocking effects. The Commonage Management Plan also clearly set out that uncontrolled burning would not be allowed, which has clearly been flagrantly ignored since then. As a result the majority of the habitat areas on the hill are currently assessed as being in **Unfavourable/Bad Status**.

There must be no further burning on this commonage until these habitats recover.

The ridge between Carrigshouk Mountain and Mullaghcleevaun East Top and from Mullaghcleevaun East Top east towards Duff Hill and the summit of same (WI4a and WI4b), are in very poor ecological condition and these areas should be the focus of specific measures by the project as they are vulnerable to ongoing severe peat erosion and landslides. These areas of eroding blanket bog and areas of burnt dry heath should have all sheep and other grazing animals (such as deer) removed from them by completely destocking this portion of the hill, shepherding animals off the ridges and by shepherding trespassing stock from adjoining commonages to encourage these animals to graze elsewhere. This will reduce grazing pressure from domestic animals and allow the habitats here to begin to recover.

The impacts of grazing deer in this area are harder to resolve. In order to determine the grazing impact of deer in these areas it is recommended that a number of enclosures are erected, which would allow changes in vegetation to be monitored. These will require the erection of flight diverters on the fences to reduce collision risk for grouse on the site. Counts of deer and a mark-up of their indicative locations on the hill should also be made during the shepherding sessions to develop an understanding of deer populations in the area.

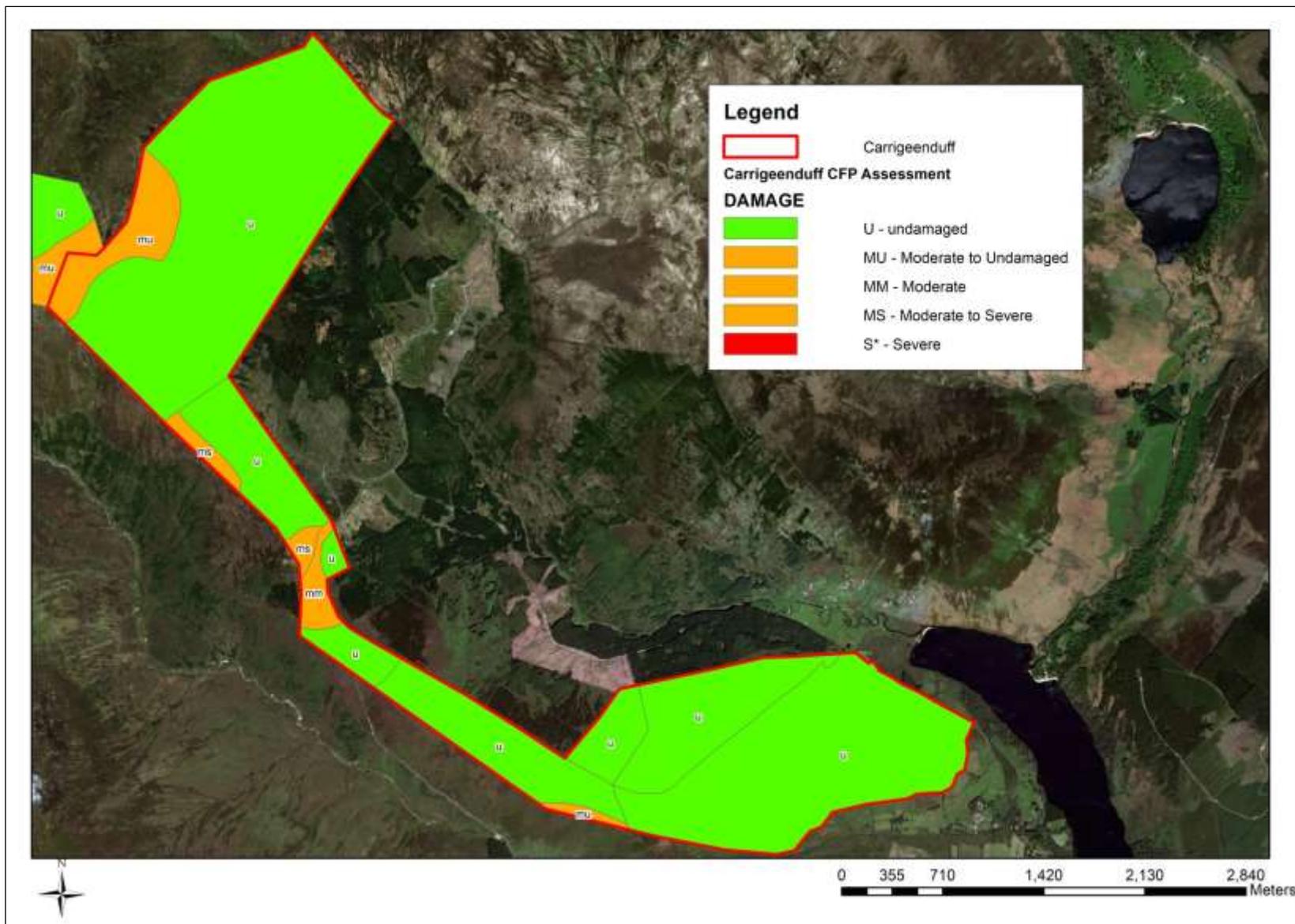


Figure 18. Commonage Framework Habitat Condition Assessment 2001.

The most damaged areas on the summits and ridges will require urgent measures to stabilise eroding peat, block eroding peat gullies and implement active habitat restoration measures. These should be designed to aid and speed up the recovery of the damaged habitat, which would then also reduce the levels of peat erosion and the risk of further landslide events as documented by the Geological Survey of Ireland (see **Figure 15**).

Large areas of dry heath habitat on the north east and south east facing slopes of Kanturk have been burnt in the past. Those on the north eastern slopes are becoming invaded by bracken which will need to be controlled. Areas of bracken west of the Inchavore Stream should be retained as these provide habitat for Whinchat, which is a species that has moved from Amber to Red on the Birds of Conservation Concern in Ireland list. Destocking is recommended for the heath and acid grassland on the south eastern slopes above Duff Brook to allow these to recover.

There is a small number of self-sown Sitka spruce in the vicinity of Carrigshouk Mountain which should be removed. Several Sitka spruce are also present on the lower slopes of Kanturk in the areas of acid grassland/dry heath and these should also be removed.

Consideration should be given to the expansion of the existing stands of mountain ash, downy birch and hawthorn with the addition of willows, aspen, whitebeam, Scots pine, oak and holly along the Inchavore Stream and the establishment of similar small stands of native upland woodland along Crickgarr and Duff Brook. These species could also be used to diversity the small area of remnant planting at Mountain Lodge, Carrigshouk.

The establishment of these upland woodlands will help to buffer the impacts of combined grazing pressures, bracken encroachment, increased flow and erosion of peat arising from the condition of the burnt habitats on the commonage. The retrofitting of native woodland on these streams to act as protection forests for water quality would be a welcome measure for both the watercourses and Lough Dan itself. Species used must be of certified Irish genetic provenance to ensure continuity of genetic diversity and minimise the risk of introduction of tree diseases as has occurred with stock originating from continental and UK sources.

The creation and restoration of upland gully woodlands consisting of native broadleaf species located along fast flowing upland streams and surrounding steep sided valleys provide a number of benefits – these include:

- Creating shelter and shade for livestock
- Reducing soil erosion
- Improving water quality
- Mitigating downstream flood risk
- Supporting woodland and upland birds
- Increasing habitat and species diversity
- Storing carbon
- Increasing resilience of the landscape in the face of climate change
- Enhancing the landscape
- Enhancing visitor experience and well-being
- Providing an evidence base for the future

The various parts of the commonage requiring specific management are mapped on **Figure 19** and summarised in **Table 4**. Further information and best practice guidance on each of the management measures recommended are outlined below.

Detailed information on the principles of the management measures that can be utilised as recommended in the Natural England Upland Management Handbook and other best practice guidance from Scotland, are presented in detail in **Appendix 2**. This guidance has been modified for the Irish situation.

4.2 Measures for Damaged and Eroding Bog

4.2.1 Measures for Damaged Blanket Bog

The areas of bare peat and eroding and cracked areas of blanket bog on the ridge between Carrigshouk Mountain and Mullaghcleevaun East Top and from Mullaghcleevaun East Top east towards Duff Hill and the summit of same will require a number of measures including elimination of burning, the exclusion of grazing animals to allow the vegetation to recover, stabilisation of the peat and eroding areas through the introduction of seed sources and other techniques.

Information on the restoration of hydrology in blanket bog from the Natural England Upland Management Handbook and from the Moors for the Future project are presented in **Appendix 2**.

4.2.2 Eroding Bog/Montane Heath on the Ridges and Summits

The areas of bare and eroding peat on the ridge and summits of the commonage are of urgent concern and are at continued risk of erosion and landslide. These areas will require destocking, restoration of hydrological function, stabilisation of the peat and revegetation. There must be no further burning of these habitats.

Upland blanket bog in good habitat condition should have a diversity of species present (more than seven indicator species), contain both dry- and wet-loving species, and be *Sphagnum*-rich with an abundance of hummock-forming *Sphagnum* moss and Woolly hair moss (*Racomitrium lanuginosum*). Areas of bare peat should be rare and the water table should be high such that peat tears and hollows are filled with *Sphagnum* mosses.

Removal of Sheep from the Ridge

The Moors for the Future project in the UK has identified that in some instances removing sheep completely from restoration areas was a key component for success.

‘In April 2003 a 31km fence was erected around a 25.5km² area of Bleaklow to prevent fresh young growth being eaten. This was funded via an ESA stock exclusion payment where the farming tenant was paid to keep sheep off the site. The fence is not a permanent structure and will be removed when it is deemed the moors are in favourable condition’.

The removal of sheep from the summits, ridges and damaged areas of the commonage is required. It is recommended that the fence that extends west across the commonage from the conifer plantation on the lower slopes of Duff Hill is repaired and used to exclude grazing. The removal of trespassing sheep from other commonages may be achievable through active shepherding and encouraging sheep off the summits and ridges and to use the lower slopes of the commonage.

Assessment of Deer Grazing Impacts

In order to determine the grazing impact of deer (and other browsers) on the ridge and implications for the recovery of the habitat it is recommended that a minimum of two deer exclosures are erected on the ridge – one in the area of the ridge which has been burnt on Mullaghcleevaun East Top one on the ridge between it and Carrigshouk Mountain, where the bog vegetation is more intact but the peat is cracking, gullies have formed and the bog is eroding.

Stabilisation of Bare Peat

The Moors for the Future project in the UK has identified that the most important factor in revegetating damaged areas of blanket bog is the initial stabilisation of the areas of bare and eroding peat⁹. **It is critical that there is no more burning on this commonage to allow the vegetation to recover.** This needs to be followed up by revegetation of those areas of bare peat on the bog surface. The surface of the bog needs to be revegetated to prevent further loss of peat and reduce erosion. The

⁹ <http://www.moorsforthefuture.org.uk/repairing-bare-peat>

aim here is to restore montane blanket bog to a sward dominated by *Sphagnum* mosses, ling heather, crowberry, bog cottons, clubmosses and woolly hair moss (*Racomitrium lanuginosum*).

In some of these areas heather seed may have to be introduced. Other SUAS project sites such as Powerscourt Paddock and Glasnamullen, which can be accessed by machines, could be used as donor sites for heather bales and heather brash. Best practice guidance on cutting, baling and collecting heather brash is available from the Moors for the Future project guidance documents¹⁰.

National Parks and Wildlife Service could consider partnering with the project to assist with some of the logistics for the habitat restoration such as the helicopter flights, with the collection of material and spreading of same delivered by the commonage groups.

Increasing diversity

Some moorland plants may come into the sward through material present in unburnt areas on the site (such as heather, mosses and lichens from the heather brash, cotton-grasses and wavy hair grass by seed and vegetative expansion). These can be facilitated by the addition of lime and fertiliser, which increases flowering and vegetative expansion. However, many other moorland species (e.g. bilberry, crowberry, cross-leaved heath) are much slower colonisers. These species, which are significant structural species, growing at different depths in the peat, need further interventions in order to colonise. These can be added as plug plants, grown by micro-propagation from material collected locally. As documented in the Wicklow Montane Flora Study only 4 of the 10 alpine plants noted historically from the area were re-located.

Sphagnum Moss Reintroduction

The most important group of species to re-introduce on the ridge once the erosion is reduced are *Sphagnum* mosses, both biologically and structurally. In order to get *Sphagnum* to establish, there must be adequate surface water for most of the year.

Sphagnum could be reintroduced to damaged areas on the commonage by the use of cultivated propagules (such as 'Beedamoss¹¹'), *Sphagnum* plugs or by gathering *Sphagnum* from blanket bog on other parts of the nearby mountain ranges/commonages, which are undamaged.

Track Repairs

The walking track on Kanturk is in need of repair.

Drain blocking

There is a large drain along the boundary of this commonage with the forestry to the north on the saddle between Kanturk and the Military Road and a recently excavated drain adjoining the Military Road, which will be impacting this habitat. These drains should be blocked.

Further detailed information on these measures is presented in **Appendix 2**.

4.3 Measures for the Annex I Habitat 4030 Dry Heath

Measures for areas of burnt and damaged heather

The most critical measure that is required for the recovery of dry heath is a cessation of burning.

Stock need to be excluded from burnt areas to allow the vegetation to recover. It was noted that sheep were congregating on the south east facing slopes of Kanturk, near the Duff Brook, which have been recently burnt.

¹⁰ Moors for the Future. Heather Cutting - Factsheet. Available online from <http://www.moorsforthefuture.org.uk/factsheets>.

¹¹ <http://www.beadamoss.co.uk/page19.html>

This grazing pressure will prevent the recovery of habitat in this area and will result in the loss of dry heath/wet heath habitat in favour of acid grassland, which is dominated by Mat-grass (*Nardus stricta*), and Deergass (*Trichophorum cespitosum*), which are unpalatable to sheep.

Bracken invasion of dry heath

The margins of heath on the northern slopes of Kanturk are being invaded by bracken. It is recommended that these areas are targeted for bracken control over the areas of dense bracken.

Bracken invasion of burnt and damaged areas of dry heath

Bracken follows a burn and readily invades freshly burnt slopes and areas of bare peat, where the spores can readily germinate and a new colony of bracken plants can establish. The deeply rooted rhizomes also often survive a fire and new fronds can be seen re-emerging from areas of burnt and blackened peat within days of burning. Further bracken encroachment into burnt and damaged areas of dry heath from adjoining fields near Duff Brook should also be targeted for control.

4.4 Measures for the Annex I Habitat 4010 Northern Atlantic Wet Heaths with *Erica tetralix*

The best area of the habitat **4010 Northern Atlantic Wet Heaths with *Erica tetralix*** is found on the lower slopes of the north side of Kanturk. The habitat here was burnt in the past but is now recovering.

There should be no further burning of wet heath habitat within the commonage.

The main challenge for managing the **4010 Northern Atlantic Wet Heaths with *Erica tetralix*** habitat is in restoring those areas damaged by uncontrolled burning and ensuring that they do not become further degraded by sheep congregating in them. This will require active shepherding, controlling deer and hunting out trespassing sheep from adjoining commonages.

4.5 Control of Track Machines/ATVs/Road Works

Damage by a track machine (or similar) was noted on the blanket bog on the saddle between the Military Road and Kanturk. This machine appears to have gained access from the adjacent Coillte plantation. Consultation and collaboration with Coillte regarding same is required to try and deter and discourage this activity.

The recent damage to the recovering blanket bog habitat along the Military Road also needs to be discussed with the roads section in Wicklow County Council and the hydrology of the bog in this area reinstated.

4.6 Measures for Bracken Control

Areas of dense bracken occur within the commonage. Urgent consideration should be given to the control of bracken within the commonage where it is encroaching into areas of dry heath. Information and recommendations for bracken control from the Natural England Upland Management Handbook is provided in **Appendix 2** to inform same. Other areas could be planted with native woodland (such as the east facing slopes of Carrigshouk Mountain and adjoining the Inchavore Brook). Bracken was also beginning to encroach into the commonage from along the Duff Brook.

4.7 Upland Gully Woodland

Consideration should be given to the establishment of upland gully woodland and extension of this habitat along the watercourses in the site (and diversifying and protecting the existing woodland at Mountain Lodge, Carrigshouk) and the protection of any existing trees along these watercourses. Such woodland would further act as protection measure for water quality within these streams and

the Avonmore River and Lough Dan below the commonage as well as adding to the biodiversity of the uplands. Suitable species would include mountain ash (*Sorbus aucuparia*), willows (*Salix cinerea*), holly (*Ilex aquifolium*), whitebeam (*Sorbus aria*), birch (*Betula pubescens*) and ultimately oak (*Quercus petraea*), Scot's pine (*Pinus sylvestris*) and aspen (*Populus tremula*). Any trees and areas of natural regeneration will require protection from grazing animals including sheep and deer.

4.8 Track Repairs

The track on the Kanturk Ridge is in need of urgent repair. Provision of a boardwalk constructed of railway sleepers similar to that used elsewhere within Wicklow Mountains National Park should be considered.

4.9 Sheep Trespass

Sheep (and goat) trespass on the hill from adjoining commonages is a potential threat to the recovery of habitats following burning and will require management and ongoing monitoring.

4.10 Deer

Consideration should be given to deer management in the area in collaboration with other landowners/parties (Coillte/NPWS), the erection of exclosures on the ridge will give an indication of how significant grazing pressures are from same. Recording of deer numbers and locations on the hill will be required during active shepherding. This will assist in developing a deer management plan for the area.

4.11 Monitoring

Continued monitoring is required to determine how the vegetation recovers following historic burning, the stabilisation and revegetation of eroding peat, the successes or otherwise of bracken control, the establishment and protection of upland woodland and what affect active shepherding of stock on the commonage has bearing in mind that there may be a considerable delay between changes in livestock levels and a response in the vegetation.

4.12 Appropriate Assessment

Once the plan is agreed with the commonage group it will need to be agreed with National Parks and Wildlife and undergo appropriate assessment before being implemented.

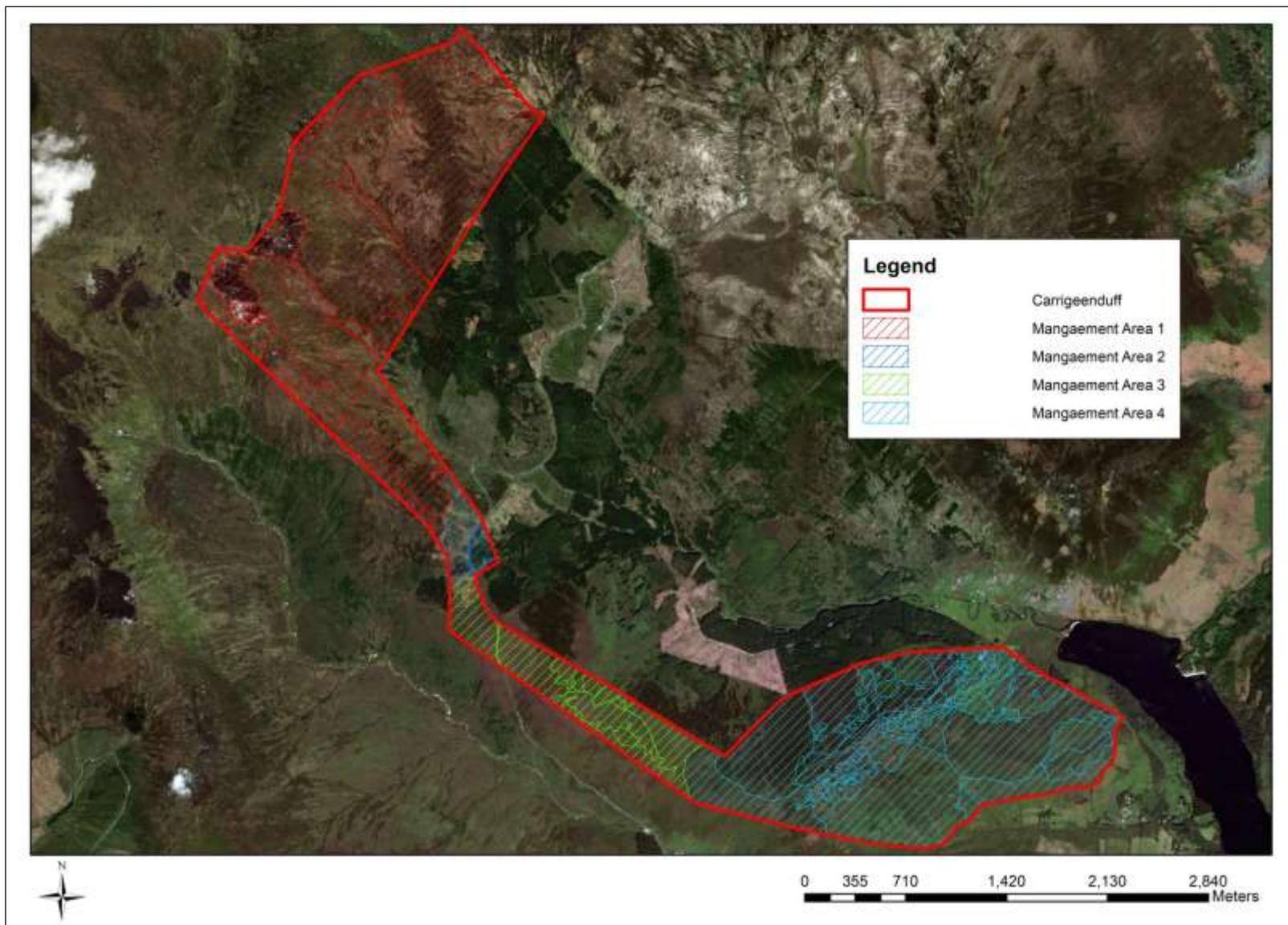


Figure 19. General Management Areas for Carrigeenduff.

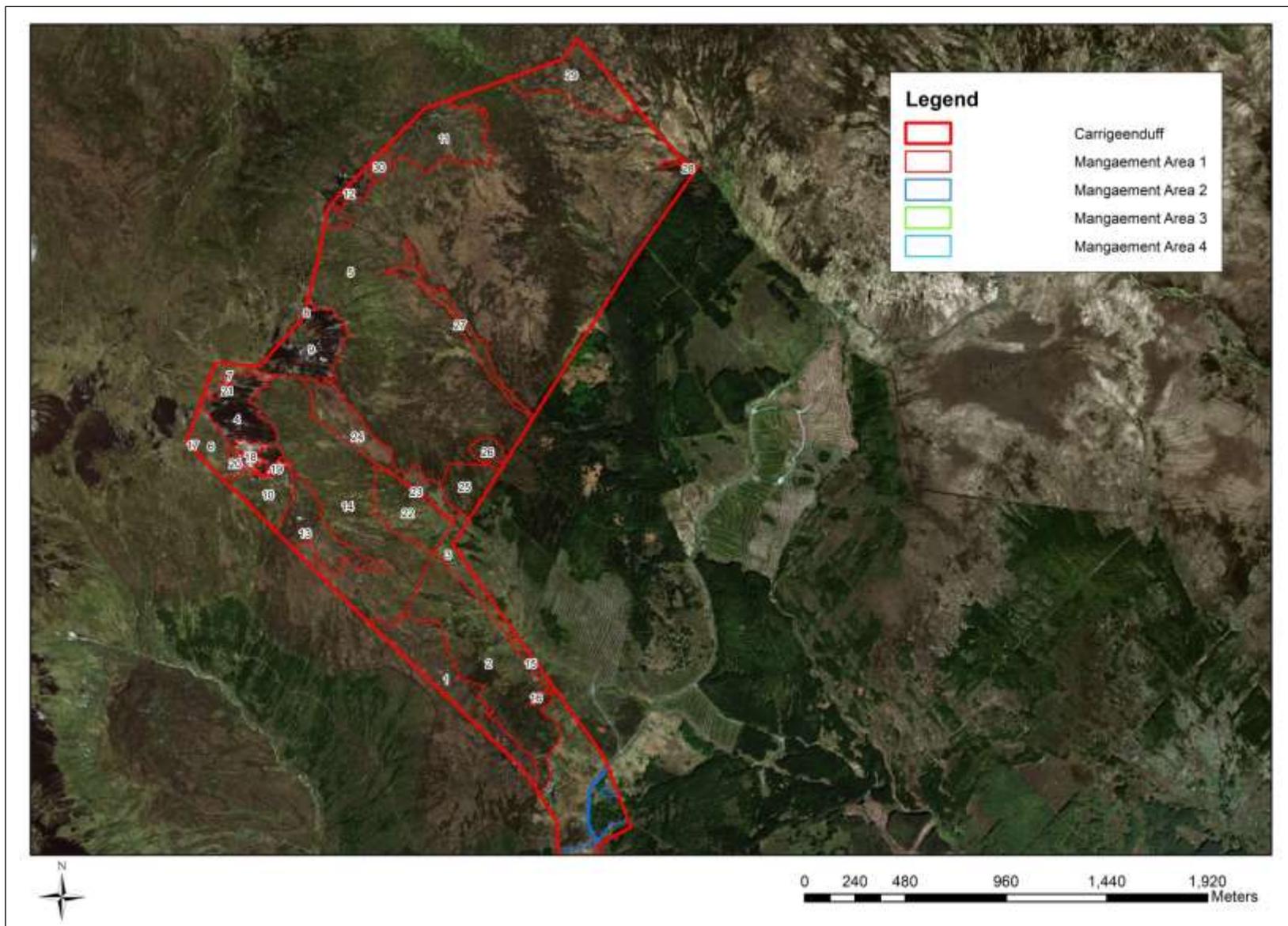


Figure 20. Management Area 1.

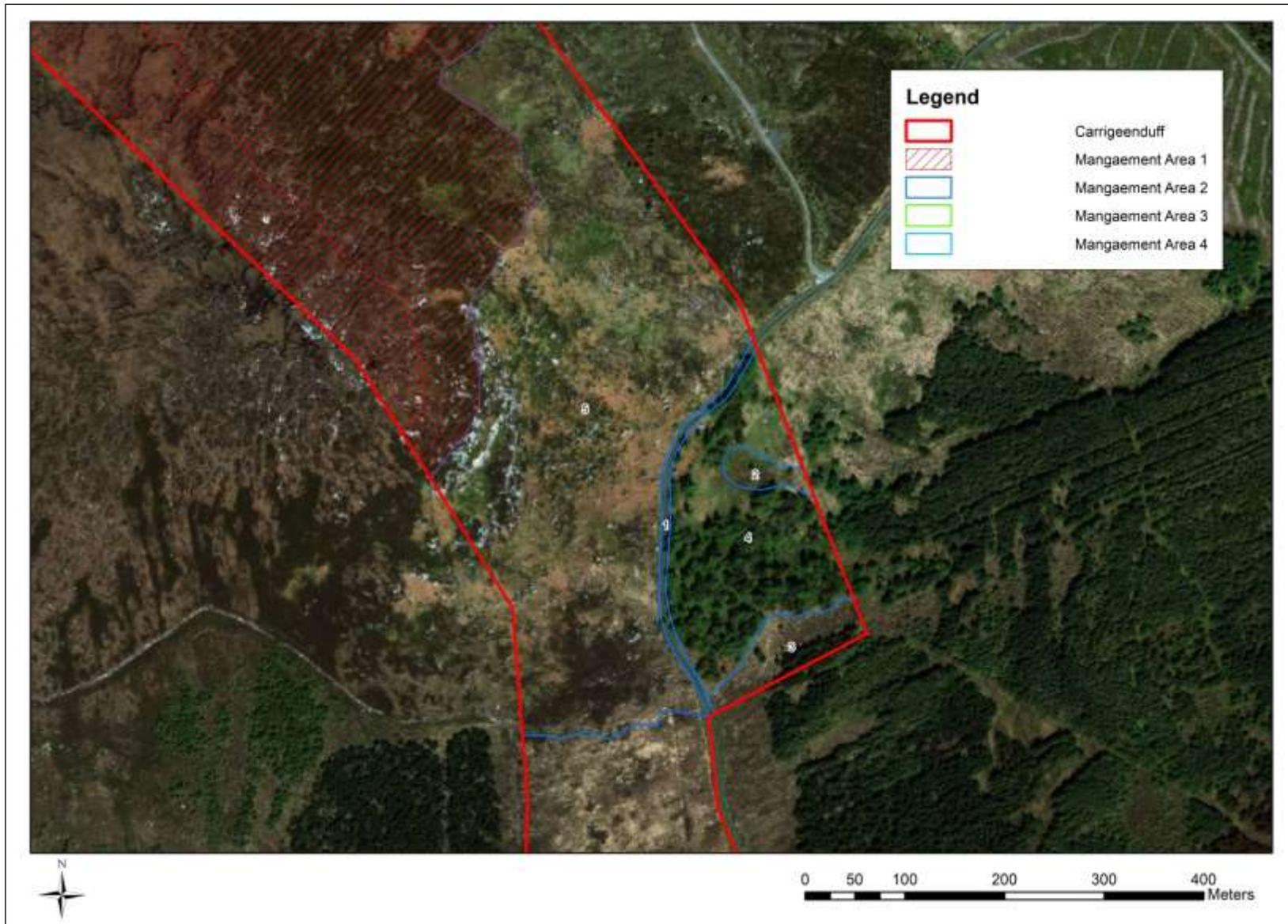


Figure 21. Management Area 2.

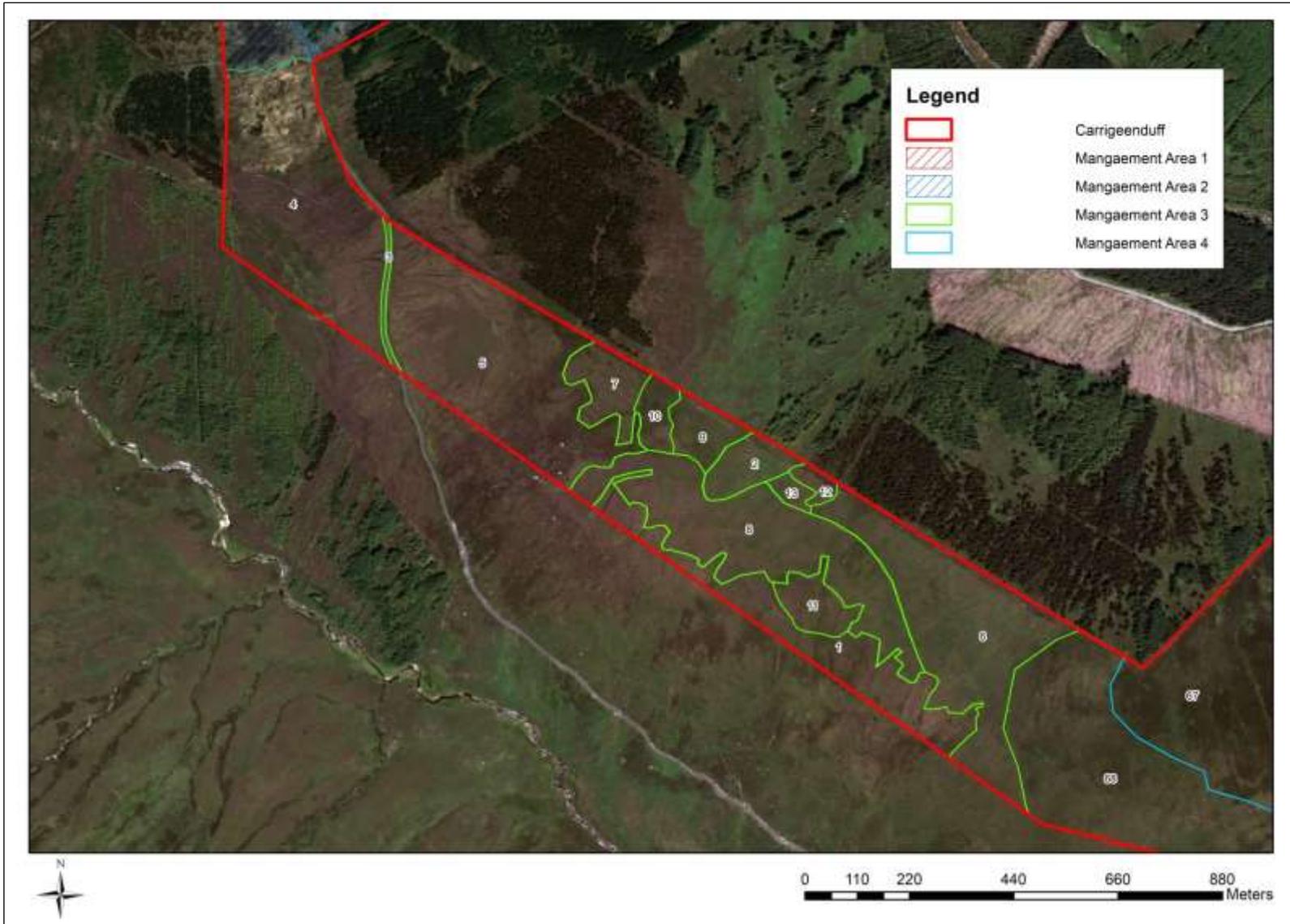


Figure 22. Management Area 3.

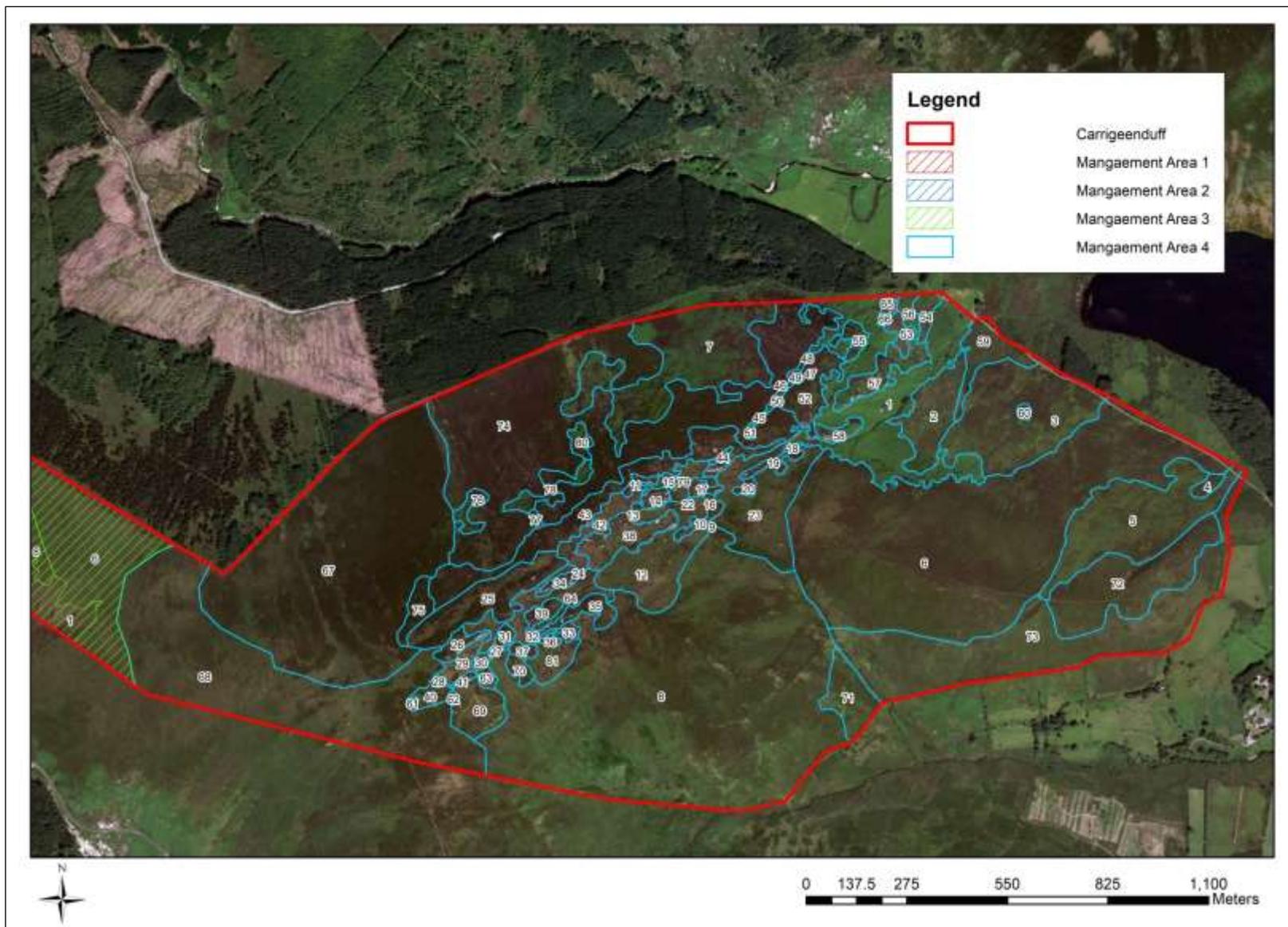


Figure 23. Management Area 4.

Table 4. Management Recommendations.

Area	Recommendation
1, 2, 3, 4	No further burning
1, 2, 3, 4	Control deer
1,2, 3, 4	Shepherd out trespassing sheep
1, 4	Protection and restoration of existing gully woodland remnants, additional planting and protection for same
1, 2	Destock the hill of grazing animals and allow the habitats to recover
1, 2	Restoration measures for eroding bog on the ridges
1, 2	Restoration measures for areas of bare peat on the ridges
1, 2	Restoration measures for areas of montane heath on the ridges
1, 2	Erect deer exclosures to determine effects of deer and trespassing sheep
2 - location 5	Consider the establishment of native woodland on this rocky outcrop where bracken is encroaching and protect from grazing Remove self-seeded Sitka spruce from this area
2 - location 4	Enrichment planting of native species into the existing stand to diversify same, protect new planting from browsing
3	Reduce grazing pressure in this area
3 - location 5	Block drain to restore hydrology along the road
3 - location 4 and 5	Liaise with Wicklow County Council re. recent drainage works at roadside margins - restore hydrology by blocking drains
3 - location 6	Resolve track damage caused - accessed from Coillte?
4 - location 1, 7, 76, 78, 80,	Bracken control - being mindful of whinchat habitat on lower slopes of location 1
4 - location 73	Bracken control
4 - location 3/6	Remove Sitka spruce from this area
4 - summit ridge of Kanturk/Bracket Rocks	Track repairs

5. Appendix 1. Historic Imagery of the Carrigeenduff Commonage

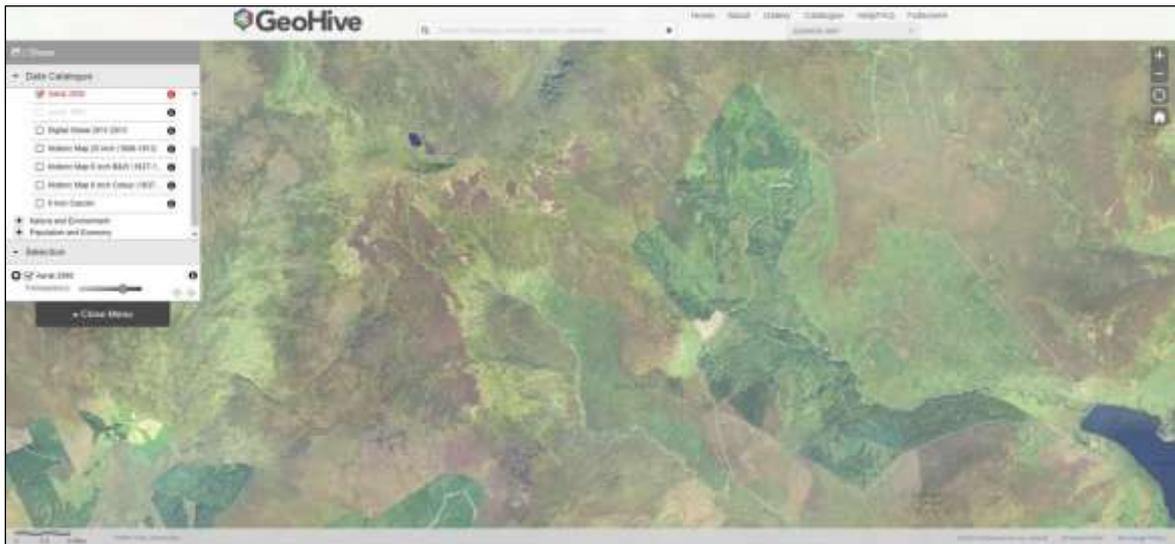


Plate 1. OSI Aerial photography 2000.



Plate 2. OSI Aerial photography 2005.

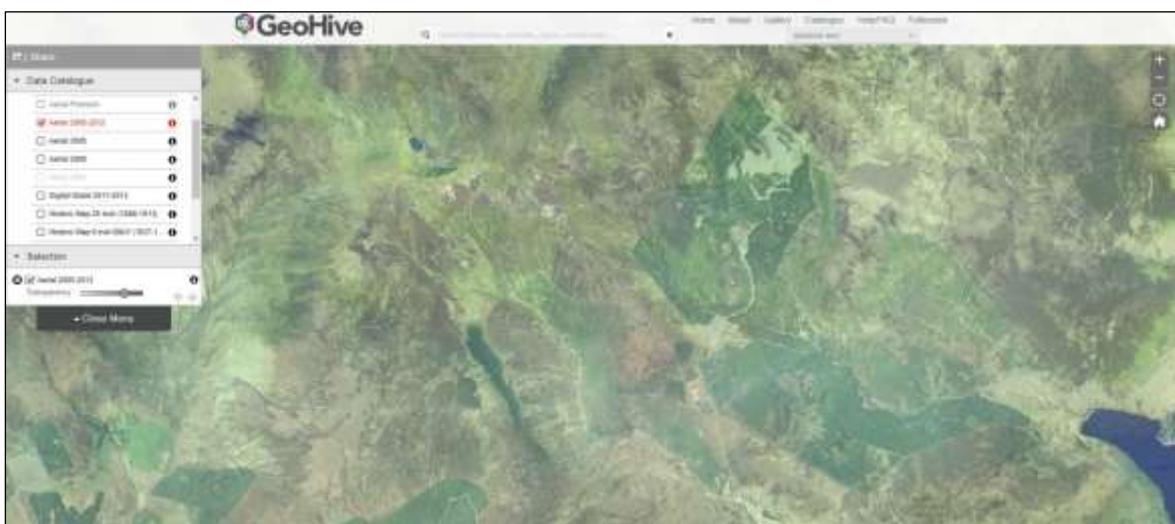


Plate 3. OSI Aerial photography 2005 - 2012.



Plate 4. May 2009 (Source: Google Earth Image)