

Kilsallagh Bog (SAC 000285), Co. Galway

Executive Summary

This survey, carried out in October 2012, aimed to assess the conservation status of habitats listed on Annex I of the European Habitats Directive (92/43EEC) on the high bog at Kilsallagh Bog. Vegetation was described and mapped based on raised bog ecotope vegetation community complexes (Kelly and Schouten, 2002). The following Annex I habitats occur: Active Raised Bog, Degraded Raised Bog and Depressions on peat substrates of the Rhynchosporion.

Active Raised Bog covers 11.53 ha (6.33%) of the high bog area. High quality Active Raised Bog consists of central ecotope and active flush featuring *Sphagnum* lawns, hummocks and hollows. *Sphagnum* cover reaches 100% in certain locations. Sub-central ecotope is frequent and *Sphagnum* cover can be up to 100% in the best quality examples of this ecotope.

Degraded Raised Bog covers 105.35 ha (93.67%) of the high bog area. It is drier than Active Raised Bog and supports a lower density of *Sphagnum* mosses. It has a less developed micro-topography while permanent pools and *Sphagnum* lawns are generally absent. The habitat also includes some inactive flushes, most of them dominated by *Molinia caerulea*.

Depressions on peat substrates of the Rhynchosporion are found in both Active and Degraded Raised Bog, but tend to be best developed and most stable in the wettest areas of Active Raised Bog. On this site it was most frequent in the sub-central community complexes 6/4 + P, 6/9 + P and 10/6.

Restoration works took place at the site between 2004-12 in the form of forestry clearfell (within the high bog) and associated drain blocking. Three drains adjacent to the former forestry plantation (in the north of the high bog) were blocked. The total length of blocked drains is 0.914km and these drains are all non-functional.

The current conservation objective for Kilsallagh Bog is to restore the area of Active Raised Bog to the area present when the Habitats Directive came into force in 1994. In the case of Active Raised Bog, the objective also includes the restoration of all of the sub-marginal ecotope present at the

time as this represents the area of Degraded Raised Bog most technically feasible to restore. The Area objective for Active Raised Bog is 76.76ha. The objective in relation to Structure and Functions (S&Fs) is that at least half of the Active Raised Bog area should be made up of the central ecotope and active flush (i.e. the wetter vegetation communities). These values have been set as Favourable Reference Values (FRVs) until more site specific values can be set based on hydrological and topographical studies. The objective for Degraded Raised Bog is for the sub-marginal area to be restored to active peat forming communities as stated above and that no loss or degradation of any kind occurs. Although FRVs could not be established for the Rhynchosporion depressions, the objectives are to increase its extent and improve its quality to values associated with a favourable conservation status of Active Raised Bog. Therefore, the habitat's objectives are indirectly associated with Active Raised Bog objectives.

There has been a small increase in the area of Active Raised Bog (0.17ha) at Kilsallagh in the 2004 to 2012 period. This has mostly taken place in the central area of the high bog and is a result of rewetting associated with forestry clearfell and drain blocking.

Some new peat forming areas have been described at the site, some of which are the result of a more comprehensive field mapping. However, several (in the central area of the high bog) are due to an increase in habitat quality as a result of rewetting associated with forestry clearfell and drain blocking.

There was an area in the south-western section of the bog where the quality of the ARB has declined and area decreased. This is likely to be due to the impact of the extensive drainage to the east of this area.

Peat cutting, drainage and afforestation are the most threatening current activities at the site. 1.63ha of high bog have been lost in the reporting period due to peat cutting. 7.323km of drains remain functional and 3.049km reduced functional. No fire events have affected the bog in the reporting period.

Active Raised Bog has been given an overall **Unfavourable Bad–Declining** conservation status assessment. Habitat Area has increased and quality (S&Fs) improved in the central area of the high bog in the reporting period. However, there was also a decrease in habitat Area and S&Fs in the south-western section of the high bog. The current Area value and S&Fs are below favourable reference values. Future Prospects are considered Unfavourable Bad–Declining, as the positive impact of restoration works (forestry clearfell and drain blocking), are not likely to counteract the negative impacting activities (peat cutting, drainage and afforestation) that continue to threaten the habitat.

Degraded Raised Bog has been given an overall **Unfavourable Bad-Declining** conservation assessment and **Rhynchosporion depressions** has been given an **Unfavourable Bad-Declining** conservation status assessment.

The **overall raised bog** at Kilsallagh SAC has been given an **Unfavourable Bad-Declining** assessment.

A series of **recommendations** have been also given, these include: cessation of peat cutting; blocking of remaining high bog reduced-functional and functional drains, as well as cutover drains; assessment of the actual impact of forestry adjacent to the high bog; restoration works on the high bog and cutover areas, including peat exploitation areas; further hydrological and topographical studies to ascertain more accurate FRVs; and further botanical monitoring surveys.

Site identification

SAC Site Code	000285	6" Sheet:	GY 7
Grid Reference:	M 6767	1:50,000 Sheet:	39
High Bog area (ha):	182.11ha ¹		
Dates of Visit:	08 to 11/11/2012		
Townlands:	Kilsallagh, Kilcoley, Ardagh, Oughtagh & Kilmacrickard		

¹ This figure corresponds with the 2012 high bog extent estimated using 2010 aerial photographs. Although Fernandez *et al.*, (2005) reported a high bog extent of 184.50ha. The actual high bog extent in 2004 was 183.74ha (see tables 8.1 and 8.3 2004 (amended) figures). This discrepancy is the result of more accurate mapping of the high bog edge.

Site location

Kilsallagh Bog is located approximately 9km north-northeast of Glennamaddy, Co. Galway and 5km south-southwest of Ballymoe, Co. Galway.

The site may be accessed from a number of bog roads. To access the north of the site follow the road running from Ballymoe to Glennamaddy, take a left turn at Kilcroan crossroads and then a right turn onto a bog road that leads to the track running through the north of the site. To access the south of the site take the third next left turn off the Ballymoe-Glennamaddy road, directly south of the area marked Kilsallagh on the OS Map. Then take the second left turn onto a track that leads to the southern margins of the bog.

Description of the survey

The survey was carried out in October 2012 and involved a vegetation survey of the high bog at Kilsallagh Bog and the recording of impacting activities affecting high bog vegetation. A similar survey was carried out in 2004 by Fernandez *et al.* (2005). High bog vegetation was described and mapped, based on raised bog ecotope vegetation community complexes developed by Kelly and Schouten (2002). Detailed notes were taken on each community complex and any flushed areas that were present. These included: species lists; estimation of % cover of dominant species; percentage *Sphagnum* cover; evidence of damage (due to burning, peat cutting or drainage); micro-topography; ground firmness; and presence of *Cladonia* species. A list of photographic records is given in

Appendix II. The survey aimed to assess the conservation status of Habitats Directive (Council Directive 92/43/EEC) Annex I habitats on the high bog.

The entire high bog of Kilsallagh Bog was re-surveyed. Sections mapped as sub-marginal, sub-central and central ecotope in 2004 were surveyed in more detail. These are the areas where changes were likely to have occurred. Quadrats, which describe the micro-topographical features and indicator species, recorded in the 2004 project (Fernandez *et al.* 2005) were re-surveyed (see Appendix III). The size of quadrats was 4m x 4m for Active Raised Bog.

A GeoExplorer handheld GPS minicomputer (Trimble GeoXT) was used in the field to record quadrats, ecotope boundaries, location of vegetation complexes and other points of interest. The GPS positions of these features were logged and stored on Terrasync software (Trimble). Additional comments were stored as text fields in the device. Post processing of data was carried out, based on the Active GPS Network from Ordnance Survey Ireland, to obtain sub-metre accuracy of the data.

A digital vector format ecotope vegetation map was produced based on the spatial data collected during the survey using ArcGIS 9.3 and 2010 aerial photography. The Irish National Grid was used as the co-ordinate reference system. Vegetation complex and ecotope maps are given in Appendix IV.

Description of the high bog

This bog has been classified geo-morphologically as a ridge basin bog type (Kelly *et al.*, 1995) and as a Western/Intermediate raised bog (Cross 1990). This bog is irregularly shaped, with the longest axis orientated in a N-S direction. There are several extensions protruding from the approximately rectangular-shaped bog in the north-west and south-west of the site. A section of the high bog at the northern end of the high bog is separated from the rest of the high bog by a bog track made of mineral material (along drain bG). Most of the high bog slopes to the south and the east with steeper slopes along the margins of the high bog and along flush Z.

Ecological Information

Raised Bog Annex I (Habitats Directive (92/43/EEC)) habitats

The following Raised Bog EU Annex I habitats, are found in Kilsallagh Bog:

- Active Raised Bog (EU code 7110),

- Degraded Raised Bog (EU code 7120) and
- Depressions on peat substrates of the Rhynchosporion (EU code 7150).

Active Raised Bog (7110)

The current area of Active Raised Bog (ARB) at Kilsallagh Bog is 11.53ha (6.3% of the high bog), which is a decrease of 7.6 ha since 1994. It should be noted that the high bog edge has been remapped at a higher level of accuracy as part of the 2012 project and that this may cause discrepancies on the overall extent of high bog (for instance 0.2ha of cutover were previously mapped incorrectly as high bog).

ARB includes central and sub-central ecotopes.

Central ecotope was found at three locations (**C1** to **C3**) (see Appendix IV, Map 1). Only one community complex was recorded (15). Complex 15 consisted of high and low hummocks, lawns and pools. Inter-connecting pools were 34 to 50% (increasing locally to 51 to 75%) and *Sphagnum* cover ranged from 76 to 90%. *Calluna vulgaris* and *Eriophorum vaginatum* were abundant throughout; *Sphagnum capillifolium* was dominant in the hummock layer with occasional *S. austinii* and *S. fuscum*. Pools were dominated by *S. cuspidatum* with frequent *Menyanthes trifoliata* and *Drosera anglica* and occasional *S. denticulatum*. Lawns were dominated by *S. papillosum* with occasional *S. magellanicum*. Additional species that were frequent at low cover throughout include *Racomitrium lanuginosum* and *Cladonia portentosa*.

Sub-central ecotope was found at six locations (**Sc1** and **Sc3** to **Sc7**) (see Appendix IV, Map 1). Five community complex types were recorded. The most widely distributed complex was 9/7 + P. This comprised high and low hummocks, lawns and pools. Inter-connecting pools were 11 to 25% (locally increasing to 34 to 50%) and *Sphagnum* cover ranged from 75 to 100%. *Calluna vulgaris* and *Eriophorum vaginatum* were abundant; *Sphagnum capillifolium* was dominant in the hummock layer with occasional *S. austinii* and *S. fuscum*. Pools were dominated by *S. cuspidatum* with occasional *Menyanthes trifoliata* and *Drosera anglica*. Lawns were dominated by *S. papillosum* with a low cover of *S. magellanicum*. Additional species that were frequent at low cover throughout include *Rhynchospora alba*, *Racomitrium lanuginosum*, *Campylopus atrovirens* and *Cladonia portentosa*. The complex 10/6 was abundant in the central area of the high bog. *S. papillosum* lawns dominated this complex, with abundant *Calluna vulgaris* and *S. capillifolium* in hummocks. Overall *Sphagnum* cover was high (75 to 91%). *Rhynchospora alba* and *Narthecium ossifragum* were frequent throughout and bare ground and algal pools suggests some periodic drying of this community. 6/9 + P and 6/4 + P were also frequent in the central area of the high bog. These comprised hummocks, pools and

lawns with overall *Sphagnum* cover of 51 to 75% and interconnecting pool cover of 26 to 33%. *Calluna vulgaris* and *Eriophorum vaginatum* were abundant with *S. capillifolium* in hummocks, *S. papillosum* in lawns and *S. cuspidatum* in pools. 6/9 + P had locally abundant *Carex panicea* and *Trichophorum germanicum* and 6/4 + P had abundant *Rhynchospora alba* (5 to 10% and locally to 25%). The remaining community complex was localised: 9/7/10 (dominated by hummocks with *Calluna vulgaris*, *Eriophorum vaginatum* and *S. capillifolium*; *Sphagnum* cover of 51 to 75%).

No active flushes were recorded at Kilsallagh in the 2012 survey.

Degraded Raised Bog (7120)

The current area of Degraded Raised Bog at Kilsallagh Bog is 170.58ha (93.67% of the high bog). It should be noted that the high bog edge has been remapped at a higher level of accuracy as part of the 2012 project and that this may cause discrepancies on the overall extent of high bog (for instance 0.2ha of cutover were previously mapped incorrectly as high bog).

Degraded Raised Bog includes the sub-marginal, marginal and face bank ecotope, as well as inactive flushes. Although some areas of Degraded Raised Bog have a relatively well-developed raised bog flora, they are affected by water loss to varying degrees, and are usually devoid of permanent pools.

The sub-marginal ecotope featured the most developed micro-topography within Degraded Raised Bog. Three community complexes and variants were recorded within the sub-marginal ecotope: 9/7 + Cl, 9/7/6 and 6/3. 9/7 + Cl was located adjacent to an area of sub-central ecotope and was the wettest of the sub-marginal complexes. There were occasional regular pools and *Sphagnum* cover was 25 to 33% in low hummocks. *Cladonia portentosa* had high cover in this complex (33 to 50%). In the other two sub-marginal community complexes the *Sphagnum* cover was 11-25% with occasional pools or tear pools. These pools occasionally supported *Sphagnum cuspidatum* but *Sphagnum* cover was usually less than 4%. Micro-topography usually consisted of low hummocks, hollows and *Narthecium ossifragum* flats in places. *Calluna vulgaris*, *Erica tetralix*, *Eriophorum vaginatum*, *Narthecium ossifragum* and *Carex panicea* were the most common species within this ecotope. The *Sphagnum* hummocks consisted of *S. capillifolium* and *S. papillosum* with occasional *S. subnitens* and *S. tenellum*. *Cladonia portentosa* was frequent throughout.

Marginal ecotope is slightly drier than sub-marginal ecotope and mainly occurred as a band near the margins of the high bog but was scattered throughout the high bog. The micro-topography consisted of *Calluna vulgaris* hummocks, low *Sphagnum* hummocks, flats and occasional hollows and tear pools. The *Sphagnum* cover was lower than in the sub-marginal ecotope (5-10% or lower)

and the vegetation was characterised by a higher cover of *Carex panicea*, *Narthecium ossifragum*, *Trichophorum germanicum*, and *Calluna vulgaris*.

Face bank ecotope is characterised by firm ground, tall *Calluna vulgaris*, poor *Sphagnum* cover and a flat micro-topography. This ecotope covered small areas around the edge of the high bog, usually adjacent to areas of past or current peat exploitation.

The high bog also features several inactive flushes (**X**, **V**, **W**, **X1**, **Y**, **Y1**, **Z** and **Z1**). Most of the flushes were dominated by *Molinia caerulea* with *Calluna vulgaris* and occasional *Potentilla erecta*, *Erica tetralix*, *Cladonia portentosa*, *Aulacomnium palustre*, *Polytrichum commune* and *Polytrichum strictum*. *Sphagnum* cover was less than 4% (occasionally 11 to 25%) with occasional, *S. papillosum* and *S. capillifolium*. Scrub species such as *Ulex europaeus* and *Salix* species were occasional to frequent. Two of the inactive flushes were not well-defined and graded into the surrounding high bog vegetation (flush **W** and flush **X**). Flush **W** had abundant *Carex panicea* and *Calluna vulgaris*, with occasional flush species such as *Molinia caerulea*, *Juncus effusus* and *Aulacomnium palustre*. This graded into adjacent sub-marginal vegetation (9/7/3 and 9/7/6). Flush **X** was previously mapped as active flush, but *Sphagnum* cover was low in 2012 and it was mapped as inactive flush. This was similar to the surrounding sub-marginal vegetation (6/3/9a), but *Eriophorum angustifolium* was locally abundant. Two flushes had areas that were influenced by calcareous water and supported bryophyte species indicative of calcareous springs and flushes: the eastern section of flush **Z** (E167799/ N266582), which had locally dominant *Scorpidium scorpioides* and *Campylium stellatum*; and throughout the newly mapped flush **Y1**, which had frequent *Ctenidium molluscum*, *Fissidens adianthoides* and *Campylium stellatum*.

There was a large area of clearfell to the north of the central area of the high bog. This appeared to have been felled in the last few years, with some regrowth removal undertaken in 2012. Most trees had been felled to waste and left in situ. Amongst the felled trees and brash there was vegetation with affinity to flush and bog vegetation. *Sphagnum* cover was locally high (up to 75%) with dominant *Eriophorum vaginatum* (51 to 75%). Flush species included *Aulacomnium palustre*, *Polytrichum strictum*, *P. commune*, *Molinia caerulea*, *Juncus effusus*, *Sphagnum palustre* and *S. fallax*. The *Sphagnum* layer was dominated by *S. capillifolium* with abundant *S. papillosum* and frequent *S. cuspidatum*. This area slopes to the north and may develop into an active flush.

Depressions on peat substrates of the Rhynchosporion (7150)

Rhynchosporion vegetation is frequent in the central area of the high bog on Kilsallagh Bog. It was found in both Active and Degraded Raised Bog, but was most frequent in the sub-central

community complex **6/4 + P**. The Rhynchosporion vegetation occurred along *Sphagnum* pool edges and in lawns. Typical plant species included *Rhynchospora alba* (5 to 10% and locally up to 25%), *Narthecium ossifragum*, *Trichophorum germanicum*, *Sphagnum cuspidatum*, *S. papillosum* and *Eriophorum angustifolium*. Rhynchosporion vegetation was also frequent in the central community **15**; sub-central community complexes **10/6** and **6/9 + P**; sub-marginal complexes **9/7/6** (in variant **9/7/4 + P**) and **6/3** (in variant **6/4/9a**); and marginal complex **3/6** (in variant **3/6/4**).

Detailed vegetation description of the high bog

A detailed description of high bog vegetation recorded during the 2012 survey of Kilsallagh Bog is given in Appendix I. Vegetation is divided into a number of community complexes, which are listed and described based on the dominant species. These community complexes are grouped into ecotope types. The distribution of the ecotopes is shown on the ecotope map (Appendix IV, Map 1). The community complexes are shown on the community complex map (Appendix IV, Map 2) and the quadrat details are given in Appendix III and their location in Appendix IV (Map 1).

Impacting activities

Table 6.1 below provides a list of activities impacting high bog vegetation at Kilsallagh Bog, according to their occurrence on the high bog or adjacent to the high bog; area or length affected, and whether they influence negatively (i.e. drainage, peat extraction) or positively (i.e. restoration works):

Table 6.1 Impacting activities

Code	Activity	Ranking	Influence	Area (ha) /Length(km)	Location	Habitat affected
C01.03	Peat extraction	H	-1	1.63ha high bog cut away	Inside High Bog: 39 different locations along most high bog sections	7120
C01.03	Peat extraction	L	-1	1.63ha high bog cut away	""	7110/7150
J02.07	Drainage	H	-1	13.254km ¹	Inside High Bog	7110/7120/7150
J02.07	Drainage	M	-1	n/av	Outside High Bog	7110/7120/7150
I01	Invasive alien species	L	-1	<0.1ha ³	Inside High Bog	7110/7120/7150

Code	Activity	Ranking	Influence	Area (ha) /Length(km)	Location	Habitat affected
B01.02	Artificial planting on open ground (non-native trees)	L	-1	14.69ha	Outside High Bog	7110/7120/7150
4.2	Restoring/Improving the hydrological regime	H	+1	0.914km ²	Inside High Bog	7110/7120/7150
B02.02	Forestry clearance	H	+1	9.43km ²	Inside High Bog	7110/7120/7150

Peat cutting HB: High Bog; Ranking: H: High importance/impact; M: Medium importance/impact; L: Low importance/impact.

¹ This figure only includes functional and reduced-functional drains.

² This figure includes blocked drains on high bog.

³ This figure is estimated and represents the extent of trees across entire high bog

n/a: not applicable, n/av: not available

Peat cutting

This activity has taken place at 39 locations along the northern (14 locations (plots)), east (10 locations), south (13 locations) and west (1 location) section of high bog, as well as one location on the north-eastern cutover adjacent to the high bog (E 167901 / N 267320) in the 2004-2010 period. This has reduced the area of high bog by 1.63ha. Cutting is particularly intense along the southern section (E 167388 / N 266057) and north-west section (E 167033 / N 267784) of the high bog. Fernandez *et al.* (2005) reported cutting at a number of locations in 2004, with an estimated 21% of the bog margin being cut.

The loss of high bog from peat cutting is calculated using GIS techniques on aerial photography from 2004/05 and 2010. Information from the NPWS indicates that 46 plots were cut on Kilsallagh in 2010/2011; four plots were cut in 2012 and six in 2013. Thus, the area of high bog lost on Kilsallagh during the reporting period is in excess of 1.63ha, but since there is no aerial photography available post 2010, the area lost from 2010 to 2013 cannot be estimated.

In addition to ongoing peat exploitation, the old facebanks and multiple functional drains associated with cutting continue to impact on the high bog habitats in many areas, in particular the drain complex bD which drains the south-western part of the high bog.

This activity is considered to have a high direct importance/impact on Degraded Raised Bog habitat on the high bog and a low indirect importance/ impact on Active Raised Bog and Rhynchosporion depressions habitats. Old face banks and high bog and cutover drainage associated with past cutting continue to cause negative impacts on the high bog habitats.

The continuation of these peat cutting will prevent the recovery of the high bog, and the recovery of ARB towards FRVs as restoration works cannot be employed until such activities stop. It should also be borne in mind that peat cutting has already had a serious negative impact over a long period at this site, indicated by the fact that ARB covers only a very small area (11.53ha or 6.3% of the high bog) and is 84.98% below the FRV target.

Drainage

High bog drainage

Table 6.2 shows a slight decrease in functional drainage as a result of natural infilling of unblocked drains. The majority of drains in the high bog remain functional (7.323km). Significant water losses through the drains were noted within the drain complex bD (flowing east and south to the central drain bB, in the south-western section of the high bog) and bG (southern drain flowing west in the north-western lobe of the high bog). Functional and reduced functional drains are still impacting on high bog habitats and will continue to do so until they are blocked and become completely infilled and thus non-functional.

High bog drainage is considered to have high importance/impact on high bog habitats.

Table 6.2 High bog drainage summary

Status	2004 (km) ¹	2012 (km)	Change
NB: functional	8.065	7.323	(-) 0.742
NB: reduced functional	3.283	3.049	(-) 0.234
NB: non- functional	1.906	1.968	(+) 0.062
B: functional	0.000	0.000	0.000
B: reduced functional	0.000	0.000	0.000
B: non- functional	0.000	0.914	(+) 0.914

B: Blocked; NB: Not blocked n/a: not applicable

¹ High bog drainage has been revised (e.g. re-digitised in cases) and figures above may vary slightly from those given by Fernandez *et al.* (2005)

Table 6.3 below provides a more detailed description of the drainage present on the high bog at Kilsallagh, including any change in drain functionality in the 2004 – 2012 reporting period (see Map 3).

Table 6.3 High bog drainage detail

Drain Name	Length (km)	2004 status	2012 status	Change	Comment
bA1	0.467	NB: functional	NB: functional	No	

Drain Name	Length (km)	2004 status	2012 status	Change	Comment
bA2	0.459	NB: functional	NB: functional	No	This drain was wrongly classified as reduced functional in 2004
bB	1.551	NB: functional	NB: functional	No	Double drain
bC	0.075	NB: functional	NB: functional	No	
bD	3.660	NB: functional	NB: functional	No	Drain complex; water flowing towards S within the N/S longest drain in complex, as well as within some other perpendicular drains, recorded during visit
bE	0.062	NB: reduced functional	NB: non-functional	Yes	Drain wrongly classified as non-functional in 2004.
bE	0.286	NB: reduced functional	B: non-functional	Yes	Drain wrongly classified as non-functional in 2004.
bF	0.215	NB: reduced functional	NB: reduced functional	No	
bG	0.222	NB: functional	NB: functional	No	Southern drain was wrongly classified as reduced functional in 2004; water flowing towards W recorded during 2012 visit
bG	0.228	NB: reduced functional	NB: reduced functional	No	
bH	1.085	NB: reduced functional	NB: reduced functional	No	Northern sections of double drain was wrongly classified as non-functional in 2004
bJ1	0.053	NB: functional	NB: functional	No	
bJ2	0.025	NB: functional	NB: functional	No	
bK1;5;7;9	0.411	NB: functional	NB: reduced functional	Yes	
bK2-4;6;8;10	0.559	NB: functional	NB: functional	No	
bK11	0.070	NB: non-functional	NB: non-functional	No	
bL1	0.284	NB: reduced functional	NB: reduced functional	No	
bL2	0.047	NB: reduced functional	NB: reduced functional	No	

Drain Name	Length (km)	2004 status	2012 status	Change	Comment
bM	0.154	NB: reduced functional	NB: reduced functional	No	This drain was wrongly classified as non-functional in 2004
bN	0.082	NB: reduced functional	NB: reduced functional	No	This drain was wrongly classified as non-functional in 2004
bO	0.982	NB: non-functional	NB: non-functional	No	
bR	0.146	NB: non-functional	NB: non-functional	No	
D1;2;3	0.402	NB: reduced functional	NB: reduced functional	No	Western section of drain D3 was wrongly classified as non-functional in 2004
D3	0.438	NB: reduced functional	B: non-functional	Yes	Eastern section of drain D3 was wrongly classified as non-functional in 2004
D4;5;16	0.277	NB: functional	NB: functional	No	
D6-10;15;17	0.708	NB: non-functional	NB: non-functional	No	
D11;12	0.190	NB: functional	B: non-functional	Yes	
D13;14	0.141	NB: functional	NB: reduced functional	Yes	

Bog margin drainage

The cutover areas were not surveyed for drains during 2012.

Drains associated with either currently active or no longer active peat cutting are present along the entire cutover. These drains continue to drain the high bog and impact on high bog habitats.

Drainage maintenance associated with agricultural improvements is evident on the 2010 aerial photograph: within the SAC to the north-west of the high bog (E 166800/ N 268080) (1.0km approx.), and outside of the SAC to the north-east of the high bog (E 167962/ N 267422) (0.15km approx.).

Bog margin drainage is considered to have a medium importance/impact on high bog habitats.

Fire history

Fernandez *et al.* (2005) stated that there had been no recent fires during the 1995 to 2004 reporting period. No fire events have been reported on the high bog in the 2004-2012 reporting period.

Invasive species

Occasional saplings of *Picea* sp. were recorded in 2004, particularly around the south-eastern margin of the conifer plantation in the north of the high bog (Fernandez *et al.*, 2005). Occasional saplings of *Picea* sp. were recorded from to the north-east of the recently felled plantation in 2012. These showed signs of recent spread in this area.

The non-native moss *Campylopus introflexus* was recorded occasionally from the high bog, mainly in the marginal ecotopes. However it was frequent within the sub-central community complex 10/6 in Sc1 and Sc2. This area showed some signs of past drying, with bare peat suitable for *C. introflexus*.

Invasive species are considered to have low importance/impact on high bog habitats.

Afforestation and forestry management

Fernandez *et al.* (2005) reported a conifer plantation of *Pinus contorta* (9.43ha) within the SAC on the northern part of the high bog. This has now been removed and is described in the conservation activity section of this report.

Fernandez *et al.* (2005) did not report any plantation on land adjacent to the SAC. There is an area of forestry on adjacent cutover to the north (E 167058 / N 268243) which has been removed. However, there remains several areas of forestry on adjacent cutover: to the north-west (E 166596 / N 267831) (8ha); and in two locations to the west (E 166461 / N 266764) (5.8ha) and (E 166781 / N 266984) (0.89ha). As these plantations are in areas where there is peat cutting at the bog margin, it is difficult to separate the forestry impacts from peat cutting impacts. Due to their proximity to the edge of the high bog it is likely that they are impacting upon high bog habitats.

Afforestation is considered to have low importance/impact on high bog habitats.

Other impacting activities

No significant impacting activities were noted or recorded in 2012 impacting high bog habitats in the 2005-2012 reporting period.

Conservation activities

Fernandez *et al.* (2005) reported a conifer plantation of *Pinus contorta* (9.43ha) within the SAC on the northern part of the high bog. This was adjacent to the Active Raised Bog in the north of the high bog. The plantation was described as 'not thriving' in the south-east with *Calluna vulgaris* dominated vegetation and scattered trees. This plantation was reported to be impacting upon the adjacent high bog vegetation through drainage and nutrient input (Fernandez *et al.*, 2005).

This forestry was removed as part of the LIFE project 'Restoring Raised Bogs in Ireland' (Project Reference: LIFE04 NAT/IE/000121). Restoration work on the site began in 2005 (Derwin, 2008). The main restoration methods used on the site are: fell to waste conifer crop; block drains with plastic dams; and, control natural regeneration (Derwin, 2008).

During the 2012 it was recorded that the area of forestry has been felled and there were signs of post-felling management (felling of regenerating trees) in 2012. Most of the trees appeared to have been felled to waste with lines of brash (north to south) present in the clearfell area. The drains associated with the plantation had been blocked with plastic dams as part of the restoration works.

Monitoring of the clearfell area in 2008 (Derwin, 2008) showed that there was good *Sphagnum* cover and potential active bog restoration on the northern margin (30% *Sphagnum* cover); centre (65% *Sphagnum* cover); southern margin (75% *Sphagnum* cover); north-east margin (35% *Sphagnum* cover); and, south-western margin (65% *Sphagnum* cover). The main *Sphagnum* species were *S. capillifolium*, *S. subnitens*, *S. magellanicum*, *S. papillosum*, which are typical active peat species (i.e. not flush species). Prior to removal of trees, the water-table was found to be up to 40cm below the peat surface (Derwin, 2008). Post tree removal and drain-blocking, the water table was found to be close to the bog surface for most of the year (Derwin, 2008).

The clearfell area was walked over during the 2012 survey. Localised areas had high *Sphagnum* cover and appeared to be transitioning to active bog. Approximately 1/3 of the area had greater than 75% *Sphagnum* cover and could be considered active bog. Detailed survey of the area was not possible during the 2012 survey and therefore the area has been mapped as inactive bog overall.

The results of the 2012 survey also show that there has been expansion of Active Raised Bog in the vicinity of the blocked forestry drains (to the south-west of the clearfell). **Sc4** has expanded across the drain to the south-west of the clearfell and the western part of **Sc1** has expanded north to the drain that is south-east of the clearfell.

The NPWS has engaged in negotiation with landowners in relation to the cessation of peat cutting at the site. There are on-going negotiations to try to phase out cutting in some parts of the bog that are still in private ownership. Despite negotiations, limited peat cutting continued in 2012.

Both high bog and cutover drainage blocking are reported as positive management actions under Restoring/Improving the hydrological regime (4.2) within table 6.1.

Conservation status assessment

The assessment of the conservation status of Annex I Active and Degraded Raised Bog and Bog Woodland is based on the following (a more detailed description of conservation status assessment methods is given within the methods section of the project's Summary Report (Volume 1) :

AREA - comparison of current habitat area with favourable reference values and its change in the reporting period to assess trends.

STRUCTURE & FUNCTION - comparison of central ecotope and active flush area (i.e. the higher quality wetter vegetation communities) for Active Raised Bog, and marginal and face bank ecotope area (i.e. the lower quality and drier vegetation communities) for Degraded Raised Bog against favourable reference values to assess their status and changes in their area in the reporting period to assess their trend. Community complex descriptions were also taken into account to evaluate changes in ecotope quality together with an analysis of the indicators recorded in the quadrats.

FUTURE PROSPECTS - an assessment of the influence of current and future activities both negative and positive (e.g. restoration works) affecting these habitats. Future Prospects for Active and Degraded Raised Bog are assessed at status and trend level based on the prospects for the habitat to reach favourable reference values in a two reporting period (12 years).

Active Raised Bog (7110)

Area

There has been a small increase (0.17ha) in the area of ARB on the site (Table 8.1).

More comprehensive mapping in 2012 led to slight changes in some central and sub-central section boundaries, as the mapping accuracy increased. This means that some sections (C1, C2 and Sc3) decreased slightly in size, but have actually been stable during the reporting period 2004 to 2012.

The sub-central area **Sc2** is now part of **Sc1**. This has increased the area of **Sc1**, but this is considered to be largely the result of more comprehensive mapping in 2012. The area between these sections had few previous mapping points. However, there may also be some re-wetting in this area due to the blocking of drains to the north of the area.

There was an increase in ARB (0.3ha approx.) in the north of the western part of **Sc1**, as the sub-central vegetation has extended across the blocked drain (bE) to the south-west of the clearfell. In addition, **Sc4** has expanded (increase of 0.15ha approx.) and now extends across the drains to the south-east of the clearfell (D3 and D11). This is the result of re-wetting associated with the blocking of the forestry drains and removal of the former plantation.

There were several new areas of ARB mapped in 2012 (**C3**, **Sc5**, **Sc6** and **Sc7**) that are the result of more comprehensive mapping in 2012. **C3** (approx. 0.50ha) is located within **Sc3**, in the south-western lobe of the high bog; **Sc5** (approx. 0.25ha) and **Sc6** (approx. 0.46ha) are located within the south-eastern lobe of the high bog and **Sc7** (approx. 0.06ha) is a small area in the north-eastern lobe of the bog. These areas were not comprehensively surveyed in 2004. This change is also result of re-interpretation of vegetation in the case of **C3**.

In 2004, an active flush (flush **X**) was recorded to the east of **Sc3**, sloping to the drain complex bD in the east. In 2012 this was mapped as inactive flush as the overall *Sphagnum* cover was only 11 to 25% (compared with 50 to 60% in 2004). There was one smaller area with higher *Sphagnum* cover, to the east of **Sc3**, but *Sphagnum* cover was still too low (25 to 33%) to be considered an active flush. The flush was not mapped before 2004 and may have previously been considered part of the bog vegetation, as there were no/ few 'flush' species present. *Eriophorum angustifolium* was frequent in both 2004 and 2012. However *Cladonia portentosa*, recorded as having 50% cover in 2004, was much lower in 2012 (<4%). There is no obvious reason for the decline in *Cladonia* as this was frequent in adjacent complexes. The reduction in *Sphagnum* cover suggests that the flush has dried out since 2004. The reason for the drying out of this area is likely to be the drain complex bD to the east of the flush. This drain complex is located the base of the slope running west to east, on which flush **X** is located. There are numerous functional drains, many with flowing water, which are likely to have a large impact on surrounding ARB habitats. Although the sub-central area to the west of the flush (**Sc3**) does not appear to have declined in area or quality, this is situated on flatter ground (and slopes less to the drain complex in the east) which may be the reason for the lower impact of the drains on this area. The marginal vegetation to the north-west and south of flush **X** (3/6/2 + Ra) had abundant *Racomitrium lanuginosum* hummocks (5-10% or higher). These appear to have colonised degraded hummocks and are likely to be a sign of drying out. There was a slight change

to the ecotope boundary due to more comprehensive mapping in 2004. The loss of active flush X (change from active to inactive flush) has resulted in a loss of 0.28ha of ARB at this site.

The favourable reference value (FRV) for Area is considered to be the sum of ARB (central, sub-central ecotopes and active flush) plus sub-marginal ecotope when the Habitats Directive came into force in 1994 (see table 8.4). Therefore, ARB Area FRV is 76.76ha (based on 1994/5 Kelly (1995) figures amended by Fernandez *et al.* (2005), see tables 8.1 and 8.3 below). This FRV is only approximate until further hydrological and topographical studies are carried out in order to assess the maximum potential capacity of the high bog to support ARB. The current habitat Area value (11.53ha) is 84.98% below the FRV. A current Area value more than 15% below FRV falls into the **Unfavourable Bad** assessment category.

A long-term (1994/5-2012) trend shows a decrease in the area of ARB at the site (7.6ha) (see table 8.1). A more recent and short-term trend analysis (8 years; 2004-2012) shows a slight increase of 0.17ha (1.50%) of ARB. Therefore, the Area of ARB is given an **Increasing** trend assessment.

The Area of Active Raised Bog at Kilsallagh Bog is assessed as Unfavourable Bad-Increasing (see table 8.5).

Structure & Functions

The FRV for S&Fs is for at least half of the ARB area to be made up of central and active flush, i.e. the higher quality wetter vegetation communities. This value is 5.77ha (half of 11.53ha, the current area of ARB). The current value is 0.66ha, which is 88.56% below the FRV. Therefore S&Fs are given an **Unfavourable Bad** assessment.

Both the long-term (1994/5-2012) and short-term (8 years; 2004-2012) trends indicate a decrease in the area of central ecotope and active flush (loss of 13.81ha since 1994; 0.28ha since 2004). Therefore the S&Fs are given a **Declining** trend.

Quadrats analysis (**Qc1**, **Qsc1** and **Qsc2**) indicates the following:

Qc1: There was slight variation in the quadrat data compared to 2004: the ground was described as quaking in 2012, not soft as in 2004 and there was an increase in overall *Sphagnum* cover (51 to 75%, compared with 34 to 50% in 2004), due to an increase in *S. capillifolium* hummocks and *S. papillosum* lawns. *Rhynchospora alba* and *Narthecium ossifragum* had much lower cover in 2012 (decrease from 11 to 25% to 4 to 10 %; and less than 4%, respectively). The area around the quadrat was examined and it was considered that the decline in *R.alba* and *N. ossifragum* was due to differences in quadrat positioning between 2004 and 2012, and not due to changes in the vegetation. However, the

hummock indicators *S. fuscum* and *S. austinii* were not recorded in 2012 and were not present in the surrounding vegetation; this may represent a decrease in the cover of these species. Overall the quadrat was wetter than in 2004, with higher *Sphagnum* cover and it may be that this is the result of recent improvement in habitat quality and that the hummock indicators have not yet been able to regenerate.

Qsc1: There was slight variation in the quadrat data compared to 2004: overall *Sphagnum* cover increased (76 to 90%, compared with 51 to 75% in 2004), due to an increase in *Sphagnum* pools and *S. cuspidatum*. Cover of algal in hollows and pools also decreased (4 to 105 in 2004; absent in 2012) and there was a slight decrease in *Sphagnum* hollows and *S. papillosum*. The area around the quadrat was examined and it was considered that these changes were due to differences in quadrat positioning between 2004 and 2012 and not due to changes in the vegetation.

Qsc2: There was a moderate variation in the quadrat data compared to 2004, due to an increase in habitat quality: the ground was described as quaking in 2012, not very soft as in 2004; although no pools were recorded in 2012 (4 to 10% in 2004); *Sphagnum* lawns showed a large increase (51 to 75% in 2012, compared with 5 to 10% in 2004). *S. papillosum* was the main lawn species and also showed a large increase in cover. *Rhynchospora alba* had a lower cover in 2012, but this is probably due to differences in quadrat positioning and associated with the absence of *Sphagnum* pools and hollows. This quadrat is located to the south-west of the blocked forestry drains bE and D3; the increase in *Sphagnum* cover is likely to be a result of increased wetness as a result of this drain blocking.

Typical good quality indicators and typical plant species are still found in central and sub-central vegetation throughout the entire bog. Although there has been an improvement in habitat quality in the north of the high bog, there has been a short and long term decline in the area of central and active flush ecotopes.

The Structure & Functions of Active Raised Bog at Kilsallagh Bog are assessed as Unfavourable Bad-Declining (see table 8.5).

Future Prospects

Overall there has been an increase in Area (0.45ha) and improvement in S&Fs of ARB in the central area of the high bog (e.g. increase in area of **Sc1** and **Sc4** and improved habitat quality in **Qc1** and **Qsc2**). However, there has been also been a decline in ARB area in the south-west of the high bog (e.g. loss 0.28ha due to loss of active flush **X**). This gives a slight overall increase in ARB (0.17ha).

The area in the centre and north of the high bog is likely to continue to improve in Area and quality due to the restoration works to remove the forestry plantation from the north of the high bog and

associated drain blocking. The area of clearfell was found to have high *Sphagnum* cover during the 2012 survey. It is likely that this area will transition to either ARB or active flush in the future as the area recovers from past afforestation and further increase the area of ARB in this area.

However, the areas in the southern part of the high bog are likely to decrease/decline in Area and quality due to continued peat cutting and extensive drainage. In particular the drain complex bD is having a large negative impact on the ARB in the south-western lobe of the high bog. To increase ARB in these areas will require blocking of functional and reduced functional drains on the high bog. The drain complex bD should be a priority as this is a large complex of function drains, many with flowing water. In addition, the double drain bB within flush Z had flowing water during the 2012 survey. The double drain bA2 and bA1 had less flowing water and are naturally infilling in sections; drain blocking could accelerate this natural infilling. It should be noted though that the calcareous flush recorded within this section might not persist if the drain is blocked.

Cutover areas will also play a role in the restoration of ARB on this site, as the extent of previous cutting of the high bog margin may make it difficult to regenerate previous ARB values on the high bog alone. There is potential for restoration of cutover to the north (NW, N and NE), east and south of the high bog. The area of cutover to the south of the high bog is particularly large and there is higher potential for cutover restoration in this area. The large flush Z flows into the middle of this area and so the cutover will already be collecting water from the high bog.

Although there are likely to be further improvements to ARB Area and S&Fs in the north of the high bog, continued extensive drainage in the south west and peat cutting in several location of the high bog are likely to cause further decrease in ARB Area and/or decline in S&Fs.

Habitat **Area** is currently 84.98% below FRV (see table 8.4) and a Decreasing trend is expected in the following two reporting periods (12 years). The habitat Area is expected to be more than 15% below FRV. Thus, habitat's **Area Future Prospects** are assessed as **Unfavourable Bad-Decreasing**. Habitat's **S&Fs** are currently 88.56% below FRV (see table 8.4) and a Declining trend is expected. Therefore the habitat's S&Fs are expected to be more than 25% below FRV in the following two reporting periods. **S&Fs Future Prospects** are assessed as **Unfavourable Bad-Declining**.

The overall habitat's Future Prospects are Unfavourable Bad-Declining (see table 8.5). Blocking of remaining reduced-functional and functional drains both on the high bog and cutover and cessation of peat cutting is necessary.

The overall conservation status of Active Raised Bog at Kilsallagh Bog is assessed as Unfavourable Bad-Declining (see table 8.5).

Table 8.1 Changes in Active Raised Bog area

Active Ecotopes	1994 ¹	2004	2004 (amended)	2012	Change (2004-2012)	
	Area (ha)	Area (ha)	Area (ha)	Area (ha)	Area (ha)	%
Central	14.47	0.37	0.66	0.66	0.00	0.00
Sub-central	3.77	7.75	10.42	10.87	(+)0.45	(+)4.32
Active flush	0.89	0.89	0.28	0.00	(-)0.28	(-)100.00
Total	19.13	9.01	11.36	11.53	(+)0.17	(+)1.50

¹These are the figures calculated from the vegetation map drawn by Kelly *et al.*, (1995) that was geo-referenced, digitised and in some cases adjusted as part of Fernandez *et al.* (2005) project.

Note: Table 8.1 includes 2004 figures and 2004 amended figures. The latter shows the ecotope area believed to be present in 2004 after surveying improvements in 2012. The comparison between 2004 (amended) and 2012 illustrates the actual changes in ecotope area in the 2004-2012 period. Any change in ecotope area between the 2004 and the 2004 (amended) values is due to improvement in mapping accuracy and/or the result of a more comprehensive survey in 2012 (see table 8.2 for further detail).

Table 8.2 Assessment of changes in individual Active Raised Bog areas

Area	Quadrats	Trend	Comment	Quadrats analysis
C1	Qc1	Stable	Slight changes in boundary (slightly smaller). This change is the result of more comprehensive surveying in 2012, which resulted in more accurate mapping.	Higher <i>Sphagnum</i> cover (due to improved habitat quality) and lower cover of <i>Rhynchospora alba</i> and <i>Narthecium ossifragum</i> (due to quadrat positioning). Improvement of habitat quality due to increased wetness as a result of forestry removal and associated drain blocking.
C2	None	Stable	Slight changes in boundary (slightly smaller). This change is the result of more comprehensive surveying in 2012, which resulted in more accurate mapping.	
C3	None	Unknown	This specific area within Sc3 was not comprehensively surveyed in 2004. This is likely to be the result of more comprehensive surveying in 2012, which resulted in more accurate mapping. However also re-interpretation of vegetation.	

Area	Quadrats	Trend	Comment	Quadrats analysis
Sc1	Qsc2	Increasing	Northeast section of this sub-central ecotope area expanding as a result of rewetting associated with drainage blocking. Sc1 now contains former Sc2. However, while this change represents a genuine increase in SC, part of this change is also the result of more comprehensive surveying in 2012, which resulted in more accurate mapping.	Increase in cover of <i>Sphagnum</i> and pools and decline in algal cover in hollows and pools. Changes due to differences in quadrat positioning and not actual vegetation change.
Sc2	None	No longer present	This former sub-central section is now part of Sc1.	
Sc3	Qsc1	Stable	Slight changes in boundary (slightly smaller). This change is the result of more comprehensive surveying in 2012, which resulted in more accurate mapping.	Large increase in cover of <i>Sphagnum</i> lawns (due to improved habitat quality) and lower cover of <i>Rhynchospora alba</i> (due to quadrat positioning). Improvement of habitat quality due to increased wetness as a result of forestry removal and associated drain blocking.
Sc4	None	Increasing	Northern section of this sub-central ecotope area expanding as a result of rewetting associated with drainage blocking.	
Sc5	None	Unknown	This specific area was not surveyed in 2004. This is likely to be the result of more comprehensive surveying in 2012, which resulted in more accurate mapping.	
Sc6	None	Unknown	This specific area was not surveyed in 2004. This is likely to be the result of more comprehensive surveying in 2012, which resulted in more accurate mapping.	
Sc7	None	Unknown	This specific area was not surveyed in 2004. This is likely to be the result of more comprehensive surveying in 2012, which resulted in more accurate mapping.	
X	None	No longer present	Mapped as inactive flush in 2012. <i>Sphagnum</i> cover reduced from 50-60% in 2004 to 11-25% in 2012. This decline in wetness is likely due to extensive drainage to the east.	

Degraded Raised Bog (7120)

Area

The Degraded Raised Bog FRV for Area is 105.35ha at Kilsallagh Bog. This value corresponds with the difference between the current high bog area (182.11ha) and the Active Raised Bog FRV (76.76ha) for area. Degraded Raised Bog is a particular habitat type, for which a FRV smaller than the current value may be desirable in many sites. However any decrease in habitat area would only be considered positive, when it is the result of restoration to Active Raised Bog. Current habitat area is 61.92% bigger than FRV and therefore the habitat Area is given an **Unfavourable Bad** assessment (see table 8.4).

There has been an overall reduction in the areas of sub-marginal and marginal ecotope at Kilsallagh Bog. The un-adjusted area figures for 2004 in table 8.3 show that there was a large increase in sub-marginal ecotope and decrease in marginal ecotope from 2004 to 2012. Sub-marginal ecotope is now found to be dominating some areas that were previously mapped as marginal ecotope. However, most of this was due to more comprehensive surveying in 2012 in the case of the south-western section (E 167082 / N 266885) and north-east section (E 167644 / N 267605) of the north lobe of the high bog; and, the south-western section (E 166777 / N 266518) and southern section (E 167205 / N 265995) of the southern lobe of the high bog. More accurate mapping also changed the extent of inactive flushes (**Z** and **X**) and led to Flushes **Z1**, **X1** and **Y1** being newly recorded. This has been taken into account in the 2004 (amended) figures in table 8.3.

Table 8.3 indicates that there has been an overall decrease (1.8ha) in the area of Degraded Raised Bog. The decrease is the result of expansion of Active Raised Bog (0.45ha) and a high bog loss of 1.63ha (0.49ha of facebank ecotope and 1.14ha of marginal ecotope) caused by peat cutting. This shows that 91% of the decline in area of DRB at Kilsallagh was due to a negative impact (loss of high bog due to peat cutting), which overrides the positive impact of ARB restoration. As a result the habitat is given a **Decreasing** trend but this is considered to be a negative assessment.

The Area of Degraded Raised Bog at Kilsallagh Bog is assessed as Unfavourable Bad-Decreasing (see table 8.5).

Structure & Functions

The FRV for S&Fs is for a maximum 25% of the Degraded Raised Bog area to be made up of marginal and face bank, i.e. the lower quality and drier vegetation communities. This value is 42.65ha (25% of 170.58ha, the current area of Degraded Raised Bog). The current marginal and face bank ecotopes area value (83.16ha) is 95.01% above the FRV (in the particular case of Degraded Raised Bog a current area value equal or smaller than FRV is desirable). A current value more than 25% above FRV falls into the **Unfavourable Bad** assessment category.

Table 8.3 shows a decrease in the area of marginal ecotope (1.14 ha approx.) caused by loss due to peat cutting. Face bank also decreased (0.49ha) due to peat cutting. There was an overall decrease of 1.63ha (1.92%) of marginal and face bank ecotopes within the reporting periods (2004-2012). This was due solely (100%) to loss due to peat cutting. S&Fs trend is assessed based on actual changes within marginal and face banks ecotope (e.g. decreases due to rewetting processes or increases as a result of further drying out). Thus, the DRB's S&Fs at Kilsallagh are given a **Stable** trend.

The mapping of boundary between marginal and sub marginal is difficult and decreases are only recorded where major changes in the vegetation are evident. Therefore, where no changes are shown, more subtle negative effects cannot be ruled out, and therefore negative changes may have been underestimated. The basic assumption is that were peat cutting has taken place subsidence will occur and will continue for some decades and this will dry out the adjacent areas of the bog

Typical good quality indicators and typical plant species are still found throughout the entire bog on sub-marginal ecotope.

The Structure & functions of Degraded Raised Bog at Kilsallagh Bog are assessed as Unfavourable Bad-Stable (see table 8.5).

Future Prospects

Degraded Raised Bog has decreased as result of peat cutting and is likely to continue to decline unless there is a cessation of peat cutting. Furthermore, drainage on the high bog continues to damage the habitat and to hinder its recovery to FRVs, as well as minimising the chances to convert face bank and marginal ecotope into sub-marginal and/or Active Raised bog. However, rewetting due to blocked drains to the north of the centre of the high bog has resulted in the expansion of sub-central ecotope in some areas and has contributed towards the decrease in DRB. The negative influence of impacting activities (DRB loss of 1.63ha), is overriding the results of the restoration works (ARB increase of 0.17ha) and therefore the overall assessment is Unfavourable.

Habitat **Area** is currently 61.92% above FRV (see table 8.4) and a Decreasing trend is expected in the following two reporting periods (12 years) due to the ongoing high bog losses to peat cutting. Habitat Area is expected to remain more than 15% above FRV. Thus, habitat's **Area Future Prospects** are assessed as **Unfavourable Bad-Decreasing**. Habitat's **S&Fs** are currently 95.01% above FRV (see table 8.4). A Declining trend is foreseen in the following two reporting periods as a result of remaining negatively impacting activities (e.g. peat cutting, drainage). **S&Fs** are expected to remain more than 25% above FRV. Thus, habitat's **S&Fs Future Prospects** are assessed as **Unfavourable Bad-Declining**.

The overall habitat's Future Prospects are Unfavourable Bad-Declining (see table 8.5)

The overall conservation status of Degraded Raised Bog at Kilsallagh Bog is assessed as Unfavourable Bad-Declining (see table 8.5).

Table 8.3 Changes in Degraded Raised Bog area

Inactive Ecotopes	1994 ¹	2004	2004 (amended)	2012	Change (2004-2012)	
	Area (ha)	Area (ha)	Area (ha)	Area (ha)	Area (ha)	%
Sub-marginal	57.63	42.62	67.9	67.45	(-)0.45	(-)0.66
Marginal ²	93.77	106.23	76.85	75.71	(-)1.14	(-)1.48
Face bank ²	n/a	8.78	7.94	7.45	(-)0.49	(-)6.17
Inactive flush	6.09	8.43	10.26	10.54	(+)0.28	(+)2.73
Conifer plantation/Clear felled area	9.81	9.43	9.43	9.43	0.00	0.00
Total	167.30	175.49	172.38	170.58	(-)1.80	(-)1.04

¹These are the figures calculated from the vegetation map drawn by Kelly *et al.*, (1995) that was geo-referenced, digitised and in some cases adjusted as part of Fernandez *et al.* (2005) project.

² Any 2012 marginal and face bank ecotope value given within the report should be taken as a maximum value. Their extent is based on the 2012 habitat survey and 2010 aerial photographs. It cannot be ruled out that further marginal and/or face bank ecotope losses may have taken place at the margin of the high bog in the 2011-2012 period associated with peat cutting.

Note: Table 8.3 includes 2004 figures and 2004 amended figures. The latter shows the ecotope area believed to be present in 2004 after surveying improvements in 2012. The comparison between 2004 (amended) and 2012 illustrates the actual changes in ecotope area in the 2004-2012 period. Any change in ecotope area between the 2004 and the 2004 (amended) values is due to improvement in mapping accuracy and/or the result of a more comprehensive survey in 2012.

Depressions on peat substrates of the *Rhynchosporion* (7150)

Rhynchospora alba depressions are found across the entire bog in both Active and Degraded Raised Bog. The species is more frequently found and reaches its finest quality associated within wet features (*Sphagnum* pools, lawns and hollows) on Active Raised Bog.

The physical structure and distribution of the habitat across large sections of the high bog makes the process of calculating its area unfeasible and as a consequence makes the process of calculating realistic FRVs unfeasible. Thus, the assessment of the habitat's Area conservation status is indirectly based on the assessment of Active Raised Bog habitat Area (a favourable assessment indicates that

all sub-marginal ecotope has turned Active Raised Bog). The habitat Area is given an **Unfavourable Bad** assessment.

The Area trend assessment is based on the variation on Active Raised Bog and sub-marginal ecotope within Degraded Raised Bog in the reporting period. The area of Active Raised Bog has increased by 0.17ha (1.5%) in the reporting period. This was the result of an increase of 0.45ha of sub-central vegetation in the north of the high bog (**Sc1**, **Sc2** and **Sc4**) and a loss of 0.28ha active flush vegetation in the south-west of the high bog (flush **X**). The sub-central vegetation to the north of the high bog supported frequent *R. alba* depressions in sub-central community complexes **6/4 + P**, **6/9 + P** and **10/6** and central community **15**. *R. alba* depressions were not recorded in flush **X** in 2004 (Fernandez *et al.*, 2005) or 2012. Therefore the actual change in area of ARB suitable for *R. alba* depressions is an increase of 0.45ha (3.96%). There was a corresponding loss of sub-marginal ecotope (0.45ha) due to expansion of ARB. However, *R. alba* depressions were more frequent in the sub-central community complexes and therefore there was an overall increase in habitat suitable to support *R. alba* depressions of ca. 3.96%. As result habitat Area is given a **Stable** trend.

The habitat's Area Future Prospects status is equally based on the Active Raised Bog Area Future Prospects status assessment and the Area Future Prospects trend is based on the trend expected for Active Raised Bog and sub-marginal ecotope in the following two reporting periods. Although *R. alba* depressions are frequently found in the north of the high bog which is improving in Area and S&Fs due to removal of forestry on the high bog and associated drain blocking. Impacting activities such as peat cutting, extensive drainage and forestry on adjacent land continue to threaten Active and Degraded Raised Bog, in particular in the south-west of the high bog. Therefore, the habitat's Area Future Prospects are given an **Unfavourable Bad-Decreasing** assessment.

The S&Fs conservation assessment is also indirectly based on the Active Raised Bog S&Fs status and trend assessments, as Active Raised Bog supports the finest habitat quality type. Therefore, the habitat's S&Fs are given an **Unfavourable Bad-Declining** assessment.

The habitat's S&Fs Future Prospects status and trend are equally based on the Active Raised Bog S&Fs Future Prospects status and trend assessments in the following two reporting periods. Therefore, the habitat's S&Fs Future Prospects are given an **Unfavourable Bad-Declining** assessment.

The overall habitat's Future Prospects assessment is Unfavourable Bad-Declining.

The conservation status of depressions on peat substrates of the Rhynchosporion at Kilsallagh Bog is assessed as Unfavourable Bad-Declining (see table 8.5).

Table 8.4 Habitats favourable reference values

Habitat	Area Assessment			Structure & Functions Assessment		
	FRV Target (ha) ¹	2012 value (ha) ²	% below target	FRV 2012 Target (ha) ³	2012 value (ha) ⁴	% below target
7110	76.76	11.53	84.98	5.77	0.66	88.56
¹ 1994 central, sub-central, active flush, bog woodland and sub-marginal ecotope area.						
² 2012 central, sub-central ecotope, active flush and bog woodland area.						
³ Half of the current central, sub-central ecotope and active flush area. The target is that the area of the highest vegetation quality (i.e. central ecotope and active flush) should be at least this figure.						
⁴ 2012 central ecotope and active flush area.						
Habitat	FRV Target (ha) ⁵	2012 value (ha) ⁶	% above target	FRV 2012 Target (ha) ⁷	2012 value (ha) ⁸	% above target
7120	105.35	170.58	61.92	42.65	83.16	95.01
⁵ 1994 high bog area minus 7110 area FRV.						
⁶ 2012 Degraded Raised Bog area.						
⁷ 25% of the current Degraded Raised Bog habitat area. The target is that the extent of marginal and face bank ecotopes should not be larger than 25% of the current Degraded Raised Bog habitat area.						
⁸ Current marginal and face bank ecotopes area.						

As table 8.5 below indicates, each individual EU habitat present on the high bog has been given the following overall conservation status assessment based on the three main parameters (Area, S&Fs and Future Prospects) individual assessments:

- **Active Raised Bog is assessed as being Unfavourable Bad–Declining**
- **Degraded Raised Bog is assessed as being Unfavourable Bad–Declining.**
- **Rhynchosporion depressions is assessed as being Unfavourable Bad–Declining.**

Table 8.5 Habitats conservation status assessments

Habitat	Area Assessment	Structure & Functions Assessment	Future Prospects Assessment	Overall Assessment
7110	Unfavourable Bad-Increasing	Unfavourable Bad-Declining	Unfavourable Bad-Declining	Unfavourable Bad-Declining
7120	Unfavourable Bad-Decreasing	Unfavourable Bad-Stable	Unfavourable Bad-Declining	Unfavourable Bad-Declining
7150	Unfavourable Bad-Stable	Unfavourable Bad-Declining	Unfavourable Bad-Declining	Unfavourable Bad-Declining

Conclusions

Summary of impacting activities

- Peat cutting still continues at the site and has taken place at 39 to 46 locations in the 2004-2012 reporting period. 1.63ha of high bog have been lost in this period due to peat cutting. Cutting is particularly intense along the southern section and northwest section of the high bog.
- 7.323km of drains on the high bog remain functional. Most of these are associated with former peat exploitation. Functional and reduced functional drains are still impacting on high bog habitats and will continue to do so until they are blocked and become completely in-filled and thus non-functional.
- Cutover drainage (peripheral drainage) associated with either currently active or no longer active peat cutting continues to impact on the high bog habitats. In addition, maintenance works have been carried out in the reporting period on drains in agriculture land along the eastern margin of the high bog.
- No fire events have been reported on the high bog in the 2004-2012 reporting period.
- The invasive species *Picea sitchensis* and *Campylopus introflexus* are present occasionally on the bog but are considered to have a low impact on high bog habitats.
- There are a number of forestry plantations adjacent to the SAC. The plantations to the north-west and two locations west of the high bog are considered to likely to have a negative impact on high bog habitats.

Changes in active peat forming areas

- There has been a small actual increase (0.17ha) in the area of ARB on the site. Some of the change in area is due to more comprehensive mapping but other increases are due to changes (increase or decrease) in habitat quality within the site.
- More comprehensive mapping in 2012 led to slight changes in some central and sub-section boundaries, as the mapping accuracy increased: the former area of **Sc2** is now mapped as part of **Sc1** and three sections (**C1**, **C2** and **Sc3**) decreased slightly in size. However, there was no actual change in ARB area.
- There was an increase in ARB (0.3ha approx.) in the north of the western part of **Sc1**. **Sc4** has also expanded (0.15ha approx.). These increases are the result of re-wetting associated

with the blocking of the forestry drains and removal of the former plantation. This gives an increase of 0.45ha of ARB (approx.) in the north of the high bog.

- There was a decrease in ARB (approx. 0.28ha) from the loss of active flush **X**, which was considered to be inactive in 2012. This is likely to be the result of drying out as there is an extensive drain complex (bD) to the east of the flush which has numerous functional drains, many with flowing water.
- There were four newly mapped areas of central and sub-central ecotope (**C3**, **Sc5**, **Sc6** and **Sc7**) (approx. 1.27ha in total) that were the result of more comprehensive mapping in 2012.

Other changes

- None

Quadrats analysis

- Quadrat **Qc1**: Higher *Sphagnum* cover in 2012 (due to improved habitat quality) and lower cover of *Rhynchospora alba* and *Narthecium ossifragum* (due to quadrat positioning). Improvement of habitat quality due to increased wetness as a result of forestry removal and associated drain blocking.
- Quadrat **Qsc1**: Large increase in cover of *Sphagnum* lawns (due to improved habitat quality) and lower cover of *Rhynchospora alba* (due to quadrat positioning). Improvement of habitat quality due to increased wetness as a result of forestry removal and associated drain blocking.
- Quadrat **Qsc2**: Increase in cover of *Sphagnum* and pools and decline in algal cover in hollows and pools. Changes due to differences in quadrat positioning and not actual vegetation change.

Restoration works

- An area of forestry plantation, which was located in the northern area of the high bog, has been clear-felled and the drains associated with the plantation (D3, D11 and bE) have been blocked as part of the restoration works. These drains are now non-functional and wetness has increased in the vicinity of the drains.
- NPWS has engaged in negotiation with landowners in relation to the cessation of peat cutting at the site. Despite negotiations, limited peat cutting continues at Kilsallagh Bog.

Summary of conservation status

- **Active Raised Bog** has been given an **Unfavourable Bad-Declining** conservation status at Kilsallagh Bog. Habitat Area has increased and quality (S&Fs) improved in the northern part of the high bog in the reporting period. However, there has been a decline in habitat Area and S&Fs in the south-western lobe of the high bog and both values are below the FRVs. The increase in the northern part of the bog is associated with the restoration works to remove forestry and block major drains to the north of the centre of the high bog. The decrease in the south-western part of the bog is due to continued extensive drainage in this area. Future Prospects are considered **Unfavourable Bad-Declining** as, although there are likely to be further improvements to ARB Area and S&Fs in the north of the high bog, continued extensive drainage in the south west of the high bog and peat cutting are likely to cause further decrease/decline in ARB Area and/or S&Fs.
- **Degraded Raised Bog** has been given an **Unfavourable Bad-Declining** conservation status at Kilsallagh Bog. Habitat Area has decreased, partly due to an expansion of ARB (0.45ha) but mainly due to losses associated with peat cutting (1.63ha) and habitat area is above the FRV. The negative impact of loss of high bog due to peat cutting overrides the positive impact of ARB restoration. S&Fs are Unfavourable Bad-Stable. Due to continued peat cutting and high bog drainage, the Future Prospects of DRB are considered to be **Unfavourable Bad-Declining**.
- **Depressions on peat substrates of the Rhynchosporion** has been given an **Unfavourable Bad-Declining** conservation status at Kilsallagh Bog. Habitat Area has remained Stable and quality (S&Fs) Declined in the reporting period. Future Prospects are therefore considered **Unfavourable Bad-Declining**.

The conservation status of the **overall raised bog** at **Kilsallagh** is assessed as being **Unfavourable Bad-Declining**.

Recommendations

- **Cessation of peat cutting.**
- **Assessment of the actual impact of forestry** adjacent to the high bog.
- **Restoration works** including blocking of remaining high bog reduced-functional and functional drains, as well as cutover drains.
- **Further hydrological and topographical studies** to ascertain the capacity of the high bog to support Active Raised Bog and thus estimate a more accurate favourable reference value.

- **Further botanical monitoring surveys** on the high bog in order to assess change in habitat's conservation status. If restoration works are undertaken on the cutover areas then these should be included in future botanical monitoring surveys.
- **Further restoration works are recommended** including the restoration of suitable cutover areas adjacent to the high bog.

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Appendix I Detailed vegetation description of the high bog

Active Raised Bog (7110)

Central Ecotope Complex

COMPLEX 15

- **Location:** C1 (Sc1), C2 (Sc1) and C3 (Sc3)
- **Ground:** quaking
- **Physical indicators:** absent
- **Calluna height:** 21-40cm
- **Cladonia cover:** 11-25%
- **Macro-topography:** depression
- **Pools:** interconnecting pools 34-50% (locally 51-75%)
- **Sphagnum cover:** 76-90%
- **Narthecium cover:** <4% (locally 5-10%)
- **Micro- topography:** High and low hummocks, lawns and pools
- **Tussocks:** absent
- **Degradation or regeneration evidence:** absent
- **Species cover:** *Calluna vulgaris* (11-25%), *Eriophorum vaginatum* (25-33%), *E. angustifolium* (<4%), *Erica tetralix* (<4%), *Menyanthes trifoliata* (<4%), *Narthecium ossifragum* (<4%), *Rhynchospora alba* (<4%), *Sphagnum capillifolium* (25-33%), *S. cuspidatum* (26-33%), *S. papillosum* (11-25%), *S. tenellum* (<4%), *S. fuscum* (<4%), *S. denticulatum* (<4%), *S. magellanicum* (<4%), *S. austinii* (<4%), *Racomitrium lanuginosum* (<4%), *Cladonia portentosa* (11-25%).
- **Additional comments:** described from C3. The area in the south of C3 has a higher proportion of lawns and less pools but overall Sphagnum cover is still high with *S. papillosum* (25-33%). The central area grades into sub-central ecotype and the boundary was difficult to map in some locations. Therefore some sub-central complex (9/7/10) on the eastern boundary has been included within the area mapped as central. This was a newly mapped area. There were previously no mapping points in this area and therefore it is likely to be due to increased mapping detail in 2012.
- **C1** – this area in the central-western part of Sc1. The vegetation similar to that described from C3 but with locally lower cover of inter-connecting pools (25-33%) and *Sphagnum* (51-75%).

Trichophorum germanicum is present in small amounts throughout (<4%) and cover of *Eriophorum vaginatum* is lower (5-10%). Sphagnum cover is generally high, but there are some areas where *Narthecium ossifragum* and/ or *Rhynchospora alba* are abundant in flats with low Sphagnum. *Sphagnum capillifolium* is dominant in hummocks (26-33%), *S. papillosum* in lawns (26-33%) and *S. cuspidatum* in pools (26-33%). *S. austinii* is occasional (<4%), as is *Cladonia uncialis* (<4%) and *Menyanthes trifoliata* (<4%). The area of **C1** was reduced in size slightly in 2012 but this is likely to be due to increased mapping detail.

- **C2** – this area in the south-western lobe of the western section of **Sc1**. Part of the area that was originally mapped as **C2** has now been mapped as sub-central vegetation (a small area in the north-west). The central vegetation similar to that described from **C3**, but with soft to quaking ground and occasional bare peat (<4%). Cover of *Cladonia* is lower than **C3** (5-10%) and overall Sphagnum cover is also lower (51-75%). Hummocks are dominated by *Calluna vulgaris* (5-10%) and *Eriophorum vaginatum* (5-10%). Inter-pool areas have frequent *Narthecium ossifragum* (5-10%) and *Trichophorum germanicum* (5-10%). *Sphagnum papillosum* was dominant in lawns (26-33%), *S. capillifolium* in hummocks (11-25%) and *S. cuspidatum* in pools (26-33%). *Campylopus atrovirens* and *Racomitrium lanuginosum* were occasional at low cover (<4%). *T. germanicum* is frequent throughout and this vegetation grades into sub-central 6/9 + P, in which *T. germanicum* is a prominent component; or 6/4 + P with high *Rhynchospora alba*. Quadrat **Qc1 (Sc1)** was recorded within this complex.

Sub-Central Ecotope Complexes

COMPLEX 9/7 + P

- **Location:** **Sc1, Sc3, Sc5, Sc6** and **Sc7**, as well as isolated patches to the north of **Sc1**
- **Ground:** soft
- **Physical indicators:** abs
- **Calluna height:** 21-40cm
- **Cladonia cover:** <4%
- **Macro-topography:** flat to slight depression
- **Pools:** interconnecting pools 11-25%
- **Sphagnum cover:** 75-100%
- **Narthecium cover:** <4%
- **Micro- topography:** occasional high hummocks, low hummocks, lawns and pools
- **Tussocks:** *Trichophorum germanicum* <4%

- **Degradation or regeneration evidence:** absent
- **Species cover:** *Calluna vulgaris* (26-33%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (5-10%), *E. angustifolium* (<4%), *Rhynchospora alba* (<4%), *Trichophorum germanicum* (<4%), *Narthecium ossifragum* (<4%), *Sphagnum capillifolium* (25-33%), *S. papillosum* (11-25%), *S. magellanicum* (<4%), *S. austinii* (<4%), *S. cuspidatum* (26-33%), *Racomitrium lanuginosum* (<4%), *Campylopus atrovirens* (<4%).
- **Additional comments:** Described from **Sc5** - newly mapped area due to increased mapping detail as few points in this area in previous survey. Occasional high hummocks of *Sphagnum austinii*, pools grade into lawns and lawns have high cover in some areas. There are some small patches of sub-marginal vegetation within the mapped area.
- **Sc3** - supports similar vegetation to **Sc5** and located in a slight depression with very soft ground. Vegetation composition was similar to the description above, but overall pool cover was higher (26-33% interconnecting pools). Locally the pools had 34-50% cover. Cover of *Cladonia* (5-10%) and *Eriophorum vaginatum* (11-25%) was also higher. *Narthecium ossifragum* was locally frequent (5-10%), but less than 4% cover overall. Overall *Sphagnum* cover was lower (51-75%). *Sphagnum cuspidatum* was dominant in pools (26-33%) with *S. capillifolium* (11-25%), *S. papillosum* (5-10%), *S. tenellum* (<4%) and *S. fuscum* (<4%). High hummocks of *S. fuscum* were frequent and *Racomitrium lanuginosum* occasional (<4%). Some areas had high pool cover, dominated by *Sphagnum cuspidatum*, but other areas were more similar to sub-marginal vegetation 9/7/6 with occasional pools and open water.
- **Sc6** - newly mapped area and supported similar vegetation to **Sc5**, on flat ground which was very soft. Vegetation composition was similar to the description above, but overall pool cover was higher (26-33% interconnecting pools). The inter-pool area was dominated by *Calluna vulgaris* (26-33%) and *Eriophorum vaginatum* (26-33%). *Drosera anglica* and *Menyanthes trifoliata* were occasional in pools. Overall *Sphagnum* cover was lower (26-33%). *Sphagnum cuspidatum* was dominant in pools (26-33%) with *S. capillifolium* (5-10%), *S. papillosum* (<4%), *S. tenellum* (<4%) and *S. fuscum* (<4%). *Cladonia* cover was higher with *Cladonia portentosa* (11-25%) and *C. uncialis* (<4%). This is a newly mapped area of moderate quality sub-central ecotype. It is probably due to increased mapping detail as few previous points in this area. There were occasional high hummocks of *Sphagnum fuscum* but these showed some signs of degradation.
- **Sc7** - newly mapped area to the west of the high bog on very soft ground. Similar vegetation to **Sc5** but with lower cover of pools (<4%), *Calluna vulgaris* (26-33%) and overall *Sphagnum* (34-50%). No high hummocks present. *Sphagnum* cover was dominated by *S. papillosum* (11-25%), *Sphagnum capillifolium* (11-25%), *S. cuspidatum* (<4%) and *S. magellanicum* (<4%). This area

was previously mapped as sub-marginal habitat and has possibly improved due to the forestry clearance and drain blocking and infilling to the east.

Quadrat Qsc1 (Sc3) was recorded within this complex.

COMPLEX 10/6

- **Location:** this complex dominates the eastern part of Sc1 and is occasional in the western part of Sc1
- **Ground:** very soft to quaking
- **Physical indicators:** <4% (occasionally 5-10%)
- **Calluna height:** 21-40cm
- **Cladonia cover:** 5-10%
- **Macro-topography:** depression
- **Pools:** regular pools 5-10% (occasionally <4%)
- **Sphagnum cover:** 75-91%
- **Nartheicum cover:** 11-25% (occasionally 5-10%)
- **Micro- topography:** high hummocks, low hummocks, lawns (dominant) and pools (occasional), flats
- **Tussocks:** *Trichophorum germanicum* <4%
- **Degradation or regeneration evidence:** regeneration to east and south-west
- **Species cover:** *Calluna vulgaris* (11-25%), *Erica tetralix* (<4%), *Eriophorum angustifolium* (<4%), *E. vaginatum* (<4%), *Sphagnum capillifolium* (11-25%), *S. cuspidatum* (<4%), *S. papillosum* (36-50%), *S. austinii* (<4%), *S. tenellum* (<4%), *Campylopus introflexus* (<4%), *C. atrovirens* (<4%), *Pleurozia purpurea* (<4%), *Cladonia portentosa* (5-10%).
- **Additional comments:** Sc2 now grades into Sc1 (mapped together as Sc1). This vegetation type is dominant in the western part of the area now mapped as Sc1. *Rhynchospora alba* is locally dominant (cf 6/4 + P) and some algal pools are present. *Nartheicum ossifragum* frequent throughout and bare ground locally frequent. The presence of frequent cushions of the non-native moss *Campylopus introflexus* suggests drying out and exposure of bare peat. Pools have low cover and lawns dominate with *Sphagnum papillosum* the main *Sphagnum* species. Some very large hummocks of *S. austinii*. Only the high quality examples of this habitat mapped as sub-central vegetation. An area to the north was previously mapped as Sc2, but is now sub-marginal 9/7/6 with high *Nartheicum ossifragum* (11-25%) and low *Sphagnum* cover (11-25%). There are some high hummocks of *S. austinii* in this area suggesting degradation from sub-central vegetation. The boundary between sub-marginal and sub-central is not always clear

and some areas of 9/7/2 with *Trichophorum germanicum*, *Carex panicea* and high *Sphagnum* have affinity to sub-central vegetation.

- A new area of 10/6 was mapped in 2012, to the north-west of **Sc1** and joined to it. This is likely to be due to the removal of the forestry to the north-east and blocking and infilling of the forestry drains. The area is very wet with high *Sphagnum* cover (75-91%) and is very soft to quaking. *Sphagnum papillosum* (26-33%), *S. cuspidatum* (26-33%), *S. capillifolium* (11-25%) are dominant. Some areas are close to central ecotope, but these are localised. Old hummocks of *S. austinii* are frequent.

COMPLEX 9/7/10

- **Location:** this complex is occasionally present in small patches within **Sc1**
- **Ground:** very soft
- **Physical indicators:** bare peat absent
- ***Calluna* height:** 21-40cm
- ***Cladonia* cover:** <25-33%
- **Macro-topography:** flat
- **Pools:** regular pools 5-10%
- ***Sphagnum* cover:** 51-75%
- ***Narthecium* cover:** absent
- **Micro- topography:** high hummocks, low hummocks
- **Tussocks:** absent
- **Degradation or regeneration evidence:** absent
- **Species cover:** *Calluna vulgaris* (26-33%), *Eriophorum* species (5-10%), *Sphagnum capillifolium* (51-75%), *Cladonia portentosa* (25-33%).
- **Additional comments:** Homogenous vegetation dominated by *Calluna vulgaris*, *Eriophorum* species and hummocks of *Sphagnum capillifolium*. Pools absent.

COMPLEX 6/9 + P

- **Location:** this complex is frequent in the western part of **Sc1** and **Sc4**
- **Ground:** very soft
- **Physical indicators:** bare peat <4%
- ***Calluna* height:** 21-40cm
- ***Cladonia* cover:** <4%
- **Macro-topography:** flat

- **Pools:** interconnecting pools 26-33%
- **Sphagnum cover:** 51-75%
- **Narthecium cover:** 5-10%
- **Micro- topography:** low hummocks, occasional high hummocks, pools and lawns
- **Tussocks:** *Trichophorum germanicum* 5-10%
- **Degradation or regeneration evidence:** regeneration in the south-west of Sc1
- **Species cover:** *Calluna vulgaris* (5-10%), *E. vaginatum* (11-25%), *Eriophorum angustifolium* (<4%), *Carex panicea* (5-10%), *Trichophorum germanicum* (5-10%), *Narthecium ossifragum* (5-10%), *Sphagnum capillifolium* (11-25%), *S. cuspidatum* (11-25%), *S. austinii* (<4%), *S. papillosum* (25-33%), *Cladonia portentosa* (<4%).
- **Additional comments:** the area of this vegetation type to the south-east of the original mapped area of **Sc1** was previously mapped as sub-marginal vegetation. This may be due to the presence of abundant *Trichophorum germanicum* and *Carex panicea*. However, pools are frequent and Sphagnum cover is very high (both inter-pool and within pools). It may be that this area has improved since the last survey. The forestry to the north of Sc1 has been felled and drains blocked or naturally infilled and it is likely that this has led to local re-wetting of **Sc1** and adjacent areas.
- The north-western area of the area previously mapped as **C2** is now mapped as 6/9 + P (sub-central). Sphagnum is locally 51-75% but some areas have only 26-33%. *Trichophorum germanicum* and *Narthecium ossifragum* flats abundant with *Rhynchospora alba* (5-10%). Where *Rhynchospora alba* cover is locally high and *T. germanicum* <4%, the vegetation is mapped as 6/4 + P.
- **Sc4** – this area is located to the south-east of the recently clear-felled forestry. It has increased in area which is likely to be due to the blocking and infilling of drains to the north, on the forestry south-eastern boundary. This area is flat to gently sloping and has a low cover of pools (regular pools, 5-10%). The cover of *Eriophorum vaginatum* (5-10%) and *Trichophorum germanicum* (<4%) are lower than in **Sc1**. Sphagnum cover is 36-50%, but locally higher, with *Sphagnum capillifolium* (11-25%) and *S. papillosum* (11-25%) dominant. *Rhynchospora alba* is of low cover or absent. At the northern edge some of the vegetation is similar to 9/7 + P with *Calluna vulgaris* and *Eriophorum vaginatum* co-dominant and pools with *S. cuspidatum* present. This area is adjacent to the blocked/ infilling drains.
- A new area of 6/9 + P was mapped in 2012, to the north-east of **Sc1** and joined to it. This is likely to be due to the removal of the forestry to the north-east and blocking and infilling of the forestry drains. Infilled drains are now effectively inter-connecting pools (26-33%). Overall

Sphagnum cover is 36-50% overall, but there are local areas with higher Sphagnum cover (51-75%). *Sphagnum capillifolium* (11-25%), *S. papillosum* (11-25%) and *S. cuspidatum* (11-25%) are the dominant Sphagnum species. *Rhynchospora alba* is almost absent (cf 6/4 + P). To the north there are patches of 9/7 + P with co-dominant *Calluna vulgaris* and *Eriophorum vaginatum* but these were localised around infilled drains. *Sphagnum fuscum* is occasional.

COMPLEX 6/4 + P

- **Location:** this complex is locally frequent within the western and eastern sections of Sc1
- **Ground:** very soft
- **Physical indicators:** bare peat <4%
- **Calluna height:** 21-40cm
- **Cladonia cover:** <4%
- **Macro-topography:** flat
- **Pools:** interconnecting pools 26-33%
- **Sphagnum cover:** 51-75%
- **Narthecium cover:** 5-10%
- **Micro- topography:** low hummocks, occasional high hummocks, pools and lawns
- **Tussocks:** *Trichophorum germanicum* <4%
- **Degradation or regeneration evidence:** absent
- **Species cover:** *Calluna vulgaris* (5-10%), *E. vaginatum* (11-25%), *Eriophorum angustifolium* (<4%), *Carex panicea* (5-10%), *Trichophorum germanicum* (5-10%), *Narthecium ossifragum* (5-10%), *Rhynchospora alba* (5-10% or locally 11-25%), *Sphagnum capillifolium* (11-25%), *S. cuspidatum* (11-25%), *S. austinii* (<4%), *S. papillosum* (25-33%), *Campylopus atrovirens* (<4%), *Pleurozia purpurea* (<4%), *Cladonia portentosa* (5-10%).
- **Additional comments:** occasional patches have higher Sphagnum cover cf central ecotype, but these patches are localised and the vegetation quickly grades to areas with high *Rhynchospora alba* and some bare peat visible. *Trichophorum germanicum* is frequent throughout. There are remnant high hummocks of *S. austinii* and the ground is frequently very wet to quaking despite low Sphagnum cover. Other areas are more similar to sub-marginal vegetation (6/3) but again these are localised patches only.

Quadrat Qsc2 (Sc1) was recorded within this complex.

Active flushes

None present

Degraded Raised Bog (7120)

Sub-Marginal Ecotope Complexes

COMPLEX 9/7 + CL

- **Location:** located to the north of Sc1
- **Ground:** soft
- **Physical indicators:** absent
- ***Calluna* height:** 21-40cm
- ***Cladonia* cover:** 33-50%
- **Macro-topography:** flat
- **Pools:** regular <4%
- ***Sphagnum* cover:** 25-33%
- ***Narthecium* cover:** absent
- **Micro- topography:** low hummocks
- **Tussocks:** absent
- **Degradation or regeneration evidence:** regeneration/ rewetting
- **Species cover:** *Calluna vulgaris* (33-50%), *Eriophorum vaginatum* (11-25%), *E. angustifolium* (5-10%), *Carex panicea* (<4%), *Rhynchospora alba* (<4%), *Andromeda polifolia* (<4%), *Menyanthes trifoliata* (<4%), *Sphagnum capillifolium* (11-25%), *S. papillosum* (5-10%), *S. cuspidatum* (<4%), *S. tenellum* (<4%), *Cladonia portentosa* (33-50%).
- **Additional comments:** highly homogenous vegetation with moderately high *Sphagnum* cover, high *Cladonia* cover with few pools. High quality sub-marginal vegetation but overall *Sphagnum* cover too low for 9/7/10 sub-central vegetation. Occasional *Sphagnum fuscum* and *S. austinii* in low hummocks or regenerating in lawns suggest that there is regeneration in this area.

COMPLEX 9/7/6

- **Location:** this complex is found across the entire high bog
- **Ground:** soft
- **Physical indicators:** absent
- ***Calluna* height:** 21-40cm
- ***Cladonia* cover:** 11-25%
- **Macro-topography:** flat to gentle slope

- **Pools:** absent
- **Sphagnum cover:** 11-25%
- **Narthecium cover:** <4%
- **Micro- topography:** low hummocks and hollows
- **Tussocks:** *Trichophorum germanicum* (<4%)
- **Degradation or regeneration evidence:** absent
- **Species cover:** *Calluna vulgaris* (11-25%), *Eriophorum vaginatum* (11-25%), *Eriophorum angustifolium* (<4%), *Carex panicea* (<4%), *Erica tetralix* (<4%), *Narthecium ossifragum* (<4%), *Drosera rotundifolia* (<4%), *Trichophorum germanicum* (<4%), *Sphagnum capillifolium* (5-10%), *S. papillosum* (<4%), *S. tenellum* (<4%), *S. subnitens* (<4%), *S. cuspidatum* (<4%), *Racomitrium lanuginosum* (<4%), *Pleurozia purpurea* (<4%), *Cladonia portentosa* (11-25%).
- **Additional comments:** *Eriophorum vaginatum* and *Calluna vulgaris* co-dominant with overall low Sphagnum cover and occasional hollows. In areas where the sub-marginal ecotype was in close proximity to marginal ecotype, there was often a mosaic of 9/7/6 sub-marginal (and variants) and 3/6 marginal (and variants). These were not always possible to map separately.
 - Variant 1 – 9/7/6 + TP: *Menyanthes trifoliata* and *Sphagnum cuspidatum* locally frequent in pools with occasional *Drosera anglica*. Inter-pool Sphagnum cover moderate only and *Rhynchospora alba* and *Narthecium ossifragum* present at pool edges.
 - Variant 2 – 6/7/9: Higher cover of *Narthecium ossifragum* (11-25%) in hollows. Sphagnum cover patchy but greater than 20% cover of *S. cuspidatum* in pools.
 - Variant 3 – 9/7/2: *Calluna vulgaris* appears to have died back but no signs of burning (cover <4%). *Trichophorum germanicum* locally frequent (5-10%) but *Narthecium ossifragum*, *Eriophorum vaginatum* and Sphagnum cover still abundant.
 - Variant 4 – 9/7/3: *Carex panicea* locally abundant (5-10% or higher).
 - Variant 5 – 9/7/3 + AP: *Carex panicea* still abundant but algal pools with open water locally frequent.
 - Variant 6 – 9/7/4 + P: *Rhynchospora alba* frequent (5-10%), *Eriophorum* species (5-10%), *Trichophorum germanicum* (<4%) and small pools with *Sphagnum cuspidatum* (<4%). Inter-pool sphagnum cover 11-25% (occasional 25-33%). Some areas of this vegetation type were formally mapped as marginal vegetation (e.g. to the north of Sc3).
 - Variant 7 – 9/7/6 + P: The vegetation between the pools is typical 9/7/6 with 11-25% cover of pools. Overall Sphagnum cover too low for sub-central vegetation. Pools have dominant *Sphagnum cuspidatum* (11-25%) and occasional *Menyanthes trifoliata*. *S. capillifolium* and

S. papillosum present in lawns at the edge of pools (<4%). *Rhynchospora alba* and *Trichophorum germanicum* of low cover and frequency (cf 9/7/6 + TP).

- Variant 8 – 9a/7/2 + P: This variant is characterised by high cover of *Trichophorum germanicum* (11-25%, occasionally 5-10%) with *Eriophorum angustifolium* (5-10%). Pools have *Sphagnum cuspidatum* and *Menyanthes trifoliata*. *Sphagnum papillosum* is frequent with occasional *S. austinii*. *Racomitrium lanuginosum* is frequent but of low overall cover (<4%). In the area of sub-marginal ecotope to the south of Sc2, this vegetation type has moderate *Sphagnum* cover and pools but *Trichophorum germanicum* and *Eriophorum angustifolium* are still of high cover. *E. vaginatum* hummocks (5-10%) are present in this area.

COMPLEX 6/3

- **Location:** frequently found to the west of Sc1, east of flush X1 and west of Sc6
- **Ground:** soft
- **Physical indicators:** bare peat (<4%)
- **Calluna height:** 21-40cm
- **Cladonia cover:** <4%
- **Macro-topography:** flat
- **Pools:** tear pools (<4%)
- **Sphagnum cover:** 11-25%
- **Narthecium cover:** 26-33%
- **Micro- topography:** low hummocks, tear pools and hollows
- **Tussocks:** *Trichophorum germanicum* (<4%)
- **Degradation or regeneration evidence:** absent
- **Species cover:** *Calluna vulgaris* (5-10%), *Eriophorum vaginatum* (5-10%), *E. angustifolium* (<4%), *Menyanthes trifoliata* (<4%), *Carex panicea* (<4%), *Narthecium ossifragum* (26-33%), *Sphagnum capillifolium* (5-10%), *S. papillosum* (<4%), *S. tenellum* (<4%), *S. cuspidatum* (<4%), *S. subnitens* (<4%), *Racomitrium lanuginosum* (<4%).
- **Additional comments:** occurs as patches within 9/7/6 and is almost a marginal ecotope. *Narthecium ossifragum* dominant with patchily abundant *Carex panicea*.
- Variant 1 – 6/3 + P: Vegetation as described above but inter-connecting pools present with higher *Sphagnum* cover between pools (26-33%). *Sphagnum cuspidatum*, *Menyanthes trifoliata* and *Drosera anglica* occasional in pools. *Sphagnum fuscum* present occasionally.
- Variant 2 – 6/3/9a: see description of inactive Flush X.

- Variant 3 – 6/4/9a: the ground in this variant is occasionally quaking. *Narthecium ossifragum* is still dominant (26-33%) but *Rhynchospora alba* is frequent in hollows (5-10%). *Eriophorum angustifolium* is frequent and there are no pools but hollows are present. Overall Sphagnum is up to 33%, with *S. capillifolium* (11-25%), *S. papillosum* (5-10%) and *S. tenellum* (<4%). There are remnant hummocks of *S. austinii* and this complex appears to have degraded from the sub-central complex 6/4 + P.

Marginal Ecotope Complexes

COMPLEX 7/9/6

- Location:** located to the west and southwest of Sc6
- Ground:** firm to soft
- Physical indicators:** absent
- Calluna height:** 21-40cm
- Cladonia cover:** <4%
- Macro-topography:** gentle slope
- Pools:** occasional tear pools (<4%)
- Sphagnum cover:** <4%
- Narthecium cover:** 5-10%
- Micro- topography:** occasional high hummocks, low hummocks and hollows
- Tussocks:** *Trichophorum germanicum* (11-25%)
- Degradation or regeneration evidence:** absent
- Species cover:** *Calluna vulgaris* (25-33%), *Eriophorum vaginatum* (<4%), *Erica tetralix* (<4%), *Carex panicea* (5-10%), *Narthecium ossifragum* (5-10%), *Sphagnum capillifolium* (<4%), *S. cuspidatum* (<4%), *S. tenellum* (<4%), *S. papillosum* (<4%), *Cladonia portentosa* (<4%).
- Additional comments:** Marginal vegetation on slope at the edge of a flush. Occasional pools as drainage through area to north. Vegetation similar to sub-marginal vegetation but overall Sphagnum cover very low.

COMPLEX 3/6

- Location:** found across the entire high bog edge
- Ground:** firm
- Physical indicators:** bare peat (<4%)
- Calluna height:** 21-40cm

- **Cladonia cover:** 11-25%
- **Macro-topography:** gentle slope
- **Pools:** occasional algal pools (<4%)
- **Sphagnum cover:** 5-10%
- **Narthecium cover:** <4%
- **Micro- topography:** low hummocks and hollows, algal pools
- **Tussocks:** *Trichophorum germanicum* (<4%)
- **Degradation or regeneration evidence:** absent
- **Species cover:** *Calluna vulgaris* (11-25%), *Eriophorum angustifolium* (<4%), *Carex panicea* (11-25%), *Trichophorum germanicum* (<4%), *Sphagnum capillifolium* (<4%), *S. cuspidatum* (<4%), *S. tenellum* (<4%), *S. papillosum* (<4%), *S. subnitens* (<4%), *Cladonia portentosa* (11-25%).
- **Additional comments:**
- *Carex panicea* dominant with locally frequent but patchy *Trichophorum germanicum*. Some of the 3/2 vegetation occurs in a mosaic with sub-marginal vegetation (9/7/6 and variants). It was not always possible to map these separately. In these areas the 3/6 vegetation has some *Eriophorum vaginatum* and patchy *Sphagnum* but over *Sphagnum* cover is still generally less than 10%.
 - Variant 1 – 3/6/2: areas with higher cover of *Trichophorum germanicum* (5-10%).
 - Variant 2 – 3/6/2 + AP: areas with typical 3/6/2 vegetation interspersed with occasional pools with open water and algae. *Sphagnum cuspidatum* occasional in pools but never abundant.
 - Variant 3 – 3/6/4: areas with locally frequent *Rhynchospora alba* in hollows (5-10%).
 - Variant 4 – 3/6 + TP: On southern edge of south-western lobe of bog. Interpool areas dominated by *Carex panicea* (25-33%) and *Narthecium ossifragum* (25-33%) with low *Sphagnum* cover. Long tear pools present with *S. cuspidatum* (11-25%), *S. denticulatum* (<4%) and occasional *Eriophorum angustifolium*. Overall *Sphagnum* cover too low for sub-marginal ecotype and surface firm. There could be subsidence in this area leading to the formation of the pools on the gentle slope. This vegetation grades to 6/3 + P on flatter ground.
 - Variant 5 – 3/6/9a: *Carex panicea* (11-25%) and *Narthecium ossifragum* (up to 33-50%) co-dominant in lawns with locally frequent *Eriophorum angustifolium* (<4%). *Sphagnum* cover less than 10%.
 - Variant 6 – 3/6/2 + Ra: in these areas typical 3/6/2 vegetation has frequent hummocks of *Racomitrium lanuginosum* (5-10% or higher). These appear to have colonised degraded hummocks and are likely to be a sign of drying out.

COMPLEX 3/2 + CL

- **Location:** found on the south-western lobe as well as to the east of southern section of **flush Z**
- **Ground:** firm
- **Physical indicators:** bare peat (<4%)
- **Calluna height:** 21-40cm
- **Cladonia cover:** 5-10%
- **Macro-topography:** gentle slope
- **Pools:** absent
- **Sphagnum cover:** <4%
- **Narthecium cover:** <4%
- **Micro- topography:** occasional low hummocks and erosion channels
- **Tussocks:** *Trichophorum germanicum* 11-25%
- **Degradation or regeneration evidence:** absent
- **Species cover:** *Calluna vulgaris* (11-25%), *Erica tetralix* (<4%), *Eriophorum angustifolium* (<4%), *Trichophorum germanicum* (11-25%), *Rhynchospora alba* (<4%), *S. subnitens* (<4%), *S. tenellum* (<4%), *Cladonia portentosa* (5-10%).
- **Additional comments:** Specie poor open community on degraded peat, usually near the cut edges. Relative proportion of species varies between different areas but *Carex panicea*, *Trichophorum germanicum* and *Cladonia portentosa* always prominent and usually co-dominant. Near the boundary with sub-marginal ecotypes (e.g. complex 9/7/6 and variants), *Calluna vulgaris*, *Eriophorum vaginatum* and *Sphagnum* cover increase. Occasionally *Sphagnum* increases to over 20% but some of these areas are too small to map and marked by a single point only.
- Variant 1 – 2/3/9: on boundary between marginal and sub-marginal ecotype *Eriophorum vaginatum* is present within the 3/2 vegetation and overall vegetation cover is higher. *Calluna vulgaris* cover is up to 33%. This is a high quality marginal complex variant.
- Variant 2 – 3/2: this variant has low *Eriophorum* and *Cladonia* species cover.

Clearfells

CLEARFELL A

- **Location:** located in the area of recently clear-felled forestry
- **Ground:** soft
- **Physical indicators:** absent

- **Calluna height:** 21-40cm
- **Cladonia cover:** <4%
- **Macro-topography:** gentle slope to north
- **Pools:** absent
- **Sphagnum cover:** 51-75% (frequently 76-91%)
- **Narthecium cover:** absent
- **Micro- topography:** low Sphagnum hummocks and lawns
- **Tussocks:** *Eriophorum vaginatum* tussocks dominant (51-75%)
- **Degradation or regeneration evidence:** regeneration after forestry removal
- **Species cover:** *Eriophorum vaginatum* (51-75%), *Calluna vulgaris* (<4%), *Eriophorum angustifolium* (<4%), *Narthecium ossifragum* (<4%), *Dryopteris dilatata* (<4%), *Juncus effusus* (<4%), *Molinia caerulea* (<4%), *Chamerion angustifolium* (<4%), *Rubus fruticosus* agg. (<4%), *Vaccinium myrtillus* (<4%), *Sphagnum palustre* (<4%), *S. capillifolium* (34-50%), *S. papillosum* (11-25%), *S. cuspidatum* (5-10%), *S. fallax* (<4%), *Pleurozium schreberi* (<4%), *Polytrichum strictum* (<4%), *P. commune* (<4%), *Aulacomnium palustre* (<4%) and *Cladonia portentosa* (<4%).
- **Additional comments:** *Eriophorum vaginatum* tussocks and *Sphagnum capillifolium* dominant with occasional *Salix aurita*. Remains of *Pinus* stumps present and brash arranged in rows running north to south. Flush species frequent and Sphagnum cover locally high and this area may transition to active flush in future. Due to the recent removal of forestry trees this area may subsequently develop into typical raised bog vegetation. However, as the area slopes to the north, flush species may still be abundant.

Inactive flushes

FLUSH X

- **Location:** south west of the centre of the high bog
- **Ground:** soft
- **Physical indicators:** <4%
- **Calluna height:** 41-60cm
- **Cladonia cover:** <4%
- **Macro-topography:** depression
- **Pools:** absent
- **Sphagnum cover:** 11-25%
- **Narthecium cover:** 5-10%

- **Micro- topography:** occasional lawns and hollows
- **Tussocks:** *Trichophorum germanicum* (<4%)
- **Degradation or regeneration evidence:** this flush was not mapped before 2004 and may have previously been considered part of the bog vegetation. In 2004 it was described as having high cover of *Cladonia* (50%) and *Sphagnum* (50-60%), but these were much lower in 2012 suggesting that the flushed area is drier. There is no obvious reason for the decline in *Cladonia* as this was frequent in adjacent complexes.
- **Species cover:** *Calluna vulgaris* (5-10%), *Erica tetralix* (<4%), *Carex panicea* (11-25%), *Eriophorum angustifolium* (5-10%), *Rhynchospora alba* (<4%), *Narthecium ossifragum* (5-10%), *Sphagnum magellanicum* (<4%), *S. papillosum* (<4%), *Leucobryum glaucum* (<4%), *Cladonia portentosa* (<4%).
- **Additional comments:** mapped as an active flush in 2004 but overall *Sphagnum* cover low and no/ few 'flush' species present. Vegetation could be described as sub-marginal complex 6/3/9a with abundant *Narthecium ossifragum*, *Carex panicea* and *Eriophorum angustifolium*. Wetter depression in western part of mapped flush as frequent to abundant tall *Eriophorum angustifolium* and slightly higher *Sphagnum* cover (25-33% maximum).

FLUSH V

- **Location:** to the north-east of the clear-felled forestry
- **Ground:** firm to soft
- **Physical indicators:** absent
- ***Calluna* height:** 21-40cm
- ***Cladonia* cover:** 5-10%
- **Macro-topography:** depression
- **Pools:** absent
- ***Sphagnum* cover:** 11-25%
- ***Narthecium* cover:** absent
- **Micro- topography:** high hummocks of *Molinia caerulea*
- **Tussocks:** *Molinia caerulea* 11-25% (to 51-75% locally), *Eriophorum vaginatum* <4%
- **Degradation or regeneration evidence:** absent
- **Species cover:** *Molinia caerulea* (11-25%), *Eriophorum angustifolium* (11-25%), *E. vaginatum* (<4%), *Sphagnum capillifolium* (5-10%), *Polytrichum commune* (<4%), *Pleurozium schreberi* (<4%) and *Aulacomnium palustre* (<4%).

- **Additional comments:** Small flush which is hardly distinct from surrounding bog vegetation into which it grades. *Molinia caerulea* dominant to the north and *Eriophorum angustifolium* to the south *Pinus* seedlings and saplings frequent.

FLUSH W

- **Location:** to the east of the main area of high bog
- **Ground:** soft to firm
- **Physical indicators:** absent
- ***Calluna* height:** 41-60cm
- ***Cladonia* cover:** absent
- **Macro-topography:** gentle slope
- **Pools:** absent
- ***Sphagnum* cover:** <4%
- ***Narthecium* cover:** 5-10%
- **Micro- topography:** n/a
- **Tussocks:** *Molinia caerulea* <4%, *Trichophorum germanicum* <4%
- **Degradation or regeneration evidence:** the small section to the south-east graded into bog (9/7/6) and was not visible during this survey
- **Species cover:** *Calluna vulgaris* (5-10%), *Trichophorum germanicum* (<4%), *Molinia caerulea* (<4%), *Carex panicea* (11-25%), *Eriophorum angustifolium* (<4%), *Narthecium ossifragum* (<4%), *Juncus effusus* (<4%), *Dryopteris dilatata* (<4%), *Sphagnum capillifolium* (<4%), *S. papillosum* (<4%), *Aulacomnium palustre*, *Cladonia portentosa* (<4%).
- **Additional comments:** Flush not well defined and grades into surrounding sub-marginal vegetation (9/7/3 to the east and west and 9/7/6 to the south).

FLUSH X1

- **Location:** to the north of the western lobe of the high bog
- **Ground:** firm
- **Physical indicators:** absent
- ***Calluna* height:** 41-60cm
- ***Cladonia* cover:** <4%
- **Macro-topography:** gentle slope
- **Pools:** absent
- ***Sphagnum* cover:** 5-10%

- **Narthecium cover:** <4%
- **Micro- topography:** high hummocks of *Molinia caerulea*
- **Tussocks:** *Molinia caerulea* (91-100%)
- **Degradation or regeneration evidence:** absent
- **Species cover:** *Calluna vulgaris* (<4%), *Molinia caerulea* (91-100%), *Narthecium ossifragum* (<4%), *Potentilla erecta* (<4%), *Carex panicea* (<4%), *Sphagnum capillifolium* (<4%), *S. papillosum* (<4%), *Polytrichum strictum* (<4%), *Hypnum jutlandicum* (<4%), *Leucobryum glaucum* (<4%), *Cladonia portentosa* (<4%).
- **Additional comments:** A newly mapped area at the edge of the bog located on old cutover and sloping ground. No previous mapping points in this area so likely to be due to increased mapping detail in 2012. Central area has low species richness with *Molinia caerulea* tussocks dominant and occasional patches of *Sphagnum*. This grades to 9/7/6 (and variant 9/7/3) sub-marginal complex at the edges and in the northern section, this complex occurs in a mosaic with the flush vegetation. Overall *Sphagnum* cover low but occasionally over 10%.

FLUSH Y

- **Location:** in the north-western lobe of the site
- **Ground:** firm in centre to soft at edge
- **Physical indicators:** absent
- **Calluna height:** 41-60cm
- **Cladonia cover:** 4-10
- **Macro-topography:** gentle slope
- **Pools:** absent
- **Sphagnum cover:** 5-10%
- **Narthecium cover:** <4%
- **Micro- topography:** high hummocks of *Molinia caerulea*
- **Tussocks:** *Molinia caerulea* (91-100%)
- **Degradation or regeneration evidence:** absent
- **Species cover:** *Calluna vulgaris* (<4%), *Molinia caerulea* (91-100%), *Eriophorum angustifolium* (<4%).
- **Additional comments:** Species-poor vegetation

FLUSH Y1

- **Location:** on the northern lobe of the bog, running north to south between two ditches

- **Ground:** firm
- **Physical indicators:** absent
- **Calluna height:** 21-40
- **Cladonia cover:** <4%
- **Macro-topography:** slight ridge between two drains
- **Pools:** absent
- **Sphagnum cover:** <4%
- **Narthecium cover:** <4%
- **Micro- topography:** hummocks of *Molinia caerulea*
- **Tussocks:** *Molinia caerulea* 75-91%
- **Degradation or regeneration evidence:** absent
- **Species cover:** *Calluna vulgaris* (<4%), *Molinia caerulea* (75-91%), *Carex panicea* (<4%), *Rhynchospora alba* (<4%), *Trichophorum germanicum* (<4%), *Potentilla erecta* (<4%), *Ulex europaeus* (<4%), *Angelica sylvestris* (<4%), *Juncus acutiflorus* (<4%), *Succisa pratensis* (<4%), *Sphagnum subnitens* (<4%), *S. capillifolium* (<4%), *S. palustre* (<4%), *S. papillosum* (<4%), *Hylocomium splendens* (<4%), *Scleropodium purum* (<4%), and *Cladonia portentosa* (<4%).
- **Additional comments:** Ridge between two drains with wet grassland/ flush species in a mosaic with *Ulex europaeus* and *Salix* species scrub and bog vegetation. Frequent calcicole bryophytes *Ctenidium molluscum*, *Fissidens adianthoides*, *Campylium stellatum* suggest that this is either a mineral ridge or an old trackway, which has mineral soil/ gravel surface (now not visible). Standing water present through most of the flush.

FLUSH Z

- **Location:** in the centre of the south-eastern part of the bog, running mainly north to south
- **Ground:** firm
- **Physical indicators:** absent
- **Calluna height:** 41-60cm
- **Cladonia cover:** <4%
- **Macro-topography:** generally flat but sloping at the margins
- **Pools:** absent
- **Sphagnum cover:** <4%
- **Narthecium cover:** absent
- **Micro- topography:** high hummocks of *Molinia caerulea*
- **Tussocks:** *Molinia caerulea* 91-100%

- **Degradation or regeneration evidence:** absent
- **Species cover:** *Calluna vulgaris* (<4%), *Molinia caerulea* (91-100%), *Eriophorum vaginatum* (<4%), *Pteridium aquilinum* (<4%), *Sphagnum subnitens* (<4%), *S. cuspidatum* (<4%) and *S. capillifolium* (<4%).
- **Additional comments:** Scattered *Salix* in drains. Flush grades into bog at edges with occasional *Calluna vulgaris*, *Eriophorum vaginatum* and *Sphagnum* but the main flush is species-poor with dominant *Molinia caerulea*. Appears to be an old-cutover area. In the centre part of the flush there appears to be some mineral influence as wet grassland species such as *Juncus effusus*, *Potentilla palustris*, *Holcus lanatus*, *Festuca rubra*, *Filipendula ulmaria*, *Rumex acetosa*, *Potentilla erecta*, *P. anserina*, *Succisa pratensis* and *Rhytidiadelphus squarrosus* are frequent. *Juncus effusus* is locally dominant in the western central area. In the eastern arm of the flush (E167799/N266582), there appeared to be a calcareous spring as the vegetation was dominated by bryophyte species indicative of calcareous springs and flushes: *Scorpidium scorpioides* and *Campylium stellatum*.

FLUSH Z1

- **Location:** to the east of the main area of high bog, near the margin of the bog
- **Ground:** soft
- **Physical indicators:** absent
- ***Calluna* height:** 21-40cm
- ***Cladonia* cover:** 11-25%
- **Macro-topography:** slight depression
- **Pools:** absent
- ***Sphagnum* cover:** 11-25%
- ***Narthecium* cover:** absent
- **Micro- topography:** hummocks of *Molinia caerulea*
- **Tussocks:** *Molinia caerulea* (75-91%)
- **Degradation or regeneration evidence:** absent
- **Species cover:** *Molinia caerulea* (75-91%), *Potentilla erecta* (<4%), *Trichophorum germanicum* (<4%), *Vaccinium oxycoccos* (<4%) and *Sphagnum capillifolium* (11-25%), *S. papillosum* (<4%).
- **Additional comments:** Newly mapped small flush due to increased mapping detail.

Face bank Complexes

COMPLEX 1

- **Location:** found at the edge of the high bog in many locations across high bog
- **Ground:** firm
- **Physical indicators:** <4%
- ***Calluna* height:** 21-40 cm
- ***Cladonia* cover:** <4%
- **Macro-topography:** steep slope
- **Pools:** absent
- ***Sphagnum* cover:** generally absent but <4% in places
- ***Narthecium* cover:** absent
- **Micro- topography:** *Calluna vulgaris* hummocks
- **Tussocks:** absent
- **Degradation or regeneration evidence:** absent
- **Species cover:** *Calluna vulgaris* (76-90%), *Eriophorum angustifolium* (<4%), *Carex panicea* (<4%), *Hypnum jutlandicum* (5-10%), *Cladonia portentosa* (<4%).
- **Additional comments:** none

Appendix II Photographical records

Photograph Number	Aspect	Type	Feature	Date
P1060775	NE	Overview	Qsc1	09/10/2012
P1060779	NE	Overview	Qsc2	10/10/2012
P1060778	NE	Overview	Qc1	10/10/2012

Appendix III Quadrats

Ecotope type	Central	Central	Sub-central	Sub-central
Complex Name	15	15	9/7+P	9/7 + P
Quadrat Name	Qc1	Qc1	Qsc1	Qsc1
Easting	167107	167103.56	166992	167018.50
Northing	267175	267179.40	266579	266596.18
Date	10/11/2004	10/10/2012	10/11/2004	09/10/2012
Firmness	Soft	Quaking	Very soft	Very soft
Burnt	No	No	No	No
Algae in hollows %	Absent	Absent	4-10	Absent
Algae in pools %	4-10	1-3 (many indiv)	4-10	Absent
Bare peat %	Absent	Absent	Absent	Absent
High hummocks %	na	4-10	na	11-25
Low hummocks %	11-25	11-25	26-33	4-10
Hollows %	11-25	Absent	34-50	Absent
Lawns %	4-10	26-33	4-10	Absent
Pools %	11-25	11-25	11-25	34-50
Pool type	Interconnecting	Interconnecting	Tear	Interconnecting
S.austinii hum type	na	Absent	na	Absent
S.austinii hum %	1-3 (many indiv)	Absent	Absent	Absent
S.austinii height(cm)	na	Absent	na	Absent
S.fuscum hum type	na	Absent	na	Active
S.fuscum hum %	1-3 (many indiv)	Absent	Absent	4-10
S.fuscum height(cm)	na	Absent	na	0-10
Leucobryum glaucum	Absent	Absent	Absent	Absent
Trichophorum type	Tussocks	Tussocks	Flats	Tussocks
Trichophorum %	1-3 (many indiv)	1-3 (many indiv)	1-3 (many indiv)	1-3 (many indiv)
S.magellanicum %	Absent	Absent	4-10	Absent
S.cuspidatum %	11-25	11-25	11-25	26-33
S.papillosum %	4-10	11-25	11-25	4-10
S.denticulatum %	Absent	Absent	4-10	Absent
S.capillifolium%	11-25	26-33	11-25	11-25
S.tenellum %	na	1-3 (many indiv)	na	1-3 (many indiv)
S.subnitenens %	Absent	Absent	Absent	Absent

Ecotope type	Central	Central	Sub-central	Sub-central
Complex Name	15	15	9/7+P	9/7 + P
R.fusca %	Absent	Absent	Absent	Absent
R.alba %	11-25	4-10	4-10	1-3 (many indiv)
N.ossifragum %	11-25	1-3 (many indiv)	4-10	4-10
Sphag pools %	11-25	11-25	11-25	26-33
Dominant pool Sphag	S.cuspidatum	S.cuspidatum	S.cuspidatum	S.cuspidatum
Sphag lawns %	4-10	11-25	4-10	4-10
Sphag humm %	11-25	26-33	26-33	26-33
Sphag holl %	4-10	Absent	11-25	Absent
Total Sphag %	41-50	51-75	51-75	76-90
Hummocks indicators	S.austinii & S.fuscum	Absent	Absent	S.fuscum
Cladonia portent %	4-10	4-10	4-10	11-25
Other Cladonia sp	na	na	na	na
C. panicea %	Absent	Absent	Absent	Absent
Calluna cover %	4-10	11-25	11-25	26-33
Calluna height(cm)	11-20	21-30	21-30	21-30
Other Notable Species		Menyanthes trifoliata		Dros. rotu, Meny trif, Odon sphag
Other comment		Rhynchospora alba & Narthecium ossifragum cover lower due to Q position. Sphagnum austinii & S. fuscum not in local area		Higher cover of Sphagnum cuspidatum & less Eriophorum vaginatum - probably due to Q positioning.

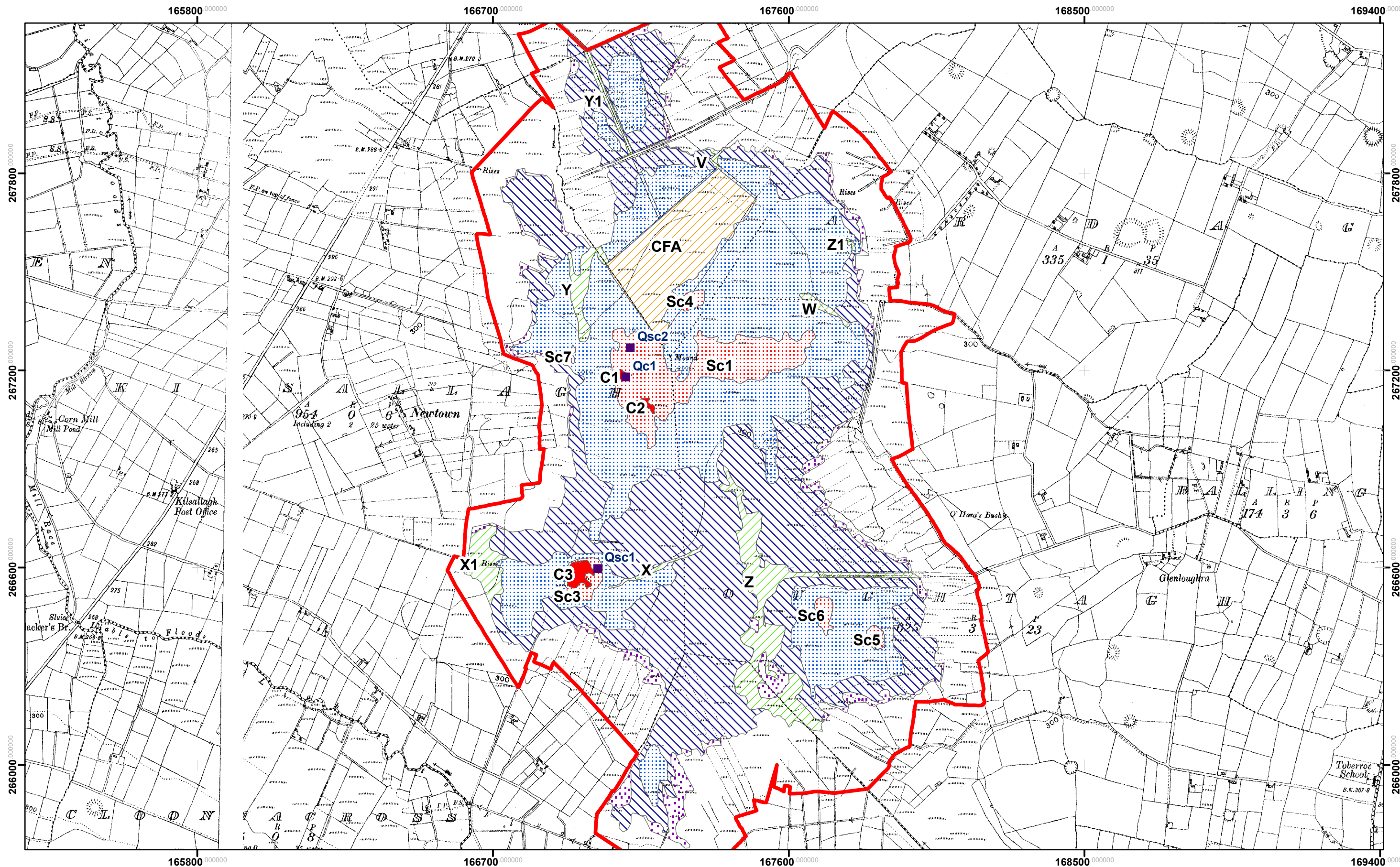
Ecotope type	Sub-central	Sub-central
Complex Name	6/4+P	6/4 + P
Quadrat Name	Qsc2	Qsc2
Easting	167115	167118.04
Northing	267261	267268.70
Date	10/11/2004	10/10/2012
Firmness	Very soft	Quaking
Burnt	No	No
Algae in hollows %	Absent	Absent
Algae in pools %	4-10	Absent
Bare peat %	Absent	Absent

Ecotope type	Sub-central	Sub-central
Complex Name	6/4+P	6/4 + P
High hummocks %	na	Absent
Low hummocks %	11-25	11-25
Hollows %	11-25	4-10
Lawns %	4-10	51-75
Pools %	4-10	Absent
Pool type	Regular	Absent
S.austinii hum type	na	Absent
S.austinii hum %	Absent	Absent
S.austinii height(cm)	na	Absent
S.fuscum hum type	na	Absent
S.fuscum hum %	Absent	Absent
S.fuscum height(cm)	na	Absent
Leucobryum glaucum	Absent	Absent
Trichophorum type	Tussocks	Absent
Trichophorum %	1-3 (many indiv)	1-3 (many indiv)
S.magellanicum %	Absent	Absent
S.cuspidatum %	Absent	1-3 (many indiv)
S.papillosum %	11-25	51-75
S.denticulatum %	Absent	Absent
S.capillifolium%	4-10	4-10
S.tenellum %	na	1-3 (many indiv)
S.subnitens %	Absent	4-10
R.fusca %	Absent	Absent
R.alba %	11-25	4-10
N.ossifragum %	26-33	26-33
Sphag pools %	4-10	Absent
Dominant pool Sphag	Absent	Absent
Sphag lawns %	4-10	51-75
Sphag humm %	11-25	11-25
Sphag holl %	4-10	Absent
Total Sphag %	41-50	51-75
Hummocks indicators	Absent	Absent
Cladonia portent %	4-10	4-10
Other Cladonia sp	na	na
C. panicea %	Absent	Absent

Ecotope type	Sub-central	Sub-central
Complex Name	6/4+P	6/4 + P
Calluna cover %	4-10	Absent
Calluna height(cm)	11-20	Absent
Other Notable Species	Hypnum jutlandicum; Campylopus atrovirens; Pleurozia purpurea	
Other comment	Absence of pools and lower cover of Rhynchospora alba probably due to Q position	

Note: Data for those 2004 quadrats re-surveyed in 2012 is given to the right of the original 2004 quadrat data in table above. Additional quadrats were recorded where necessary. Some 2004 quadrats may have been given a different ecotope category in 2012; further detail justifying the re-classification is given within the report.

Appendix IV Survey maps



Raised Bog Monitoring & Assessment Survey 2013

Map 1: Ecotopes Map and Quadrats

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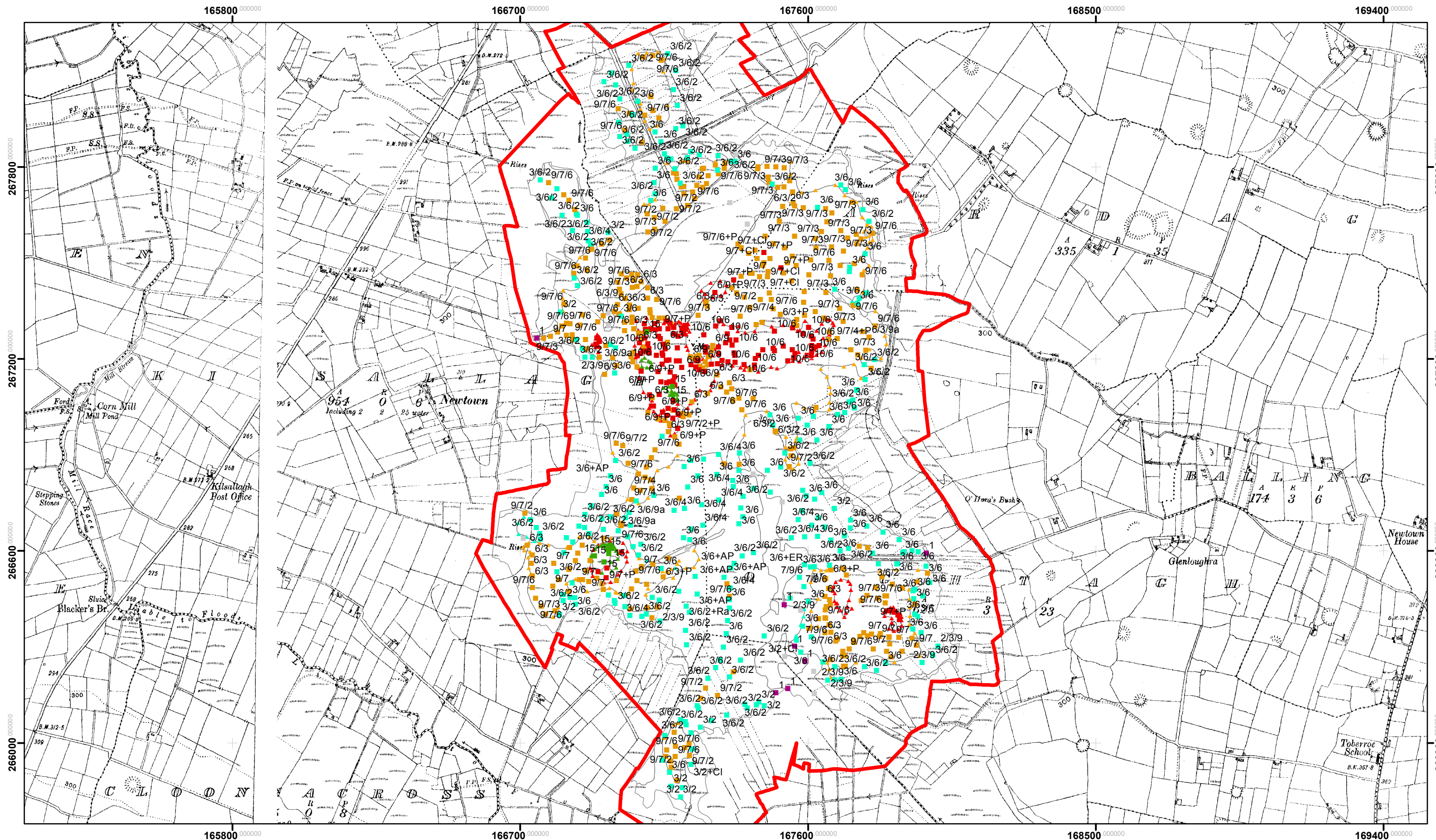
Kilsallagh SAC (000285) Co. Galway

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0 135 270 540 810 1,080 Meters

Legend

■ Quadrat	▨ Active Flush	▤ Face bank
Ecotope type	▧ Sub-marginal	■ Open water
■ Central	▨ Marginal	■ Conifer plantation
▨ Sub-central	▧ Inactive Flush	▨ Clear felled area
▨ Bog Woodland	▧ Woodland	■ SAC



Raised Bog Monitoring & Assessment Survey 2013

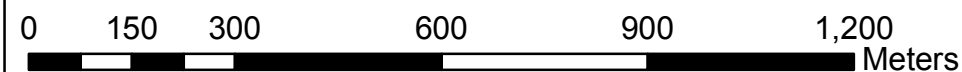
Map 2: Vegetation community complexes

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Legend

Ecotope type

- Central ecotope complex
- Sub-central ecotope complex
- Sub-marginal ecotope complex
- Marginal ecotope complex
- Face bank ecotope complex

Boundary type

- Flush
- SC/C
- F/C
- SM/C
- M/C

- F/SC
- SM/SC
- M/SC
- FB/SC
- F/SM
- M/SM
- SM/FB
- F/M
- M/FB
- F/FB
- Other
- SAC

