Ecological Baseline Survey

prepared for

Glassavullaun Commonage

as part of the Commonage Management Plan for SUAS

Final Report

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1. Introduction

This large commonage (378ha) extends from an elevation of 180m adjoining the local road in Bohernbreena at the base of the commonage rising to the summit of Seefingan at 724m. The commonage also includes the summit of Corrig Mountain at 618m and the ridge between it and Seefingan as shown on **Figure 1** below.

Plate 1. Looking across to the commonage from the Featherbeds.

The commonage adjoins the Kilbride Rifle Range to the west and is bounded by the Slade Brook to the east and the Glassamucky Stream to the north. The lower slopes of the commonage are known locally as Castlekelly and the col between Corrig Mountain and Seefingan, at 560m is known as Barnacreel. These lands were formally part of the Cobbe Estate in County Dublin.

Lands within the commonage are now 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.

The Slade Brook and the Glassamucky Stream both rise within the commonage. These watercourses are tributaries of the River Dodder, which is impounded at the Bohernabreena Reservoir, and as such form part of the main drinking water supply for Dublin City.

The commonage is predominantly underlain by Caledonian granite and granodiorites, although a band of Ordovician dark slate-schist, quartzite & coticule associated with the Butter Mountain Formation occurs on the north west facing slopes of the commonage adjoining the Glassamucky Stream. The soils of the lower 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 soils near the Glassamucky Stream are described as the Knockastanna association of loamy soils over shale bedrock.

The commonage was previously owned by the Cobbe Estate and is now owned by National Parks and Wildlife Service. There are 6 farmers with established grazing rights on this commonage.

Figure 1. Glassavullaun 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** and **4** below. This assessment identified that the commonage damaged from recent burns and recommended that a destocking rate of 10.876% was required to allow recovery.

The habitats were roughly classified in the commonage framework plan as blanket bog, wet heath, dry heath, flushes, upland acid grassland, dense bracken, scrub and bare rock/scree or a mosaic of each as shown on **Figure 5** below. There were no records made of any significant erosion at that time.

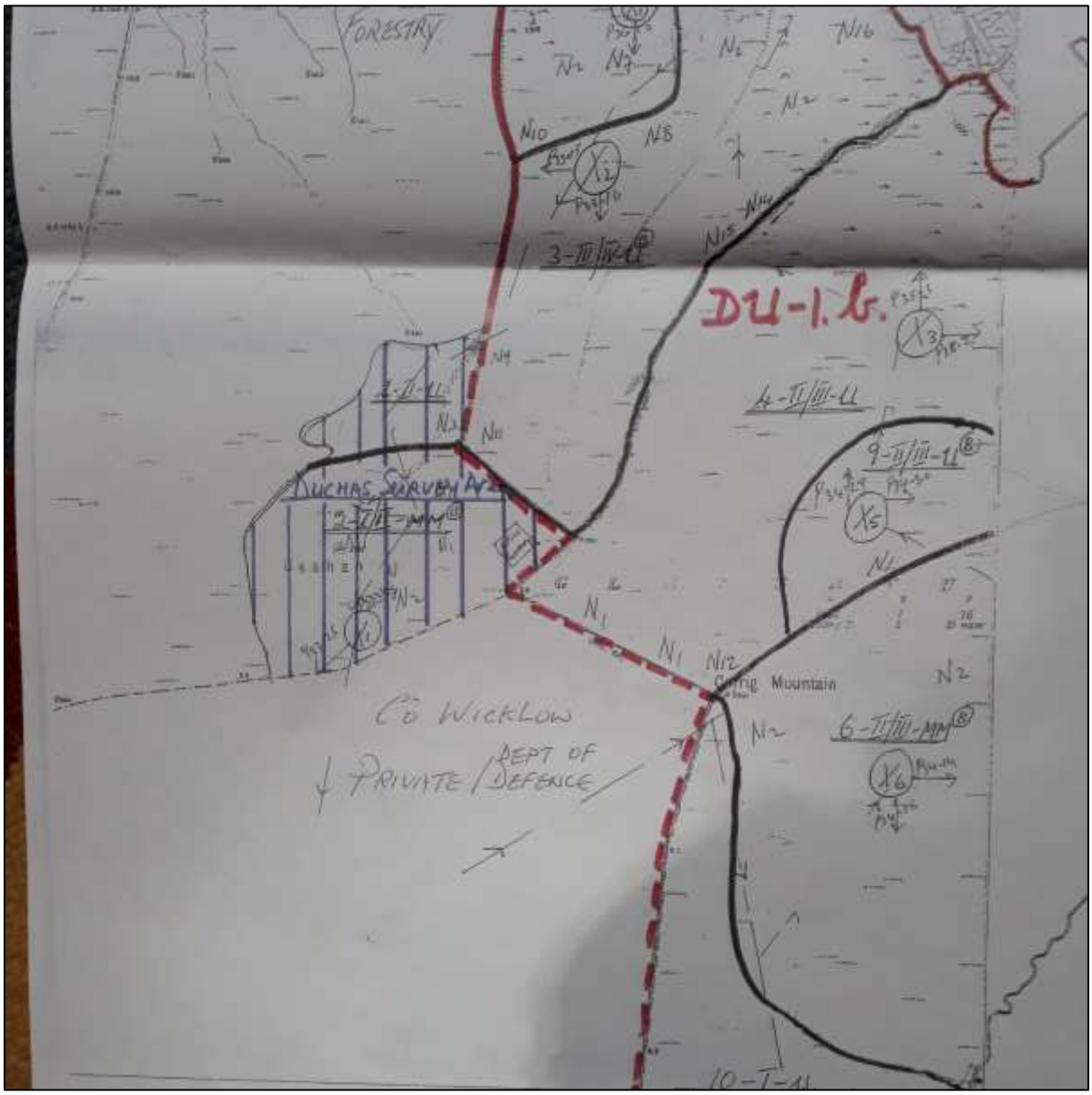

Figure 2. Commonage Framework Plan Map (2001).

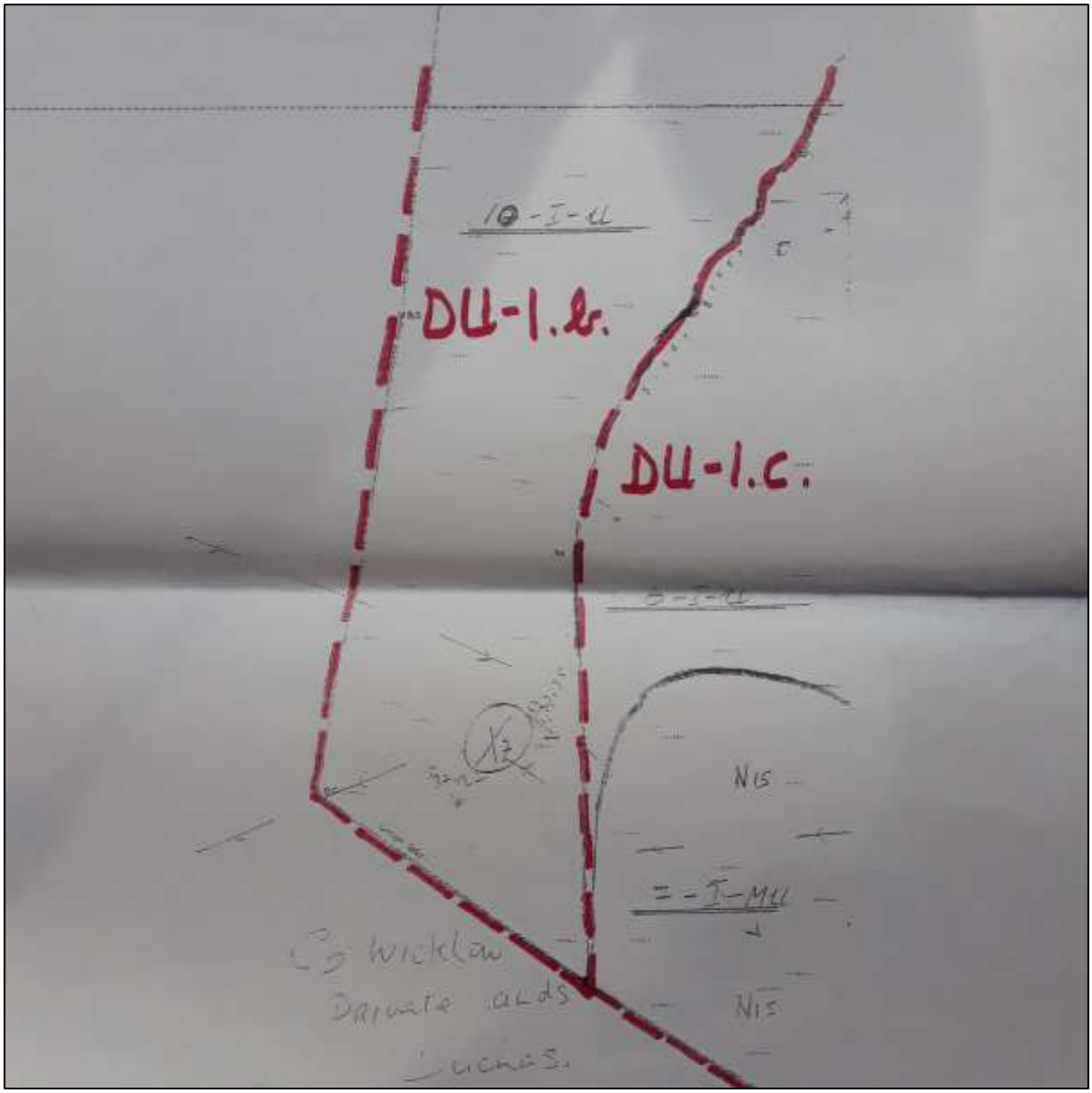

Figure 3. Commonage Framework Plan Map (2001).

Figure 4. Commonage Framework Plan Map (2001).

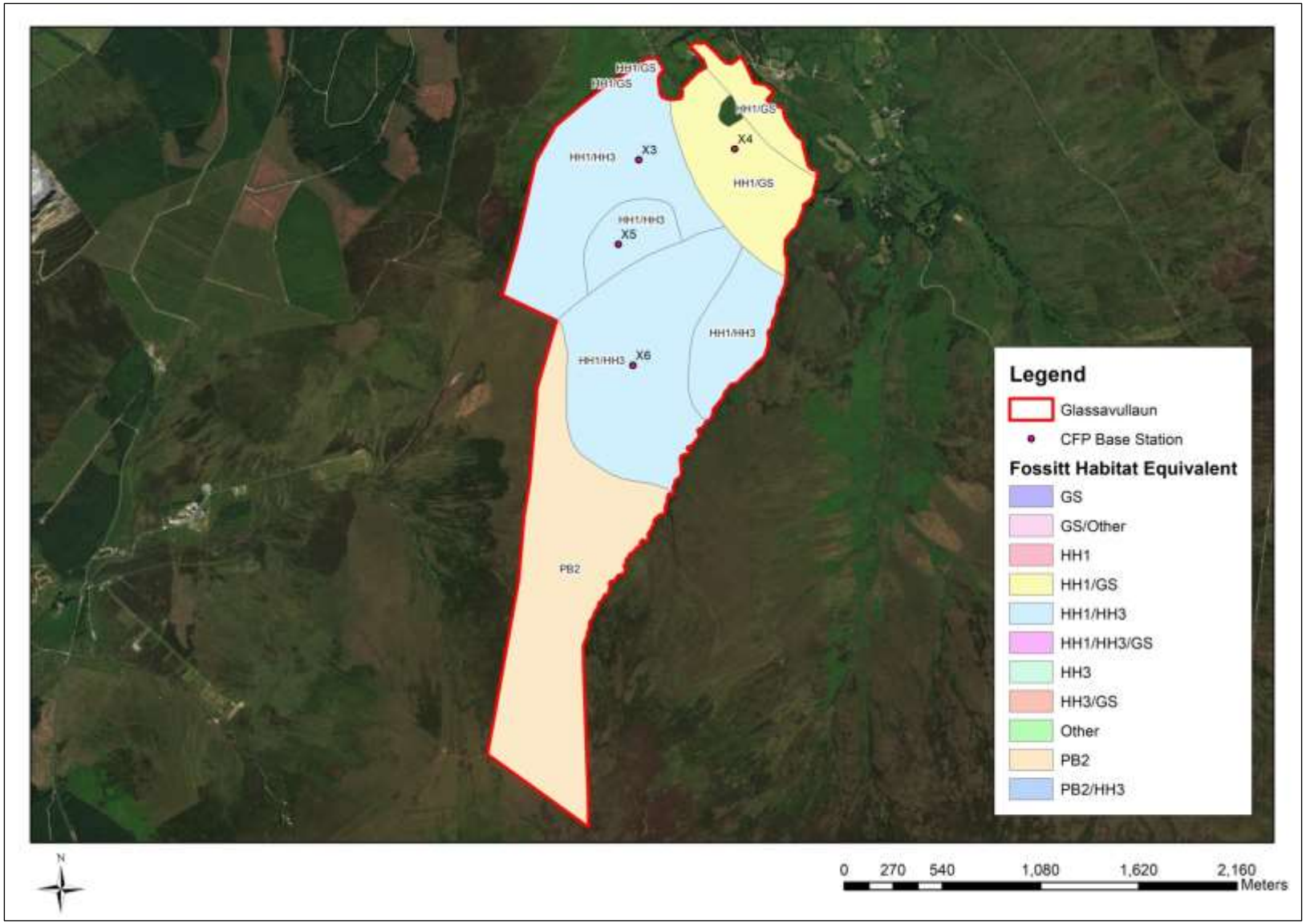

Figure 5. Commonage Framework Plan Habitat Map showing monitoring locations (X3, X4, X5 and X6).

2. Receiving Environment - 2019

2.1 Habitats Present

Under Fossitt's (2000) habitat classification scheme the dominant habitat within the Glassavullaun commonage on the slopes of Corrig Mountain is that of **Dry Heath HH1**, which in some locations forms a mosaic with **Wet Heath HH3** and **Dry Humid Acid Grassland GS3**.

Areas of **Dry Heath HH1**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 and the habitat is moving to being grass dominated, which in turn is being invaded by **Dense Bracken HD1** which dominates in many areas.

Plate 2. Looking north west across the slopes of Corrig Mountain showing extensive bracken, and pockets of acid grassland and dry heath.

In areas of **Dense Bracken HD1**, **b**racken (*Pteridium aquilinum*) covers 75% of the area with Red Fescue (*Festuca rubra*), White Clover (*Trifolium repens*), Tormentil (*Potentilla erecta*), Mat-grass (*Nardus*

stricta), and Heath Bedstraw (*Galium saxatile*) beneath. There are scattered exposed rocks through much of this area.

Plate 3. Bracken is encroaching much of the hill (photographed here on an early visit).

Acid Grassland GS3 is dominated by Sheep's Fescue (*Festuca ovina*) and Mat-grass (*Nardus stricta*), with Heath Bedstraw (*Galium saxatile*), Tormentil (*Potentilla erecta*) and the moss *Polytrichum commune.* There is occasional Bilberry (*Vaccinium myrtillus*), Ling heather (*Calluna vulgaris*) and Western Gorse (*Ulex gallii*), which are indicative of the former extent of heath, which has been lost to grassland on account of grazing and burning. Large areas of this habitat are being encroached by Bracken (*Pteridium aquilinum*), which dominates the entire slope almost to the summit.

Within these areas there is scattered Hawthorn (*Crataegus monogyna*) and Mountain Ash (*Sorbus aucuparia*), which is indicative of the potential extent of native woodland on these slopes.

Near the road at the base of the commonage at Castlekelly is an area of **Wet Heath HH3** with a series of **Poor Fen and Flush PF2**. Areas of wet heath here, and elsewhere within the commonage, correspond to the habitat **4010 Northern Atlantic Wet Heaths with *Erica tetralix*,** as listed under Annex I of the EU Habitats Directive. Drier portions of this are becoming invaded by gorse and hawthorn forming small areas of **Scrub WS1**.

Flushed areas in Castlekelly support Bog pondweed (*Potamogeton polygonifolius*), Round-leaved Sundew (*Drosera rotundifolia*), Tormentil (*Potentilla erecta*), Soft Rush (*Juncus effusus*), Glaucous Sedge (Carex flacca), Bog Asphodel (*Narthecium ossifragum*), Sheep sorrel (*Rumex acetosella*) and Marsh thistle (*Cirsium palustre*). There is abundant Bog Moss (*Sphagnum fallax*) along with *Sphagnum subnitens.* Outside the flushed area, Purple Moor-grass (*Molinia caerulea*) dominates with Cross-leaved Heath *(Erica tetralix)* and scattered Soft Rush (*Juncus effusus*). Common Gorse (*Ulex europaeus*) and Hawthorn

(*Crataegus monogyna*) scrub are beginning to encroach here. This is the known location of an extremely rare and legally protected orchid – the Bog Orchid (*Hammarbya paludosa*).

Plate 4. By late summer the bracken is c. five to six foot high.

An area of **Poor Fen and Flush PF2** is also found on the western side of the commonage near the Glassamucky Stream, and on the eastern side of the commonage near Slade Brook closely associated with an area of wet heath. These flushed seepage areas have abundant Bog moss (*Sphagnum*) species. *Sphagnum papillosum* and *Sphagnum capillifolium* dominate with Round-leaved Sundew (*Drosera rotundifolia*) and Bog Asphodel (*Narthecium ossifragum*). Drier areas support heath with Ling heather (*Calluna vulgaris*), Cross-leaved Heath *(Erica tetralix*), Tormentil (*Potentilla erecta*), Heath Rush (*Juncus squarrosus*), and Common Gorse (*Ulex europaeus*). There is also some *Cladonia portentosa* lichen present in unburnt wet areas.

In areas of **Dry Heath HH1**, which are unburnt typical species include Ling heather (*Calluna vulgaris*) and Bilberry (*Vaccinium myrtillus*) with Mat-grass (*Nardus stricta*), Tormentil (*Potentilla erecta*), Purple Moor-grass (*Molinia caerulea*), Cross-leaved Heath *(Erica tetralix),* Heath Rush (*Juncus squarrosus*) and Lousewort (*Pedicularis sylvatica*).

In some areas Common Gorse (*Ulex europaeus*) is present and in many areas the habitat is being invaded by Bracken (*Pteridium aquilinum*). Below the dry heath the commonest moss is *Hypnum jutlandicum*, with occasional *Sphagnum tenellum*.

In areas which have been recently burnt there is no old Ling heather (*Calluna vulgaris*). There is some young Bilberry (*Vaccinium myrtillus*) and Ling heather (*Calluna vulgaris*) with Tormentil (*Potentilla erecta*), Hare's tail cottongrass (*Eriophorum vaginatum*), Mat-grass (*Nardus stricta*), Heath Rush (*Juncus squarrosus*) and extensive areas of bare peat. There is generally no moss cover in these areas beyond that of *Campylopus introflexus*, and at high risk of erosion. These areas have been seriously damaged by repeated burning. The peat is typically dry and hard and is cracking, which will lead to bog slides.

Plate 5. Looking north east down the slope of Glassavullaun commonage showing the areas of wet heath and poor fen and flush on the lower slopes at Castlekelly, which are becoming invaded by common gorse on the margins.

Plate 6. Remnant areas of dry heath, which were not recently burnt surrounded by encroaching bracken.

Plate 7. Burnt dry heath.

Plate 8. Bracken and soft rush encroaching into areas of recently burnt dry heath.

Plate 9. Dry heath becoming invaded by bracken.

Plate 10. Recently burnt and badly damaged dry heath on the lower slopes – sheep congregating and grazing in this area delay vegetation recovery.

Plate 11. Recently burnt and badly damaged dry heath and blanket bog habitat on the upper slopes of the commonage on Seefingan Mountain.

The summits of both mountains and the ridge between Seefingan and Corrig Mountains 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**.

The summit of Corrig Mountain is burnt and overgrazed with bare peat present. Deergrass (*Trichophorum cespitosum*) dominates with Mat-grass (*Nardus stricta*), Heath Rush (*Juncus squarrosus*) and the moss C*ampylopus introflexus*. There are some scattered bog moss *Sphagnum papillosum* hummocks that have been damaged by fire and bleached. This area is seriously damaged and will erode if damaging operations do not cease.

The blanket bog on the ridge between the summits, has also been disturbed as a result of recreational activities. There is bare peat and many wet tracks. Hare's tail cottongrass (*Eriophorum vaginatum*), Deergrass (*Trichophorum cespitosum*), and Mat-grass (*Nardus stricta*) dominate this damaged area. There is recreational use with numerous tyre tracks and hiking/ running tracks. Boards have been

placed across ditches to allow bike access. Four scrambler motorbike were noted on the summit of Seahan, which gained access from adjacent Coillte plantation.

The eastern slope of Seefingan has been recently burned and is dominated by Mat-grass (*Nardus stricta*), and Deergrass (*Trichophorum cespitosum*) with the mosses *Polytrichum commune* and *Campylopus introflexus*. There are dead hummocks of bog moss (*Sphagnum* spp.) due to burning. Small plants of Bilberry (*Vaccinium myrtillus*), Ling heather (*Calluna vulgaris*) and Hare's tail cottongrass (*Eriophorum vaginatum*) are present but sparse. This deep peat area may have supported blanket bog (or in shallower areas wet heath) but has been destroyed by burning. There is 50% bare peat on lower slopes of shallow peat. This extensive burn extends from the river to the upper slopes of the mountain. There are small pockets of the moss *Hypnum jutlandicum* and bleached sphagnum moss.

Plate 12. Eroding bare peat and tracks on the ridge.

The summit of Seefingan is trampled by deer and tracks from hikers and mountain bikes. Erosion channels are beginning to form. Further erosion must be prevented. Ling heather (*Calluna vulgaris*), Deergrass (*Trichophorum cespitosum*) and Hare's tail cottongrass (*Eriophorum vaginatum*) are present with bare peat amounting for 30% and erosion channels for 30%. There is a distinct hiking trail along the ridge that should be repaired.

Plate 13. Summit of Seefingan Mountain.

The adjacent burnt areas have 70% bare peat. There are cracks forming in the peat, which will lead to slippage and erosion. There are many examples of old slippages on the steep slopes. A flock of 35 sheep and one goat were noted on this burnt commonage, giving the vegetation no chance of recovery.

A small series of **Dystrophic Pools FL1** are found along the upper ridge and in the col between the two summits. These do not correspond to the habitat **3160 Natural Dystrophic Lakes and Ponds**, as listed under Annex I of the EU Habitats Directive as they have formed from erosion and cracking/tearing of peat. These tear pools occur in wet hollows and contain the bog moss *Sphagnum cuspidatum* but are linked to adjacent erosion channels. *Sphagnum capillifolium* and *S. subnitens* occur in adjacent wet hollows and *S. papillosum* is in-filling from margins. There is a larger tear pool with algae present. There is some Hare's tail cottongrass (*Eriophorum vaginatum*) growing on shallow substrate with exposed rock. There are numerous deer tracks adjacent to this pool and erosion channels pose a threat. This dystrophic shallow pool has exposed rock and bare peat substrate. There are algal blooms with some *S. cuspidatum* and *Eriophorum angustifolium* at margin beside adjacent peat hag.

Plate 14. Dystrophic tear pools on the col between Seefingan and Corrig Mountains.

On the lower slopes of the commonage near the Slade Brook is an area of **Wet Heath HH3**, which corresponds to the habitat **4030 Northern Atlantic Wet Heaths with *Erica tetralix*** as listed under Annex I of the EU Habitats Directive. Species recorded here include; Ling heather (*Calluna vulgaris*), Cross-leaved Heath *(Erica tetralix*), Tormentil (*Potentilla erecta*), Heath Rush (*Juncus squarrosus*), Hare's tail cottongrass (*Eriophorum vaginatum*) and Common cottongrass (*Eriophorum angustifolium*) with the mosses *Hypnum jutlandicum* and *Dicranum scoparium* along with the bog mosses *Sphagnum papillosum*, *S. subnitens*. This is a good example of unburnt wet heath but the density of Heath Rush would indicate grazing pressure.

The Slade Brook, which forms the eastern boundary of the commonage, is best described as an **Upland Eroding River FW2** and is found in a steep sided gully for much of its length within the commonage. The slopes of this stream support excellent examples of upland gully woodland which is best described as **Oak Holly Birch Woodland WN1**. **Dense bracken HD1** also cloaks much of the slopes. Within the gully there are mature Downy Birch (*Betula pubescens*) growing along the stream banks and scattered Hawthorn (*Crataegus monogyna*) and Mountain Ash (*Sorbus aucuparia*).

Plate 15. Wet heath is found in a mosaic with dry heath, exposed rocks and bracken on the north eastern slope of the commonage.

Plate 16. Areas of undamaged wet heath on the east side of the commonage above Slade Brook.

Plate 17. Looking downstream along the Slade Brook where gully woodland composed of birch, mountain ash, hawthorn and willows occurs.

The commonage has been subject to various damaging activities in the past including frequent illegal burning, over grazing, quad damage and some trampling from walkers. In many areas it is unclear as to what habitat the peats here originally supported as it is so damaged and either beginning to or at high risk of eroding. Bracken is continuing to rapidly invade these areas of drier burnt and degraded peats following many years of illegal and intensive fires.

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 6**. These burns have been documented since the 1990s, occurring in 2000, 2002, 2003, 2006, 2007, 2010, 2011, 2014, 2016, 2017 and earlier this year in April 2019. There has been no 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 lack of recovery time between burning events. The ongoing presence of sheep and deer on these hills following burn events further reduces the opportunity for the hill to recover.

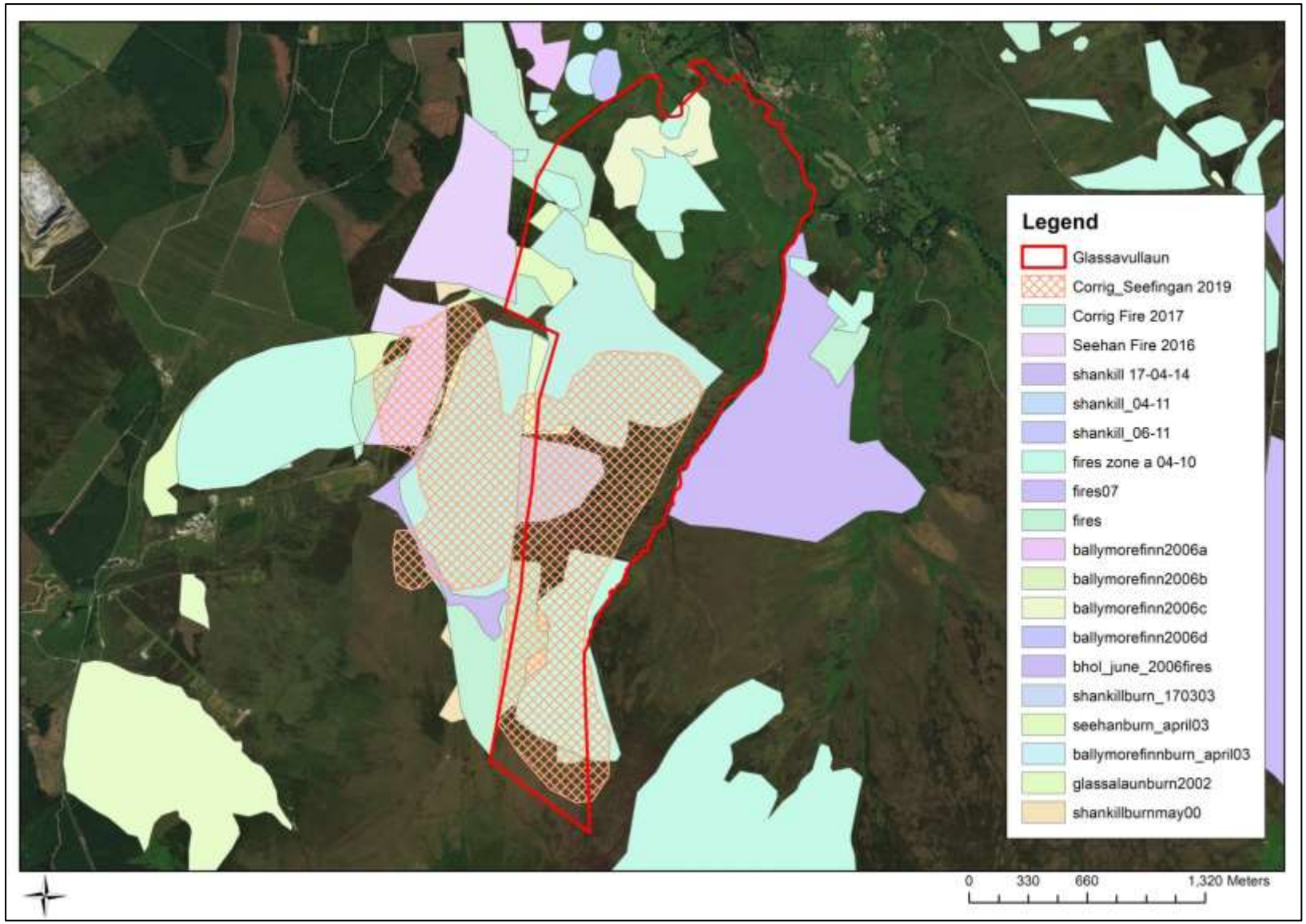

Figure 6. Indicative burn history and extent on Glassavullaun as recorded by National Parks and Wildlife.

Plate 18. Recently burnt areas near the Slade Brook – currently grazed by sheep.

The two watercourses, which rise on the slopes of Seefingan and Corrig Mountains, 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

The areas of upland blanket bog are now so badly damaged from burning that they no longer correspond to the habitat **7130 Blanket Bog** and are best described as eroding blanket bog.

2.2 Rare Plants

The legally protected orchid species Small Bog Orchid (*Hammarbya paludosa*) is present on the lower portion of the commonage at Castlekelly. The population there was documented by this author in September 2011.

Plate 19. Bog Orchid (*Hammarbya paludosa*) on the lower slopes of the commonage in Castlekelly.

There was an absence of club-mosses and other alpine species on the ridge and on the summits. Alpine species previously recorded from here include; *Lycopodium clavatum, Huperzia selago, Hymenophyllum wilsonii, Saxifraga stellaris, Vaccinium vitis-idaea, Vaccinium myrtillus* and *Empetrum nigrum*. The Montane Flora of Wicklow Survey[1] conducted in 2009 recorded only *Huperzia selago, Vaccinium myrtillus* and *Saxifraga stellaris* from the general environs of the Kilbride Rife Range and the ridge between Corrig and Seefingan. These species would be expected and have been lost as a result of repeated burning.

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*) would be expected and large herds of deer (red/Sika hybrids) graze the commonage. Other faunal records recorded during this survey include Common Frog (*Rana temporaria*), Fox (*Vulpes vulpes*), Snipe (*Gallinago gallinago*), Red Grouse (*Lagopus lagopus*), Meadow Pipit (*Anthus pratensis*), skylark (*Alauda arvensis*) and Raven (*Corvus corax*). Common Lizard (*Zootoca vivipara*) would also be expected.

Red Grouse were recorded during the present survey (two in flight and six in unburnt heather). Indicative estimates of the population of Red Grouse within the Wicklow Mountains SPA is extracted below in **Table 1** from the 2011 survey[2].

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*

Downstream of the commonage the River Dodder supports Otter (*Lutra lutra*), Brown trout (*Salmo trutta*), and Kingfisher (*Alcedo atthis*).

2.4 Fisheries and Water Quality

The commonage is located within the Eastern River Basin District within the Liffey and Dublin Bay catchment (09) and the Dodder Sub-catchment (SC010).

Two headwater streams, which are both tributaries of the Dodder River (IE_EA_09D010100), rise within the commonage. The Slade Brook is unnamed in the EPA datasets but the stream, which forms the western boundary of the commonage, is mapped as the Glassamucky Stream. From west to east the streams are known locally/mapped on the 6" series as Glassamullyawn (East West mapping)/Glassamucky (EPA), and Slade Brook.

[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.

The Slade Brook is a tributary of the River Dodder, joining with the Dodder below the confluence of the Cot Brook and Mareen's Brook. The River Dodder then enters the Bohernabreen Reservoir.

Water sampling on the River Dodder at Piperstown Stream, just upstream of it's confluence with the River Dodder (and downstream of the commonage and the reservoir) indicates that the Dodder River at this location is currently assigned a Q value of 4. The River Dodder is also sampled upstream fo the reservoir on the Mareen's Brook and the latest water sampling here indicates that the Dodder River at this location is currently assigned a Q value of 4.

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

The Dodder River and its tributaries are a salmonid system with stocks of Brown Trout (*Salmo trutta*), Sea trout (*Salmo trutta trutta*) and Atlantic Salmon (*Salmo salar*). The River Dodder is a known salmonid watercourse. The Atlantic salmon are listed on Annex II of the EU Habitats Directive, and are protected under national legislation as an important fisheries resource. They are vulnerable to pollution and morphological disturbance of rivers, and of sedimentation of spawning beds (which are often in gravelly river beds).

An electro-fishing survey on the Mareen's Brook in the Upper Dodder was carried out over 2 days by Inland Fisheries Ireland in October 2008 as part of a pilot project to restore upland gully woodland in Ireland[3] and recorded brown trout in these upper reaches. These would be non-migratory resident fish which are trapped above the reservoir. Brown trout would also be expected in the Slade Brook within the commonage.

2.5 Recreation/Amenity

The commonage provides hillwalking access to the Dublin uplands and to the passage graves on the summits of Seehan and Seefingan. The walking route is in very poor condition for much of the ridge with bare peat and many wet tracks.

There is frequent illegal use of quad bikes, ATV and scrambler bikes on the hill. Mountain biking is also frequent.

The lands were traditionally shot for grouse as part of the Cobbe Estate. The Dublin Regional Game Council hold a licence to shoot grouse on this hill and conduct an annual count of grouse on the August Bank Holiday Weekend.

3. 2019 Ecological Assessment

3.1 Field Survey

Following the background review and desktop research the site was visited in June, July and August 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 7, 8** and **9** below and as described above.

[3] Purser, P. and F. Wilson (2009). The Development of a Gully Woodland Restoration Plan for the Upper River Dodder Catchment and the Identification and Assessment of Generic Issues of Relevance for Future Similar Projects in Ireland. A Report to Woodlands of Ireland.

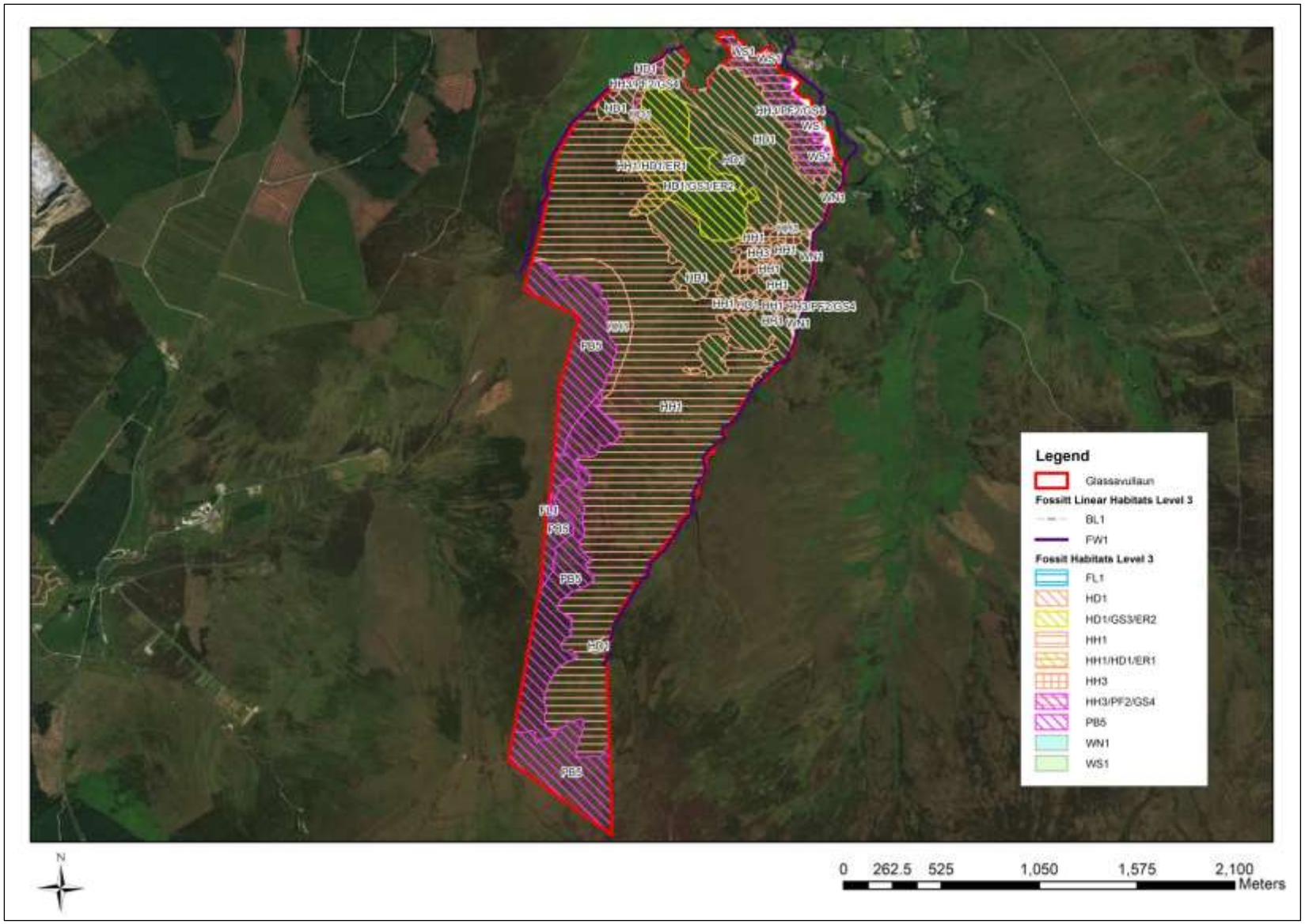

Figure 7. Habitats mapped to Level Three (Fossitt, 2000) within the Glassavullaun commonage.

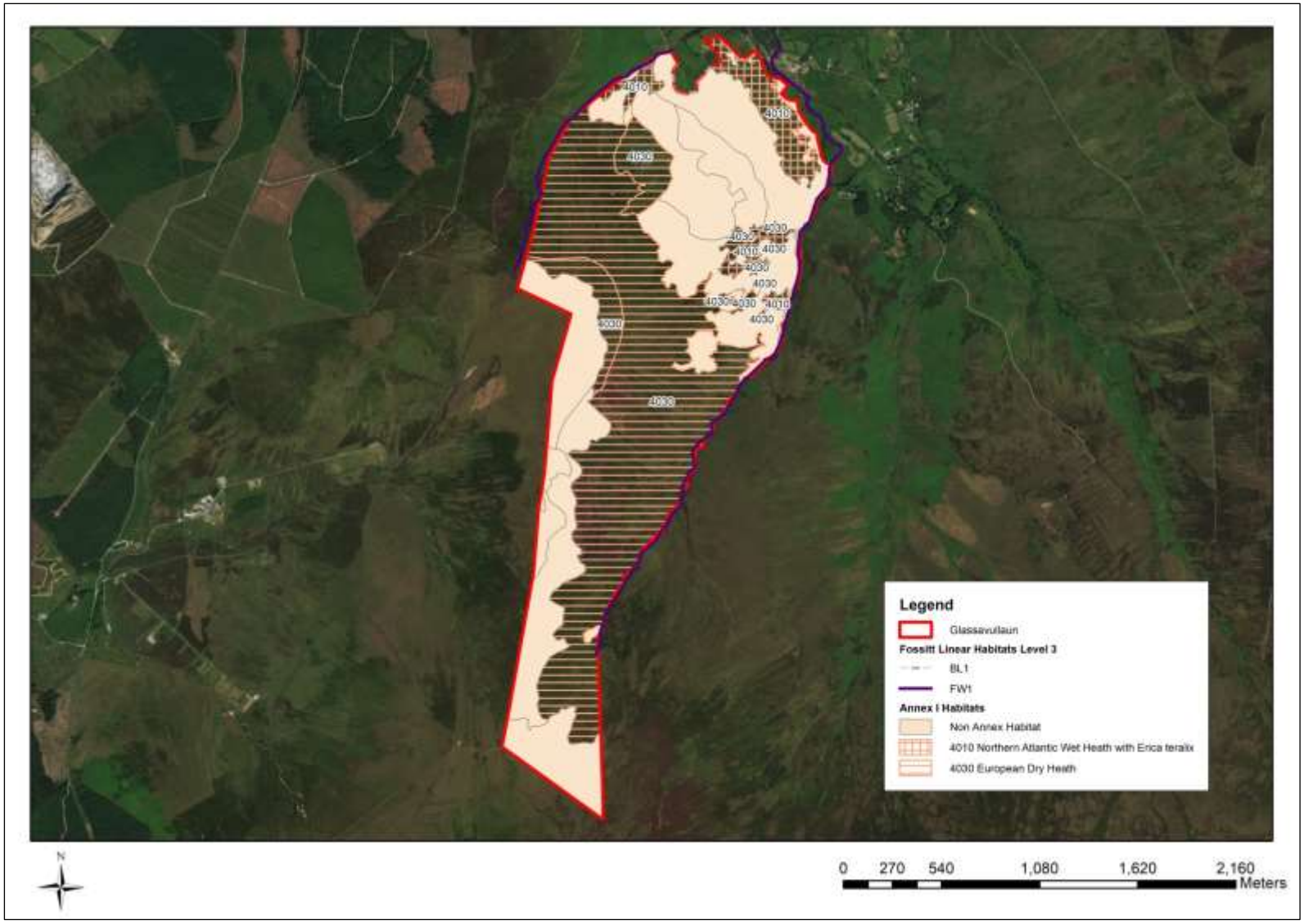

Figure 8. Habitats mapped according to their correspondence with Annex I habitats within the Glassavullaun commonage.

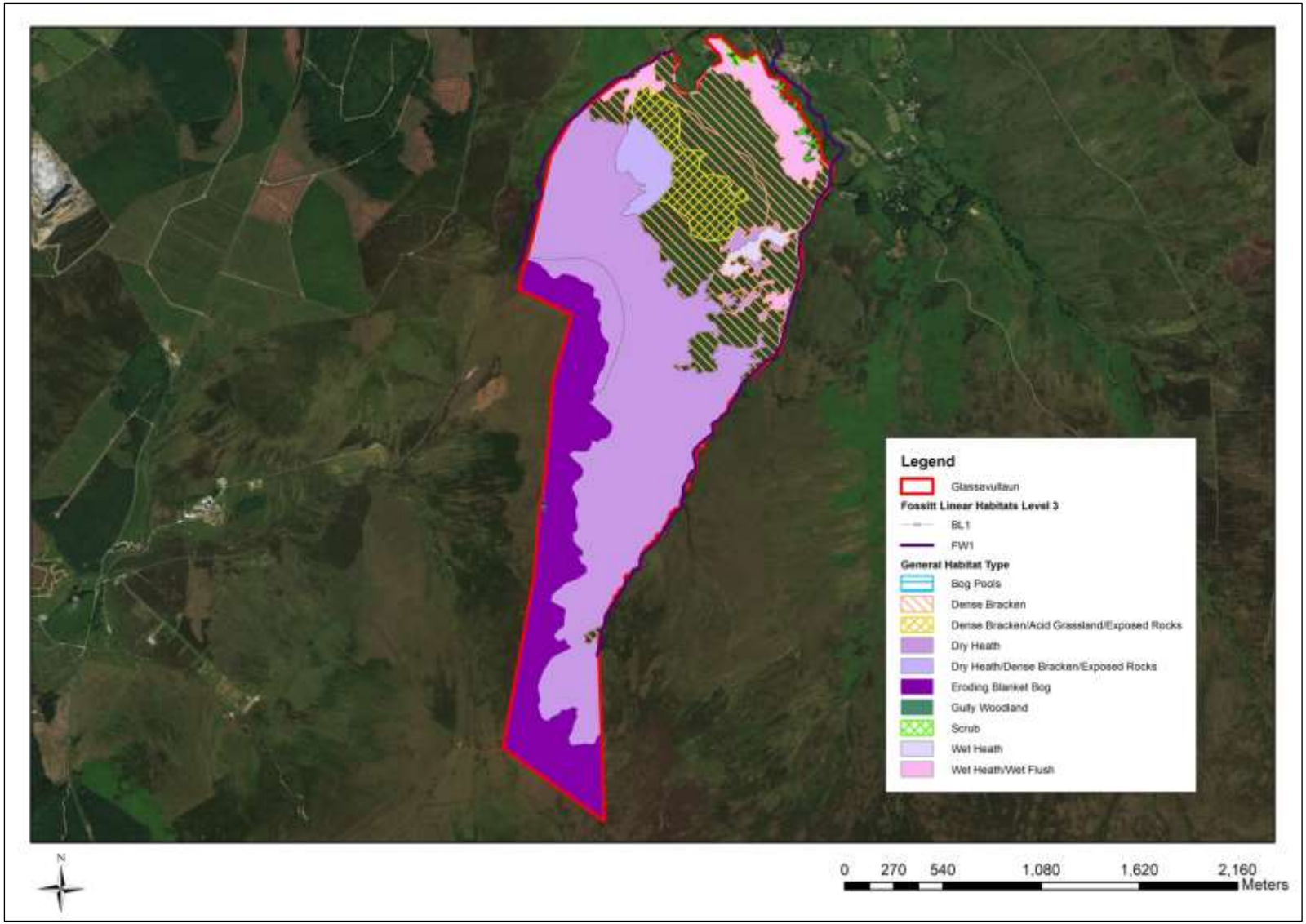

Figure 9. Habitats mapped using general vegetation descriptions.

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	Unfavourable – Bad	Unfavourable – Bad	Unfavourable – Bad	Unfavourable – Bad	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	Unfavourable – Bad	Unfavourable – Bad	Unfavourable – Bad	Unfavourable – Bad	Unfavourable – Bad	Unfavourable – Bad	Unfavourable – Bad
7130 Blanket bogs (* if active bog),	Unfavourable – Bad	Unfavourable – Bad	Unfavourable – Inadequate	Unfavourable – Bad	Unfavourable – Bad	Unfavourable – Bad	Unfavourable – Bad	Unfavourable – Bad
8110 Siliceous screes	Unfavourable – Inadequate	Favourable	Unfavourable – Inadequate	Unfavourable – Inadequate	Unfavourable – Inadequate	Unfavourable – Inadequate	Unfavourable – Inadequate	Unfavourable – Inadequate
8210 Calcareous rocky slopes	Unfavourable – Inadequate	Favourable	Unfavourable – Inadequate	Unfavourable – Inadequate	Unfavourable – Inadequate	Unfavourable – Inadequate	Unfavourable – Inadequate	Unfavourable – Inadequate
8220 Siliceous rocky slopes	Unfavourable – Inadequate	Favourable	Unfavourable – Inadequate	Unfavourable – Inadequate	Unfavourable – Inadequate	Unfavourable – Inadequate	Unfavourable – Inadequate	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 rockclimbing, 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*** and **4030 Dry Heath**). 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, gully woodland areas, 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 10** below.

3.2.1 4030 Dry heath

A total of 4 monitoring stops were recorded within the **4030 Dry heath** habitat within the commonage. The results of the monitoring stops are presented below in **Table 3.2.1**.

Table 3.2.1: Monitoring criteria and failure rates for 4030 Dry heath (*n* = 4).

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 *Campylopus* spp. and *Polytrichum* spp. ≥ 3	Relevé	4	4	100
2. Number of positive indicator species present ≥ 2 (Appendix VI)	Relevé	4	0	0
3. Siliceous heaths: cover of positive indicator species ≥ 50% (Appendix VI)	Relevé	4	1	25
4. Proportion of dwarf shrub cover composed of *Myrica gale*, *Salix repens*, *Ulex gallii* collectively < 50%	Relevé	4	0	0
5. Cover of the following weedy negative indicator species: *Cirsium arvense, C. vulgare, Ranunculus repens*, large *Rumex* species (except *R. acetosa*), *Senecio jacobaea*, *Urtica dioica* collectively < 1%	Relevé	4	0	0
6. Cover of non-native species < 1%	Relevé	4	0	0
7. Cover of non-native species < 1%	Local vicinity	4	0	0
8. Cover of scattered native trees and scrub < 20%	Local vicinity	4	0	0
9. Cover of *Pteridium aquilinum* < 10%	Local vicinity	4	1	25
10. Cover of *Juncus effusus* < 10%	Local vicinity	4	1	25
Vegetation structure				
11. Senescent proportion of *Calluna vulgaris* cover < 50%	Relevé	4	1	25
12. Last complete growing season's shoots of ericoids and *Empetrum nigrum* showing signs of browsing collectively < 33% (Assess a minimum of 10 shoots distributed across the plot)	Relevé	4	2	50
13. No signs of burning inside boundaries of sensitive areas[4]	Local vicinity	4	3	75
14. Outside boundaries of sensitive areas, all growth phases of *Calluna vulgaris* should occur throughout, with ≥ 10% of cover in mature phase[5]	Local vicinity	4	2	50
Physical structure				
15. Cover of disturbed bare ground < 10%	Relevé	4	2	50
16. Cover of disturbed bare ground < 10%	Local vicinity	4	1	25

[4] 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, haggs and erosion gullies, and within 5 – 10 m of the edge of watercourses.

[5] *Calluna vulgaris* growth phases
1. Pioneer < 10 cm
2. Building 10 – 30 cm
3. Mature > 30 cm

Dry heath is found across much of the slopes of 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 north-east facing slopes of the commonage now consist of dry acid grassland as a result of repeated burning and grazing but these are being lost as a result of the invasion of dense bracken. In some areas species poor grassland dominated by Mat grass or Deer grass have developed 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 no significant change 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. The Commonage Framework Plan map would indicate that the majority of the hill was heath habitat (dry heath/wet heath mosaic) with acid grassland found only on the lower slopes near Castlekelly. As a result of grazing and burning the overall extant of dry heath has decreased and is now dominated by acid grassland into which dense bracken has encroached.

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

Large areas of the commonage are at risk of erosion as a result of systematic and repeated burning of the hill.

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 4 monitoring stops failed two 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 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, in one stop the dry heath was becoming invaded by bracken, while in another the presence of soft rush (*Juncus effusus*) was an indicator that areas of bare peat had previously been exposed. This would 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 large parts of the commonage bracken (*Pteridium aquilinum*) is starting to 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.

It is unclear if the CFP stock reductions were implemented to reduce grazing pressure, but the current condition of the commonage following years of uncontrolled burning, coupled with a lack of appropriate grazing and no active management of encroaching bracken has resulted in an overall poor condition of this habitat for many areas.

Future Prospects
The future prospects for the habitat are assessed as **Unfavourable – Bad** unless the hill is fully 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. The encroaching spread of bracken following burning will require ongoing engagement and active management by the commonage group.

Conservation Status Assessment
Overall the conservation status assessment for dry heath habitat within the commonage is assessed as **Unfavourable – Bad**.

3.2.2 4010 Northern Atlantic Wet Heaths with *Erica tetralix*

A total of 2 monitoring stops were recorded within the **4010 Northern Atlantic Wet Heaths with *Erica tetralix*** habitat within the commonage. The results of the two monitoring stops conducted in areas of unburnt habitat are presented below in **Table 3.2.2**.

Table 3.2.2. Monitoring criteria and failure rates for 4010 Northern Atlantic Wet Heaths with *Erica tetralix* (n = 2).

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

[6] 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, haggs 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.

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. In the lower slopes at Castlekelly this is as a result of encroachment by scrub while in the upper slopes large areas of what was probably wet heath have been burnt. Areas of possible former wet heath near the Slade Brook now vegetated with species poor grassland habitats dominated by either purple moor grass or deer grass as a result of 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, both 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 all monitoring stops passing. One stop failed as a result of burning, while another failed on account of encroaching bracken in the surrounding area – probably following burning which dries the peat out.

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. Large areas of **4010 Northern Atlantic Wet Heaths with *Erica tetralix*** within the commonage are severely damaged from burning and are at risk of erosion as a result. 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.

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

3.2.3 Acid Grassland
Large areas of acid grassland on the hill have been lost to dense bracken which is also beginning to encroach into remaining areas of dry heath. This will require management to try and reduce the bracken cover. The condition of this habitat although not assessed using any formal assessment technique would be assessed as **Unfavourable - Inadequate**.

3.2.4 Eroding Bog
The summits and ridges of the mountains within the commonage are in extremely bad condition following year of illegal burning coupled with overgrazing and are at significant risk of erosion and landslide. They are so badly damaged that they would no longer be mapped as a habitat listed under Annex I of the EU Habitats Directive. The condition of this habitat although not assessed using any formal assessment technique would be assessed as **Unfavourable - Bad**. The Commonage Framework Plan described these areas as Upland Blanket Bog and they were deemed to be in an

undamaged state at that time. Almost twenty years later the impacts of illegal burning and overgrazing have now resulted in the destruction of this habitat which will need urgent action to recover.

The results of these assessments are presented on Figure 10 below.

Active measures by the members of the commonage group as set out in the management recommendations will assist in beginning to improve the conservation status of the habitats within Glassavullaun. However it should be recognised that it may take in some instances over twenty years for habitats to begin to recover following over two decades of severe uncontrolled burning. More than one parameter may 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.).

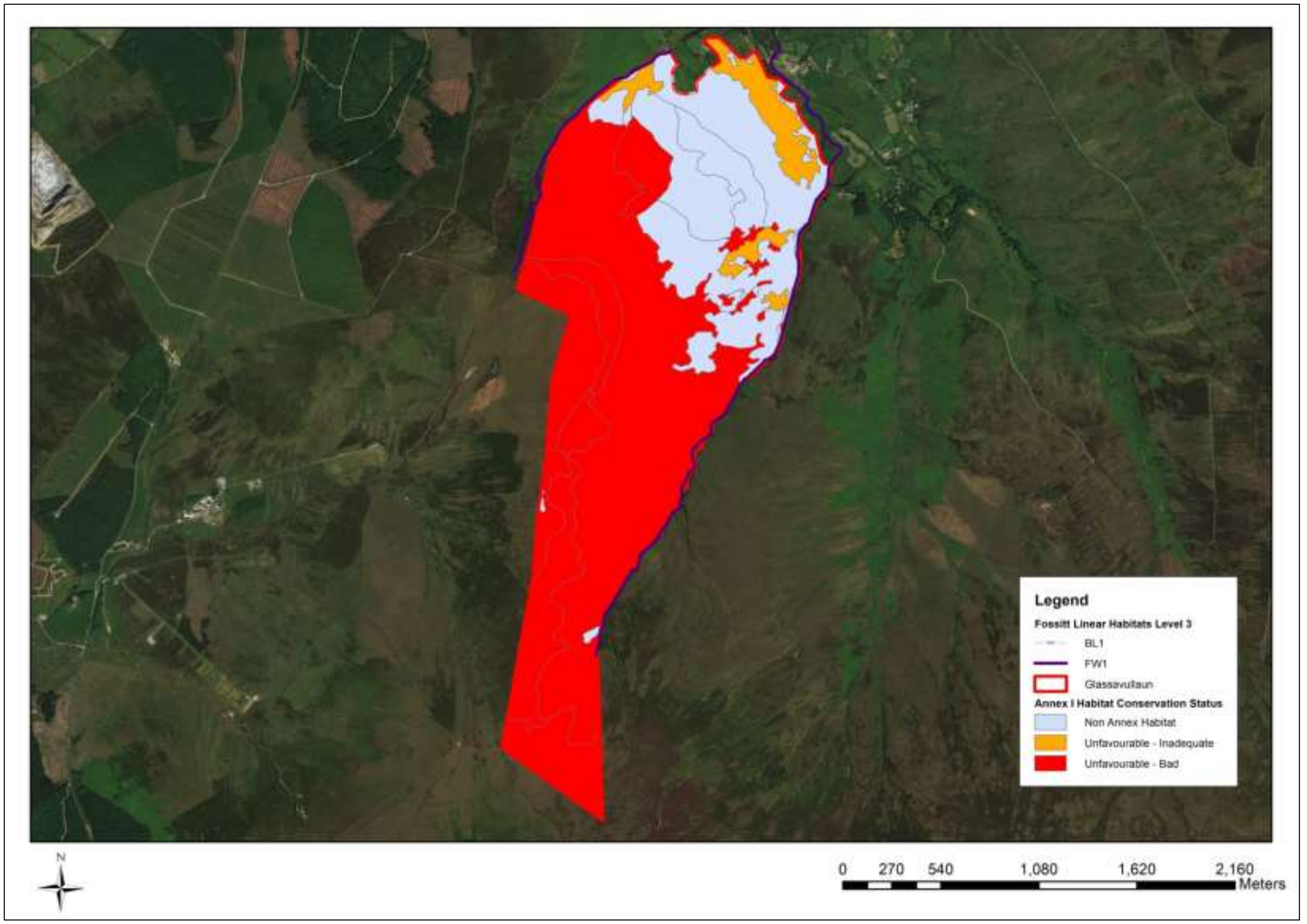

Figure 10. Habitat Condition Assessment for the Annex I habitats within Glassavullaun Commonage.

4. Management Recommendations for Glassavullaun

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** and **Wet Heath** in the long term as well as the protection for the legally protected plant species, Bog Orchid (*Hammarbya paludosa*).

The major impacts arise from a legacy of decades of uncontrolled burning, inappropriate grazing (from both sheep and also from deer) which has not allowed burnt areas to recover and has also favoured the development of acid grassland over heath, lack of control of bracken, and to a lesser extent recreational access on the ridge from quad, scrambler, ATV bikes and mountain bikes resulting in localised peat erosion along the track, 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 first visit conducted in January 2001 found the commonage to generally be in an undamaged condition (with the exception of Recording Station X6, which had been burnt and was assessed as Moderately Damaged MM) but a return visit in April that year found an extensive burn had occurred in the vicinity of Recording Station X5. The Commonage Management Plan therefore recommended a destocking rate of 10.876% (across both this commonage and Ballymorefinn) to allow the vegetation to recover as it was noted that the area surrounding Recording Station X6 was heavily grazed, which was affecting the re-establishment of vegetation, particularly *Calluna*. However it is unclear if this area was destocked. 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 hill until these habitats recover.

The ridge between Seefingan Mountain and Corrig Mountain and west towards Seehan, the east facing slopes of the commonage between the ridge and the Slade Brook are in very poor ecological condition and these areas should be the focus of specific measures by the project as they are vulnerable to peat erosion and landslides. These areas of eroding blanket bog and areas of burnt wet heath should have all sheep and other grazing animals (such as goats) removed from them either by destocking the hill 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 habitat 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 exclosures 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.

The most damaged areas on the ridge will require 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 landslides.

Large areas of habitat management on the north and north east facing slopes of the site in terms of bracken control will be required to encourage sheep to graze in and utilise these areas allowing the other areas to recover. The encroachment of bracken into adjoining areas of dry heath habitat across the commonage should be managed as a priority.

Consideration should be given to the establishment of small stands of native upland woodland on the lower slopes of the site where the bracken is particularly dense and grazing is compromised.

The two watercourses rising on the site are both tributaries of one of the main drinking sources for Dublin City – the Bohernabreena Reservoir. 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 retrofitting of native woodland on these streams to act as protection forests for water quality would be a welcome measure.

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 11** 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/Wet Heath

The areas of bare peat and eroding and cracked areas of blanket bog on the ridge and slopes (possibly wet heath) of Seefingan Mountain, the ridge between it and Corrig, and the ridge to Seahan 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 works to the trail.

Information on the restoration of hydrology in blanket bog and wet heath, 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 on the Ridge

The areas of bare and eroding peat on the ridge and slopes of the commonage are at real risk of erosion and landslide. These areas will require destocking, restoration of hydrological function, stabilisation of the peat and revegetation.

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. This may be achievable through active shepherding and encouraging sheep to use the lower northern facing slopes of the commonage. Trespassing sheep from Castlekelly and Ballymorefinn will also need to be moved out of the commonage.

However complete destocking of the hill combined with active shepherding and hunting out of trespassing sheep will be required to allow the slopes to recover if active shepherding is unsuccessful.

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 the lower slopes of Seefingan Mountain, and one on the ridge between it and Corrig where the bog vegetation is more intact but the peat is cracking and at risk of sliding and further erosion.

Stabilisation of Bare Peat
The Moors for the Future project in the UK has identified that the most important factor in re-vegetating damaged areas of blanket bog is the initial stabilisation of the areas of bare and eroding peat[7]. 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 aim here is to restore montane blanket bog to a sward dominated by *Sphagnum* mosses, ling heather, crowberry, bog cottons and woolly hair moss (*Racomitrium lanuginosum*).

In many areas the heather is almost completely destroyed so 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 documents[8].

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

[7] http://www.moorsforthefuture.org.uk/repairing-bare-peat

[8] Moors for the Future. Heather Cutting – Factsheet. Available online from http://www.moorsforthefuture.org.uk/factsheets.

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.

Sphagnum Moss Reintroduction
The most important group of species to re-introduce on the ridge once the erosion is reduced in small gulls/tear pools 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 'Beedamoss[9]'), *Sphagnum* plugs or by gathering *Sphagnum* from blanket bog on other parts of the nearby mountain ranges/commonages, which are undamaged.

Track Repairs
The track on the ridge and towards the summit of Seefingan is in need of urgent repair. Uncontrolled access by ATVs, scramblers, etc. here needs to be urgently stopped (see **Section 4.8**).

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

4.3 Measures for the Annex I Habitat 4060 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 in the lower slopes of Seefingan Mountain near the Slade Brook which have been recently burnt. This 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 generally dominated by Mat-grass (*Nardus stricta*), and Deergrass (*Trichophorum cespitosum*), which are unpalatable to sheep.

Bracken invasion of dry heath
Other areas such as a narrow band of unburnt heath on the northern slopes of the commonage are relatively under-grazed and are also being invaded by bracken (see **Plate 8** and **9** above). 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 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 commonage at Castlekelly. Here the habitat is becoming encroached on the margins by Common Gorse and in some locations Hawthorn, which are not desirable species (see **Plates 2 and 20**). It is recommended that these shrubs are cut and removed. Sheep do not generally

[9] http://www.beadamoss.co.uk/page19.html

have a controlling impact on these species which would have been reduced in their vigour when the hills were grazed by cattle.

Plate 20. Gorse encroaching into areas of wet heath on the lower slopes.

Some areas of the commonage (such as the slopes of Seefingan Mountain in particular) may have been covered by a pure stand of wet heath habitat but these areas are now so badly damaged through burning that is impossible to assign them to a habitat type other than damaged and eroding bog. In other areas wet heath HHS forms part of a mosaic with **Dry Heath HH1/Dry Acid Grassland GS3**.

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

The main challenge then 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 - moving sheep away from the areas near the Slade Brook to other areas of the hill, controlling deer and hunting out trespassing sheep from adjoining commonages.

4.5 Control of ATVs/Quads/Scramblers

Damage by quads, ATVs and scrambler motorbikes was noted on the ridge of Seefingan and on the summit of Seahan. These appear to have gained access from the adjacent Coillte plantation. Consultation and collaboration with Coillte regarding locking of barriers, checking of boundary fences, or similar measures may be put in place to try and deter and discourage this activity.

4.6 Measures for Bracken Control

Areas of dense bracken now cover approximately one third of the commonage. Urgent consideration should be given to the control of bracken within the commonage, notably on the northern slopes, along the Slade Brook and 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.

4.7 Upland Gully Woodland

Consideration should be given to the further establishment of upland gully woodland and extension of this habitat along the two watercourses in the site (and in the bracken dominated slopes above Castlekelly) 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 River Dodder below 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.

It is recommended that a number of trial measures to establish upland woodland are used in the areas of dense bracken on the northern slopes. Subject to liaison with members of the commonage group a series of exclosures will be created adjoining areas of existing gully woodland along the watercourses and in the areas of dense bracken on the northern slopes (including those trees which are naturally occurring on these slopes). Within these a series of different treatments are proposed. The exclosures will be fitted to land-form, aspect, parent trees and habitat and will be in the range of 0.25 – 5 Ha in size.

Once exclosure locations are decided a programme of treatments from the following trial methods will be considered for specific exclosures to both increase and protect natural regeneration or to physically establish trees:

- Physical bruising of bracken (*Pteridium aquilinum*) fronds
- Chemical control of bracken (*Pteridium aquilinum*)
- Introduction of tree seed
- Enrichment planting of oak (*Quercus petraea*) and other species as saplings

The bracken control works would need to be conducted in advance of seed production in those areas adjacent to the watercourse to allow seed to fall into the prepared areas.

Fire is a serious threat to the success of the establishment, regeneration and retention of native woodland. These areas will need to be protected by fire breaks which could be created either around the existing areas of gully woodland or around individual exclosures. The methodology used to create the firebreaks would likely be limited to vegetation clearance to form a double line fire break.

4.8 Track Repairs

The tracks on the ride and summits of the commonage are 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 vegetation recovers following burning, the successes or otherwise of bracken control, establishment of upland woodland and what affect active shepherding of stock on the hill has bearing in mind that there may be a considerable delay between changes in livestock levels and a response in the vegetation.

The legally protected orchid species Bog Orchid (*Hammarbya paludosa*) should be accurately surveyed, mapped and monitored annually over the lifetime of this project as additional populations may occur within suitable habitat in the commonage to those known from Castlekelly (the areas of wet heath further up the hill) and care must be taken to ensure that any management measures implemented do not damage same.

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.

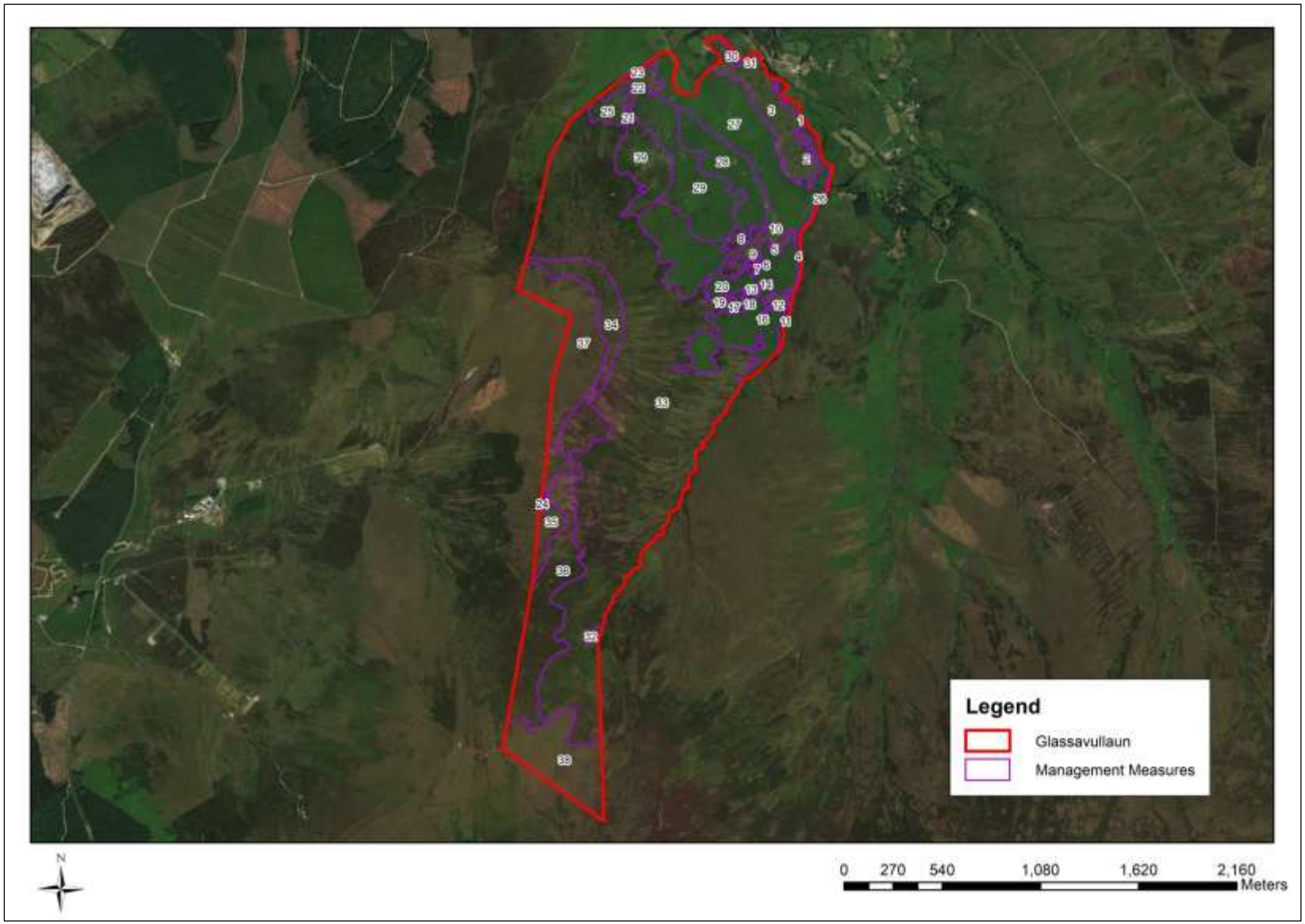

Figure 11. Management measures for Glassavullaun.

Table 4. Habitats present on Glassavullaun and Management Recommendations.

Id	Annex 1 Code	Fossitt Code	Habitat	Area (m^2)	Conservation Status	Management Prescription
1		WS1	Scrub	18928		Cut and remove encroaching gorse in areas of wet heath/flush
2		WS1	Scrub	2493		Cut and remove encroaching gorse in areas of wet heath/flush
3	4010	HH3/PF2/GS4	Wet Heath/Wet Flush	133468	Unfavourable - Inadequate	No further burning. Cut and remove encroaching gorse in areas of wet heath/flush
4		WN1	Gully Woodland	6592		Extend woodland area along this watercourse through new planting, protection from browsing, development of exclosures within areas of bracken
5	4030	HH1	Dry Heath	1860	Unfavourable - Bad	No further burning. Control bracken which is beginning to invade the habitat.
6	4030	HH1	Dry Heath	1547	Unfavourable - Bad	No further burning. Control bracken which is beginning to invade the habitat.
7	4030	HH1	Dry Heath	3855	Unfavourable - Bad	No further burning. Control bracken which is beginning to invade the habitat.
8	4030	HH1	Dry Heath	14660	Unfavourable - Bad	No further burning. Control bracken which is beginning to invade the habitat.
9	4010	HH3	Wet Heath	34043	Unfavourable - Inadequate	No further burning. Control bracken which is beginning to invade the habitat.
10	4030	HH1	Dry Heath	1435	Unfavourable - Bad	No further burning. Control bracken which is beginning to invade the habitat.
11		WN1	Gully Woodland	6735		Extend woodland area along this watercourse through new planting, protection from browsing, development of exclosures within areas of bracken
12	4010	HH3/PF2/GS4	Wet Heath/Wet Flush	9827	Unfavourable - Inadequate	No further burning. Control bracken which is beginning to invade the habitat.
13		HD1	Dense Bracken	1429		Control bracken
14	4030	HH1	Dry Heath	1514	Unfavourable - Bad	No further burning.

						Control bracken which is beginning to invade the habitat.
15		HD1	Dense Bracken	421		Control bracken
16	4030	HH1	Dry Heath	1763	Unfavourable - Bad	No further burning. Control bracken which is beginning to invade the habitat.
17		HD1	Dense Bracken	7126		Control bracken
18	4030	HH1	Dry Heath	5503	Unfavourable - Bad	No further burning. Control bracken which is beginning to invade the habitat.
19	4030	HH1	Dry Heath	3310	Unfavourable - Bad	No further burning. Control bracken which is beginning to invade the habitat.
20		HD1	Dense Bracken	345190		Control bracken
21		HD1	Dense Bracken	3716		Control bracken
22	4010	HH3/PF2/GS4	Wet Heath/Wet Flush	29212	Unfavourable - Inadequate	No further burning. Control bracken which is beginning to invade the habitat. Extend woodland area along this watercourse through new planting, protection from browsing, development of exclosures within areas of bracken
23		HD1	Dense Bracken	4648		Control bracken Extend woodland area along this watercourse through new planting, protection from browsing, development of exclosures within areas of bracken
24		FL1	Bog Pools	2742		No further burning. Exclude grazers from the ridge
25		HD1	Dense Bracken	28162		Control bracken Control bracken which is beginning to invade the habitat. Extend woodland area along this watercourse through new planting, protection from browsing, development of exclosures within areas of bracken
26		WN1	Gully Woodland	4901		Extend woodland area along this watercourse through new planting, protection from browsing, development of exclosures within areas of bracken
27		HD1	Dense Bracken	274421		Control bracken Extend woodland area along this watercourse

						through new planting, protection from browsing, development of exclosures within areas of bracken
28		HD1	Dense Bracken	124690		Control bracken
29		HD1/GS3/ER2	Dense Bracken/Acid Grassland/Exposed Rocks	190236		Control bracken
30		WS1	Scrub	5811		Cut and remove encroaching gorse in areas of wet heath/flush
31		WS1	Scrub	565		Cut and remove encroaching gorse in areas of wet heath/flush
32		HD1	Dense Bracken	4891		Control bracken
33	4030	HH1	Dry Heath	1545056	Unfavourable - Bad	No further burning. This area was extremely badly burnt over numerous years in the last two decades including in April 2019. This has resulted in the degradation of the peatland vegetation here and drying out of the peat which is cracking in several locations and is at risk of erosion and landslide. Restoration of the vegetation is required. Destocking and exclusion of grazing is recommended. Regular shepherding to hunt out trespassing sheep. Control bracken which is beginning to invade the dry heath on the lower slopes Extend woodland area along this watercourse through new planting, protection from browsing, development of exclosures within areas of bracken
34	4030	HH1	Dry Heath	95296	Unfavourable - Bad	No further burning. This area was extremely badly burnt over numerous years in the last two decades including in April 2019. This has resulted in the degradation of the peatland vegetation here and

						drying out of the peat which is cracking in several locations and is at risk of erosion and landslide. Restoration of the vegetation is required. Destocking and exclusion of grazing is recommended. Regular shepherding to hunt out trespassing sheep. Control bracken which is beginning to invade the dry heath
35		PB5	Eroding Blanket Bog	58408	Unfavourable - Bad	No further burning. This area was extremely badly burnt over numerous years in the last two decades. This has resulted in the degradation of blanket bog vegetation on the ridge and drying out of the peat which is cracking in several locations and is at risk of erosion and landslide. Restoration of the blanket bog vegetation is required. Destocking and exclusion of grazing is recommended. Regular shepherding to hunt out trespassing sheep. Bad erosion in the vicinity of the track. Track repairs required. The bog surface has been damaged here by a quad/ATV/Scrambler. No further quad/scrambler access to the entire commonage should be allowed – on other commonages this has been controlled through locked gates.
36		PB5	Eroding Blanket Bog	277229	Unfavourable - Bad	No further burning. This area was extremely badly burnt over numerous years in the last two decades. This has resulted in the degradation of blanket bog vegetation on the ridge and drying out of the

						peat which is cracking in several locations and is at risk of erosion and landslide. Restoration of the blanket bog vegetation is required. Destocking and exclusion of grazing is recommended. Erection of deer exclosures to assess deer browsing pressures. Provide grouse flight diverters on fencing if erected to reduce collision risk. Regular shepherding to hunt out trespassing sheep. Bad erosion in the vicinity of the track. Track repairs required. The bog surface has been damaged here by a quad/ATV/scrambler. No further quad/scrambler access to the entire commonage should be allowed – on other commonages this has been controlled through locked gates.
37		PB5	Eroding Blanket Bog	202667	Unfavourable - Bad	No further burning. This area was extremely badly burnt over numerous years in the last two decades. This has resulted in the degradation of blanket bog vegetation on the ridge and drying out of the peat which is cracking in several locations and is at risk of erosion and landslide. Restoration of the blanket bog vegetation is required. Destocking and exclusion of grazing is recommended. Erection of deer exclosures to assess deer browsing pressures. Provide grouse flight diverters on fencing if erected to reduce collision risk. Regular shepherding to hunt out trespassing

						sheep. Bad erosion in the vicinity of the track. Track repairs required. The bog surface has been damaged here by a quad/ATV/scrambler. No further quad/scrambler access to the entire commonage should be allowed – on other commonages this has been controlled through locked gates.
38		PB5	Eroding Blanket Bog	172218	Unfavourable - Bad	No further burning. This area was extremely badly burnt over numerous years in the last two decades. This has resulted in the degradation of blanket bog vegetation on the ridge and drying out of the peat which is cracking in several locations and is at risk of erosion and landslide. Restoration of the blanket bog vegetation is required. Destocking and exclusion of grazing is recommended. Regular shepherding to hunt out trespassing sheep. Bad erosion in the vicinity of the track. Track repairs required. The bog surface has been damaged here by a quad/ATV/scrambler. No further quad/scrambler access to the entire commonage should be allowed – on other commonages this has been controlled through locked gates.
39	4030	HH1/HD1/ER1	Dry Heath/Dense Bracken/Exposed Rocks	100557	Unfavourable - Bad	Control bracken which is beginning to invade the dry heath

5. Appendix 1. Historic Imagery of the Glassavullaun Commonage

Plate 1. OSI Aerial photography 1995.

Plate 2. OSI Aerial photography 2000. Note how burns on the lower and upper slopes of the commonage and fire on adjoining lands.

Plate 3. OSI Aerial photography 2005.

Plate 4. May 2009 (Source: Google Earth Image). Note burns on Seefingan.

Plate 5. July 2013 (Source: Google Earth Image). Note colour of bracken – bright green and burns.

Plate 6. June 2014 (Source: Google Earth Image).

Plate 7. April 2015 (Source: Google Earth Image). Note fire within the commonage.

Plate 8. June 2016 (Source: Google Earth Image). Note fire.

Plate 9. June 2018 (Source: Google Earth Image).

Plate 10. June 2019 (Source: Google Earth Image). Note extent of April 2019 burn on the ridge.

Plate 11. Google Maps Undated.

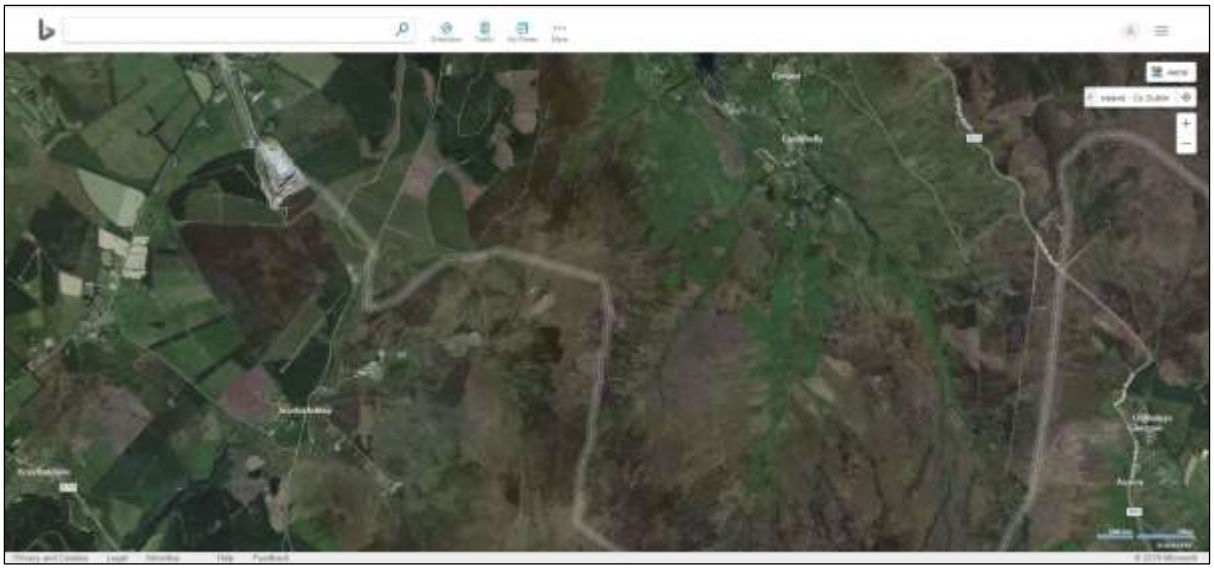

Plate 12. Undated (Source: Bing Maps).