Callow Bog (SAC 000595), Co. Roscommon

Executive Summary

This survey, carried out in November 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 Callow 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 11.3ha (3.21%) of the high bog area. Two small areas (totalling 0.44ha) of central ecotope are present in section two and in section four of the high bog and these feature interconnecting *Sphagnum* pools, lawns and hummocks. Pools cover up to 50% of these areas with the *Sphagnum* cover approximately 51-75% composed mostly of *S. cuspidatum* in pools, but also with *S. denticulatum* in pools, *S. papillosum* in lawns, and *S. austinii* and *S. capillifolium* in hummocks. Evidence of flushing in both these central ecotope areas is indicated by the presence of *Vaccinium oxycoccos*, *Polytrichum strictum*, *Aulacomnium palustre*, *Pleurozium schreberi*, *Hylocomium splendens* and *Dicranum scoparium*. Sub-central ecotope is also present (10.86ha) and is more variable in quality with the *Sphagnum* cover ranging from 34 to 75%.

Degraded Raised Bog covers 340.68ha (96.79%) of the high bog area. It is drier than Active Raised Bog and supports a lower density of *Sphagnum* mosses (generally less than 25% cover). It has a less developed micro-topography while permanent pools and *Sphagnum* lawns are generally absent. The habitat also includes some inactive flushes.

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. Only *Rhynchospora alba* was recorded on Callow Bog.

No restoration works have taken place at the site.

The current conservation objective for Callow 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 163.46ha. The objective in relation to Structure and Functions 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 or 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 slight decrease (1.0ha) in the area of Active Raised Bog at Callow Bog in the 2004/5 to 2012 period. This has mostly taken place along the eastern margin of section one and in the north-west of section two. Several new peat forming areas have been described at the site, which are the result of a more comprehensive field mapping rather than actual changes.

Peat cutting and drainage are the most threatening current activities at the site. 3.31ha of high bog have been lost in the reporting period due to peat cutting and 28 plots were recorded as being actively cut in 2012. Over 25km of drains on the high bog remain functional and a further 3.3km reduced functional. Cutover drains are also extensive with a particularly extensive network of drains on the cutover in the north-west of section two associated with peat cutting on the cutover in that area. A small area in the west of section four (8.63ha or 2.5 % of the high bog) was burnt during the reporting period and there are six small separate blocks of conifer plantations on the high bog and cutover measuring 18.17ha in total.

Active Raised Bog has been given an overall **Unfavourable Bad–Declining** conservation status assessment. Habitat Area has slightly decreased and quality (Structure and functions (S&Fs)) remained stable in the reporting period. However, both Area and S&Fs are substantially below favourable reference values. Future Prospects are considered Unfavourable Bad-Declining as impacting activities (peat cutting and drainage) 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 **Callow SAC** has been given an **Unfavourable Bad-Declining** assessment.

A series of **recommendations** have been also given, these include: cessation of peat cutting; restoration works on the high bog and the cutover including the blocking of functional and reduced functional drains and the removal of conifer plantations; further hydrological and topographical studies to ascertain more accurate FRVs; and further botanical monitoring surveys.

Site identification

SAC Site Code	000595	**6" Sheet:**	RN 8
Grid Reference:	E 167150 / N 295900	**1:50,000 Sheet:**	32
High Bog area (ha):	351.98ha [1]		
Dates of Visit:	02/11 & 06 to 09/11/12		
Townlands:	Callow or Runawillin, Cloonmagunnaun & Keelbanada.		

[1] The current extent of the high bog is 351.98ha, while that reported in 2004/05 was 357.46ha (Fernandez *et al*., 2005). This discrepancy is partially the result of more accurate mapping of the high bog edge by using the higher resolution 2010 aerial images compared to those used in 2004. High bog area has also decreased by 3.31ha in the 2004/05-2010 period due to peat cutting. The actual high bog extent in 2004 was 355.29ha (see tables 8.1 and 8.3 2004/05 (amended) figures).

Site location

Callow Bog is located on the south-western shores of Lough Gara approximately 6km northwest of Frenchpark, Co. Roscommon and 4km east of Ballaghaderreen. The Lung River runs along the north of the main lobe of high bog at Callow Bog and also separates the site from Tullaghanrock Bog (SAC 002354), which lies immediately to the west of the site. As well as being an SAC, Callow Bog forms part of the Lough Gara pNHA (000587).

Kelly *et al.* (1995) grouped Callow Bog with the raised bogs of NE Galway/NW Roscommon. This group also includes Corliskea / Trien (SAC 002110), Bellanagare (SAC 000592), Derrinea (SAC 000597) and Cloonshanville (SAC 000614).

Description of the survey

The survey was carried out in November 2012 and involved a vegetation survey of the high bog at Callow 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 photographical 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 Callow Bog was re-surveyed. Sections mapped as sub-marginal, sub-central and central ecotope in 2004/5 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 2004project (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

Callow Bog is composed of six separate sections of high bog. The main lobe (section 1, see Fernandez *et al*. (2005)) has been cut away into a vague crescent shape and was the only section surveyed by Kelly *et al*. (1995). The Lung River and a bog road run along the north of this section, separating it from section 3 to the north. A local access road runs along the western side of section 1 and separates it from section 2 to the west while another local access road separates section 1 from section 4 to the south and section 5 and 6 to the east. Section 2 is separated from the adjacent Tullaghanrock Bog (SAC 002354) that lies immediately to the west by the Lung River.

Callow Bog has been classified as a Ridge River C bog type (Kelly *et al*., 1995). Cross (1990) classified the site as a Western Raised Bog. As described above a number of roads and tracks traverse the site which fragments it to some degree. According to Kelly *et al*. (1995) there is a low relief mineral ridge running under the section 1 (mainly lobe) which is coincident with a middle flush (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 Callow Bog:

- Active Raised Bog (EU code 7110),
- Degraded Raised Bog (EU code 7120),
- Depressions on peat substrates of the Rhynchosporion (EU code 7150).

Active Raised Bog (7110)

The current area of Active Raised Bog at Callow Bog is 11.3ha (3.21% of the high bog), which is a decrease of 0.33ha since 1994.

Active Raised Bog includes central and sub-central ecotope.

Central ecotope (0.44ha) was found at two locations (**C1** & **C2**) (see Appendix IV, Map 1). **C1** was found on section 2 of Callow Bog and was dominated by complex 35. Pools covered ca. 50% of the surface area and the overall *Sphagnum* cover was 51-75% composed mostly of *S. cuspidatum* in pools, but also *S. papillosum* in lawns, and *S. austinii* and *S. capillifolium* in hummocks. *Calluna vulgaris*, *Eriophorum vaginatum* and *E. angustifolium* were the most dominant vascular plants and evidence of flushing was indicated by the presence of *Vaccinium oxycoccos*, *Aulacomnium palustre*, *Pleurozium schreberi* and *Hylocomium splendens*. The western indicator species *Racomitrium lanuginosum*, *Pleurozia purpurea* and *Campylopus atrovirens* were also recorded. **C2** was found on section 4 of Callow Bog in and around two infilling drains and was dominated by complex 14. The pool cover was 26-33% and the overall *Sphagnum* cover was 51-75% composed mostly of *S. cuspidatum* in pools and hummocks of *S. capillifolium*, but also of *S. denticulatum* in pools, *S. papillosum* in lawns and *S. austinii* in hummocks. Evidence of flushing was indicated by the presence of *Polytrichum strictum*, *Aulacomnium palustre*, *Pleurozium schreberi*, *Molinia caerulea* and *Dicranum scoparium*. *Calluna vulgaris*, *Eriophorum vaginatum*, *E. angustifolium* and *Rhynchospora alba* were the most dominant vascular plants and the western indicator species *Racomitrium lanuginosum* was also recorded.

Sub-central ecotope (10.86ha) was found at sixteen locations (**Sc1** and **Sc4** to **Sc18**). None community complex types were recorded and are listed here in order of declining quality; complex 4/15, 6/15, 9/10, 4/10, 6/10, 9A + P, 9+ P, 6/9 + P, 6/9A + P. Complex 6/9 + P was the most common dominating all or parts of **Sc1**,**Sc6**, **Sc7**, **Sc8**, **Sc11**, **Sc12**, **Sc15** and **Sc18**. The pool cover was

generally 11-25% and the *Sphagnum* cover was 34-50% dominated by *S. cuspidatum* in pools, *S. papillosum* in lawns and *S. capillifolium* in hummocks. However, *S. denticulatum*, *S. magellanicum*, *S. tenellum*, *S. austinii* and *S. fuscum* were also recorded. *Calluna vulgaris*, *Eriophorum vaginatum* and *Narthecium ossifragum* were the most dominant vascular plants. The best quality sub-central community complex types 4/15 and 6/15 were found in parts of **Sc1** and **Sc10** respectively. These areas had some central ecotope characteristics with a pool cover averaging at 26-33% and a *Sphagnum* cover of 51-75%.

Degraded Raised Bog (7120)

The current area of Degraded Raised Bog at Callow Bog is 340.68ha (96.79% of the high bog).

Degraded Raised Bog includes the sub-marginal, marginal and face bank ecotope, as well as inactive flushes and conifer plantation on high bog. 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 (168.71ha) featured the most developed micro-topography within Degraded Raised Bog. Five community complexes (with additional variants) were recorded within the sub-marginal ecotope: 9/7, 6/3 + P, 6/3/9, 4/9 and 6/3 B. Complex 9/7 and 6/3 + **P** were the best quality sub-marginal complex. *Calluna vulgaris* and *Eriophorum vaginatum* dominated the vegetation in Complex 9/7 and the *Sphagnum* cover, which ranged from 34 to 50%, was composed almost entirely of hummocks of *S. capillifolium*. *Eriophorum angustifolium*, *Carex panicea*, *Narthecium ossifragum* and *Myrica gale* were prominent in some places and in these areas variants of the complex were termed 9A/7, 9/7/3, 9/7/6 and 9/7 + My respectively. Complex 6/3 + P was the only sub-marginal complex that supported a consistent cover of pools. However, these pools had a patchy cover of *Sphagnum* and often consisted mostly of open water. One sub-marginal complex (6/3 B) found in the north-west of section 4 was burnt during the reporting period and was dominated by *Carex panicea*, *Narthecium ossifragum* and low-growing *Calluna vulgaris*.

Marginal ecotope (148.29ha) is slightly drier than sub-marginal ecotope and was mainly recorded as a narrow band near the margin of the high bog although it covered a large area of the west of section 1 and the south-west of section 2 at Callow Bog. Three marginal complexes were recorded on complex 6/7/2, 3/6 and 4/2. The *Sphagnum* cover is even lower here than in the sub-marginal ecotope (usually <10%) and the vegetation is characterised by a higher cover of *Carex panicea, Narthecium ossifragum, Trichophorum germanicum* and *Calluna vulgaris*.

Face bank ecotope (2.01ha) is characterised by firm ground, tall *Calluna vulgaris*, poor *Sphagnum* cover and a flat micro-topography.

The high bog also features several inactive flushes (19.53ha). Flush Z is the largest of these and was recorded on section one of the high bog. It was dominated mostly by *Molinia caerulea*, occurring in wide bands aligned in a N/S direction. Robust *Calluna vulgaris* sometimes co-dominated with other species recorded including *Potentilla erecta*; *Aulacomnium palustre*; *Hypnum jutlandicum* and *Polytrichum strictum*. The *Sphagnum* cover was estimated at 15-20% composed mainly of hummocks of *S. capillifolium*, but also with *S. papillosum* and *S. austinii*. A band of *Betula pubescens*, *Salix* sp. and *Pinus* sp. was recorded in the south-west of the flush and swallow holes were recorded towards its northern extent.

A conifer plantation (2.14ha) occurs on section 3 of the high bog.

Depressions on peat substrates of the Rhynchosporion (7150)

Rhynchosporion vegetation is widespread on Callow Bog. It is found in both Active and Degraded Raised Bog, but tends to be best developed and most stable in the wettest areas of Active Raised Bog. It was most frequent in the central complexes 14 and 35 and the sub-central complexes 4/15, 4/10, 9/10, and 6/9 +P and the sub-marginal complex 4/9.

In these areas, the Rhynchosporion vegetation occurs within *Sphagnum* hollows and along *Sphagnum* pool edges and on lawns. Typical plant species include *Rhynchospora alba*, *Sphagnum cuspidatum*, *S. papillosum*, *Drosera anglica* and *Eriophorum angustifolium*.

R. alba was also found within degraded raised bog, but always associated with wet features such as hollows and run off channels, being frequent in the marginal complex 4/2.

Detailed vegetation description of the high bog

A detailed description of high bog vegetation recorded during the 2012 survey of Callow 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 Callow 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	3.31ha of the high bog cut away	50 locations along the section 1 (30 location (plot)), section 2 (6 locations), section 5 (10 locations) and section 6 (4 locations)	**7110/7120/7150**
J02.07	Drainage	H	-1	28.332km [1]	Inside High Bog	**7110/7120/7150**
J02.07	Drainage	H	-1	n/av	Outside High Bog	**7110/7120/7150**
J01	Fire	L	-1	8.63ha	Inside High Bog	**7120/7150**
I01	Invasive alien species	L	-1	<0.1ha [3]	Inside High Bog	**7110/7120/7150**
B01.02	Artificial planting on open ground (non-native trees)	L	-1	6.55ha	Inside High Bog	**7110/7120/7150**
B01.02	Artificial planting on open ground (non-native trees)	L	-1	11.62ha	Outside High Bog	**7110/7120/7150**

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 50 locations along the section 1 (30 location (plot)), section 2 (6 locations), section 5 (10 locations) and section 6 (4 locations) in the 2004-2010 period. This has reduced the area of high bog by 3.31ha. 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 the high bog at Callow Bog in 2010/2011; 28 plot were cut in 2012

and 23 in 2013. Thus the area of high bog lost on Callow Bog during the reporting period is in excess of 3.31ha, but since there is no aerial photography available post 2010, the area lost from 2010 to 2012 cannot be estimated. Peat cutting is also taking place within the SAC to the northwest of section 2 on cutover areas.

Lateral cutting was reported from ten of the actively cut plots by Fernandez *et al*. (2005). This type of cutting is particularly damaging to the high bog as it is carried out using machinery working from the high bog surface with the high bog itself subsequently used as a spreading grounds. It also involves cutting a long face-bank laterally into the high bog resulting in a series of long deep drains being cut into the bog itself. Furthermore, as a result of the machinery traffic, the high bog is highly disturbed, compacted and devoid of vegetation, which increases rates of run-off. Thus, this peat cutting technique causes more rapid and extensive damage to the high bog than typical hopper-type face-bank cutting (Fernandez *et al.*, 2005).

Although direct habitat losses associated with peat cutting in the current reporting period have been confined mostly to the marginal ecotope (2.81ha) and sub-marginal ecotope (0.50ha), there has also been an indirect loss of sub-central ecotope (1.0ha) as a result of associated drying-out processes. These losses have occurred from **Sc1**, **Sc2** and **Sc5** as a result of peat cutting along the eastern margin of section 1 and from **Sc6**, **Sc16**, **Sc17** and **Sc18** in the north-west of section 2, most likely as result of the extensive drainage network associated with the cutting on the cutover to the north-west of this area. The cutting here also appears to be mostly of the lateral type and the high bog here slopes down to the river in the north and thus the cutting is taking place at a lower elevation than the high bog itself.

Continuation of cutting activities will prevent the recovery of the high bog, and the recovery of ARB towards FRV's. Furthermore, 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 (11.3ha or 3.21% of the high bog) and is 93.09% below the FRV target.

Peat cutting is considered to have a high importance/impact on high bog habitats. In addition, old face banks and high bog and cutover drainage associated with cutting continue to cause negative impacts on the high bog habitats.

Drainage

High bog drainage

Table 6.2 shows that there has been a 1.92km decrease in the length of functional high bog drains However, some of this decrease (0.5km) is the result of the drains being cut into by peat cutting and is thus not a positive development. In addition, four new drains have been excavated on the east of section one (D68a-d) measuring 0.079km in total. On the other hand, approximately 1.5km of drains classed as functional drains in 2004 have partially in-filled during the reporting period and are now classed as reduced functional drains (bF1-3 and D33 in section 1 and F1&2 in section 4). Nonetheless, the majority of drains in the high bog remain functional (25.037km) with a much smaller amount classed as reduced functional (3.295km) and a smaller amount again classed as non-functional (1.677km). Significant water losses through the drains in the north-west of section 2 were noted during the 2012 survey and thus these drains (D1 – D10) are likely to have been largely responsible for the loss of Active Raised Bog from **Sc6**, **Sc16**, **Sc17** and **Sc18** in this area of high bog. Further water losses were recorded from the drains in the east of section 2 (D14 to D22) and these are also likely to be negatively impacting on the ARB (including **C1**) in section two. Water flow off the high bog was also noted in the series of short drains (D68a-d) newly excavated in the east of section 1 and these drains may have contributed to the loss of ARB from **Sc1** and **Sc2** in section one of high bog.

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

No blockage of drains has occurred to date.

Table 6.2 High bog drainage summary

Status	2004/5 (km) [1]	2012 (km)	Change
NB: functional	26.958	25.037	(-)1.921
NB: reduced functional	1.795	3.295	(+)1.500
NB: non- functional	1.677	1.677	0.000
B: functional	0.000	0.000	0.000
B: reduced functional	0.000	0.000	0.000
B: non- functional	0.000	0.000	0.000

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 detail description of the drainage present on the high bog at Callow Bog including any change in their functionality in the 2004/5 – 2012 reporting period (see Map 3).

Table 6.3 High bog drainage detail

Drain Name	Length (km)	2004/5 status	2012 status	Change	Comment
bB	0.186	NB: functional	NB: functional	No	
bB1-3	0.550	NB: functional	NB: functional	No	
bC1-3	0.147	NB: functional	NB: functional	No	
bD	0.449	NB: functional	NB: functional	No	
bD1-8	0.926	NB: functional	NB: functional	No	
bE	1.847	NB: functional	NB: functional	No	Double drain
bF1-3	0.213	NB: functional	NB: reduced functional	Yes	
bG	0.694	NB: functional	NB: functional	No	Drain complex
bH	1.330	NB: non-functional	NB: non- functional	No	Some sections reduced functional
bJ	0.040	NB: functional	NB: functional	No	
D1	0.618	NB: functional	NB: functional	No	Strong flow recorded during 2012 visit
d2	0.054	NB: functional	NB: functional	No	Water flowing recorded during 2012 visit
D2	0.577	NB: functional	NB: functional	No	This drain was wrongly classified as reduced functional in 2005
D3	0.146	NB: reduced functional	NB: reduced functional	No	
D4	0.109	NB: reduced functional	NB: reduced functional	No	
D5	0.107	NB: reduced functional	NB: reduced functional	No	
D6	0.226	NB: functional	NB: functional	No	
D7	0.093	NB: functional	NB: functional	No	Strong flow recorded during 2012 visit
D8	0.981	NB: functional	NB: functional	No	Drain complex
D9	0.224	NB: functional	NB: functional	No	Drain complex
D10	4.977	NB: functional	NB: functional	No	Drain complex
D12	4.647	NB: functional	NB: functional	No	Drain complex
D13	0.107	NB: reduced functional	NB: reduced functional	No	Drain already present in 2004/5 but not mapped
D14	0.115	NB: functional	NB: functional	No	Drain already present in 2004/5 but not mapped; water flowing recorded during 2012 visit
D15	0.040	NB: functional	NB: functional	No	
D16-20	0.638	NB: functional	NB: functional	No	Drain already present

					in 2004/5 but not mapped
D21-32	1.311	NB: functional	NB: functional	No	Drain already present in 2004/5 but not mapped; water flowing recorded during 2012 visit within D21,22
D33	0.071	NB: functional	NB: reduced functional	Yes	
D34-37	0.234	NB: functional	NB: functional	No	
D38-40	0.184	NB: reduced functional	NB: reduced functional	No	
D41-45	0.223	NB: functional	NB: functional	No	
D46	0.057	NB: reduced functional	NB: reduced functional	No	
D47-60	1.880	NB: functional	NB: functional	No	
D62	0.137	NB: reduced functional	NB: reduced functional	No	
D63	0.188	NB: functional	NB: functional	No	Drain already present in 2004/5 but not mapped
D64-65	0.244	NB: reduced functional	NB: reduced functional	No	””
D66-67	0.268	NB: functional	NB: functional	No	Drain already present in 2004/5 but not mapped
D68a,b, c,d	0.079	Not applicable	NB: functional	Yes	New drains; water flowing recorded during 2012 visit
D69	0.347	NB: non-functional	NB: non- functional	No	
E1-5	0.419	NB: functional	NB: functional	No	
F1,2	1.216	NB: functional	NB: reduced functional	Yes	
F3	0.213	NB: reduced functional	NB: reduced functional	No	
FU	0.372	NB: functional	NB: functional	No	Water flowing recorded during 2012 visit
G1,2	0.422	NB: functional	NB: functional	No	
G3	0.108	NB: reduced functional	NB: reduced functional	No	
H1,2	0.772	NB: functional	NB: functional	No	Water flowing recorded during 2012 visit within H2
H3	0.354	NB: functional	NB: functional	No	Drain complex wrongly classified as non-functional in 2004/5

H4	0.111	NB: functional	NB: functional	No	Drain wrongly classified as non-functional in 2004/5
H5-7	0.383	NB: reduced functional	NB: reduced functional	No	
Q	0.085	NB: functional	NB: functional	No	Water flowing recorded during 2012 visit
T	0.290	NB: functional	NB: functional	No	

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 most of the cutover (and are particularly extensive to the north-west of section two where they may have contributed to the loss of Active Raised Bog from **Sc6**, **Sc16**, **Sc17** and **Sc18)**. These drains continue to drain the high bog and impacting on high bog habitats. Kelly *et al*. (1995) describe in detail the bog margin drainage of section one. As stated above there is an extensive network of drains on the cutover to the northwest of section two while there are also drains around the entire circumference of sections five and six. Section three, however, is more intact with parts of its boundary (in the north-east) apparently a natural gradation into wet birch woodland.

Adjacent agricultural drainage maintenance is evident to the south of section2: south of flush R (E166393/N294826 200m length) and south-east of section 2 again (E167025/N294457 400m length).

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

Fire history

Fernandez *et al*. (2005) mentioned the frequent occurrence of burning at the site. However, during the period 2005-2012, only a small area in the west of section four (8.63ha) was burnt. In contrast, Fernandez *et al*. (2005) recorded a large area in the west and the north-east of section one as being burnt between 1995 and 2000 as well as burns (occurring in 2002-03) in the north of section two and in section five (2003-04).

Burning is considered to have had a low importance/impact on Degraded Raised Bog and Rhynchosporion depressions in the reporting period.

Invasive species

A small number of individuals of *Rhododendron ponticum* were recorded in section 1 and section 3 and *Campylopus introflexus* was recorded scattered across all sections of Callow Bog, but at low cover values.

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

Afforestation and forestry management

There are two blocks of conifer (*Pinus contorta*) plantations on the high bog close to the centre of the high bog in section 3 measuring approximately 2.14ha in extent with another plantation (3.31ha) to the west of this section and another (1.1ha) between the south of this section and the river. It is unclear whether these two plantations are on the high bog or the cutover.

There are further plantations on cutover bog to the south of section 4 (2.39ha) and between section 4 and 5 (9.23ha).

The plantations located on the high bog in section 3 are thought to have a negative impact of low intensity on the high bog habitats while the plantations that are entirely within cutover are thought to have a negative impact of low intensity on high bog habitats.

Other impacting activities

Local roads and tracks divide the high bog up into the six separate sections, each of these with associated drains.

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

Conservation activities

Although no physical management actions such as the blocking of drains have yet been carried out to improve the conservation status of the high bog habitats, the NPWS has engaged in negotiation with landowners in relation to the cessation of peat cutting at the site and has bought out some turbary rights and ownership rights in recent years. This has contributed to the reduction in peat cutting. However, despite negotiations, peat cutting continued in 2012.

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

Table 8.1 indicates that there has been a decrease (1.00ha) in the extent of Active Raised Bog habitat on Callow Bog from 2004 to 2012. All of this loss has been from sub-central ecotope with 0.61ha lost from areas close to the eastern margin of section one and 0.39ha lost from areas close to the north-western margin of section two. The losses from the east of section one can be attributed to ongoing peat cutting (which also involved the excavation of new drains during the reporting period) along the high bog margin in this area while the losses from section two can be attributed to the extensive drainage network associated with the ongoing peat cutting on the cutover to the north-west of the high bog in this area. There have also been some changes to the distribution of habitat and a number of new Active Raised Bog areas have been identified and mapped as a result of the 2012 survey being more comprehensive than previous ones. Each individual area of ARB on Callow Bog is discussed below:

C1: Located in section two of the high bog. There are very slight changes all around the boundary as a result of the increased mapping accuracy of the 2012 survey resulting in **C1** being mapped as slightly larger than in 2004.

C2: Located in section four of the high bog. There are slight changes all around the boundary as a result of the increased mapping accuracy of the 2012 survey resulting in **C2** being mapped as slightly smaller than in 2004.

Sc1: Located in section one of the high bog. There are changes all around the boundary as a result of the increased mapping accuracy of the 2012 survey resulting in **Sc1** being mapped as larger than in 2004. However, the small (0.10ha) isolated polygon of **Sc1** mapped in 2004 to the south-east of the main area of **Sc1** is no longer present. This polygon was located within 50m of active peat cutting and new drains (D68 a-d) were excavated within 30m of the polygon during the reporting period. Water flow was recorded exiting the high bog in these drains during the 2012 survey and thus it is likely that peat cutting and associated drainage are responsible for the loss of ARB from this area. Although only 0.1ha of ARB is calculated as being lost from 2004-2012 in this area, this figure is likely to be an under-estimation as there are an additional four sub-central points from the 2004 survey lying outside (to the ENE) of the area mapped as **Sc1** in 2012.

Sc2: Located in section one of the high bog. This area of ARB (0.12ha) is no longer present as the high bog here has degraded from the sub-central complex 4/10 recorded in 2004 to the sub-marginal complex 9a/7/6 recorded in 2012. **Sc2** was located within 60m of the high bog edge in an area where active peat cutting continued to take place during the reporting period and thus this activity is likely to have been responsible for the loss of ARB from this area.

Sc3: Located in section one of the high bog. This area of ARB (0.57ha) is no longer present. However, the 'loss' of ARB here is considered to be due to interpretation differences between the 2004 survey and the 2012 survey rather than to any real differences on the ground. An additional note recorded in the quadrat taken in this area in 2004 refers to the area as 'Relic sub-central' indicating that the area was already regarded as borderline sub-central/sub-marginal in 2004. Nevertheless, it should not be ruled out that there may have been some degradation of the vegetation here as it was classed as sub-central complex 9a/10 in 2004 and sub-marginal complex 9a/7 in 2012. The estimated cover of *Eriophorum angustifolium* was much lower in 2012 (4-10% compared to 30-35% in 2004) and the *Sphagnum* cover was also lower (20-25% compared to 30-40% in 2004) while the broad hummocks of *S. austinii* referred to in 2004 were found to be restricted to a relatively small area ca. 50m to the SE of **Qsm12** alongside and within flush Z.

Sc4: Located in section one of the high bog. There are slight changes all around the boundary as a result of the increased mapping accuracy of the 2012 survey resulting in **Sc4** being mapped as slightly smaller than in 2004. Although the difference is being attributed to improved mapping accuracy, it should not be ruled out that there has been a real loss of ARB in this area as one of the sub-central points recorded in 2004 now lies outside (to the south-west) of the area mapped as **Sc4** in 2012.

Sc5: Located in section one of the high bog. There are slight changes all around the boundary as a result of the increased mapping accuracy of the 2012 survey. However, there is a relatively large area (0.39ha) in the south of former **Sc5** that is now considered to be sub-marginal ecotope. This area was mapped as sub-central complex 4/10 in 2004 and as sub-marginal complex 9a/7/6 in 2012. Comparing the descriptions of these complexes there appears to have been a decrease in the cover of *Rhynchospora alba* and *Sphagnum cuspidatum* in this area of former **Sc5**. The loss of ARB in this area may have been caused by the fact that it was located within 140m of the high bog edge in an area where active peat cutting continued to take place during the reporting period.

Sc6: Located in section two of the high bog. There are changes all around the boundary as a result of the increased mapping accuracy of the 2012 survey. In fact the area of former **Sc6** is now mapped as two separate polygons, **Sc6** and **Sc18**. However, at least part of the change in the boundary here is due to the degradation of the vegetation as there are four sub-central points that were taken within **Sc6** in 2004 that are now outside of both **Sc6** and **Sc18** and are thus mapped as sub-marginal ecotope in 2012. These points have degraded from sub-central complex 6/9a + P (RB) to the sub-marginal complex 6/3 + P with an associated decline in the *Sphagnum* cover from an estimated 30-40% in 2004 to 11-25% in 2012 as well as a decline in the cover of *Eriophorum angustifolium* (from 20% to 4-10%) and *Narthecium ossifragum* (from 25-30% to 4-25%) and an increase in the cover of *Carex panicea*. The extent of ARB lost here during the reporting period is estimated to be 0.04ha with the likely cause of the loss being that **Sc6** is located within 50m of the extensive network of drains (D1-D10) that lie in the north-west of this section of high bog. Indeed, significant water flow exiting the high bog from these drains was recorded during the 2012 survey. The drainage in this area is further intensified by the extensive series of cutover drains that are associated with active peat cutting that is ongoing on cutover to the north-west of this section of the high bog.

Sc7: Located in section two of the high bog. There are changes all around the boundary as a result of the increased mapping accuracy of the 2012 survey resulting in **Sc7** being mapped as larger than in 2004. Part of the change in the boundary here is also due to vegetation interpretation differences between the two surveys as a number of sub-marginal complex 6/4 + P points were taken in 2004

within the now extended area of **Sc7**. However, this complex would be considered as a sub-central complex using 2012 criteria, the description given in 2004 indicating that this was considered "a relatively good quality sub-marginal complex" with "parts of the complex approaching sub-central quality" and "forming a mosaic with sub-central complexes". Indeed complex 6/4 + P was also described as a variant of the sub-central complex 4 + P in 2004.

Sc8: Located in section two of the high bog. There are changes all around the boundary as a result of the increased mapping accuracy of the 2012 survey resulting in **Sc8** being mapped as slightly smaller than in 2004. The changes to the boundary include the amalgamating of the two separate polygons of **Sc8** in 2004 into one polygon in 2012. Although the 0.1ha (0.92 in the 2 polygons combined in 2004 compared to 0.82 in 2012) loss of ARB in this area is attributed to improved mapping accuracy, it should not be ruled out that there may have been some degradation of the vegetation. This is particularly the case in the north of the former extent of **Sc8** where there are now four sub-central points taken in 2004 lying outside of the 2012 mapped extent of **Sc8**. Any loss of ARB in this area of **Sc8** is likely to be attributable to the fact that it is located within 30m of the extensive network of drains (D14 to D22) that lie in the east of this section of high bog. Indeed, significant water flow exiting the high bog from these drains was recorded during the 2012 survey. The vegetation in this area of potential loss of ARB was mapped as sub-central complexes 4 + P and 6/9a + P in 2004 and sub-marginal complex 6/3 + P in 2012. The description of these complexes indicates that there may have been a decrease in the *Sphagnum* cover in this area as well as in the cover of *Rhynchospora alba* and *Eriophorum angustifolium* and an increase in the cover of *Carex panicea*.

Sc9: Located in section four of the high bog. There are very slight changes all around the boundary as a result of the increased mapping accuracy of the 2012 survey resulting in **Sc9** being mapped as slightly larger than in 2004.

Sc10: Located in section three of the high bog. There are very slight changes all around the boundary as a result of the increased mapping accuracy of the 2012 survey resulting in **Sc10** being mapped as slightly larger than in 2004.

Sc11: Located in section one of the high bog. This is a newly recorded area of sub-central ecotope and was recorded as a result of the 2012 survey being more comprehensive with an increased mapping accuracy than that of the 2004 survey.

Sc12: Located in section one of the high bog. This is a newly recorded area of sub-central ecotope and was recorded as a result of the 2012 survey being more comprehensive with an increased mapping accuracy than that of the 2004 survey.

Sc13: Located in section three of the high bog. There are very slight changes all around the boundary as a result of the increased mapping accuracy of the 2012 survey resulting in **Sc13** being mapped as slightly larger than in 2004.

Sc14: Located in section one of the high bog. This is a newly recorded area of sub-central ecotope and was recorded as a result of the 2012 survey being more comprehensive with an increased mapping accuracy than that of the 2004 survey. However, part of the difference may be attributed to vegetation interpretation differences as part of **Sc14** was mapped as active flush in 2004.

Sc15: Located in section four of the high bog. This is a newly recorded area of sub-central ecotope and was recorded as a result of the 2012 survey being more comprehensive than that of 2004 and as a result of vegetation interpretation differences between the two surveys. The 2012 extent includes a small area of what was classed as **C2** in 2004 as well as a larger area that was classed as sub-marginal ecotope (complex 6/3/9 + P and 9/7 + P). However, these complexes, 9/7 + P in particular, would likely to be considered as sub-central complexes using 2012 criteria. Nevertheless it is important to realise that some of change here may in fact be as a result of the improvement of the vegetation brought about by re-wetting as a result of the infilling of the drains F1 and F2. The vegetation here in 2012 was classed as the sub-central complex 6/9 + P indicating that there may in fact have been an increase in *Sphagnum* cover as well as a decrease in the cover of *Carex panicea*.

Sc16: Located in section two of the high bog. This was mapped as a small isolated polygon of **Sc6** in 2004. There are changes all around the boundary as a result of the increased mapping accuracy of the 2012 survey resulting in **Sc16** being mapped as slightly smaller than in 2004. However, at least part of the change in the boundary here is due to the degradation of the vegetation as there are two sub-central points (Complex 9 + P) that were taken within the former sub-central area in 2004 that are mapped as sub-marginal ecotope in 2012.The extent of ARB lost here during the reporting period is estimated to be 0.3ha with the likely cause of the loss being that **Sc16** is located within 25m of the series of drains that encompass D10 that lie in the west of this section of high bog. The drainage in this area is further intensified by the extensive series of cutover drains that are associated with active peat cutting that is ongoing on cutover to the north-west of this section of the high bog.

Sc17: Located in section two of the high bog. This was mapped as a small isolated polygon of **Sc6** in 2004. There are changes all around the boundary as a result of the increased mapping accuracy of the 2012 survey resulting in **Sc17** being mapped as slightly smaller than in 2004. However, at least part of the change in the boundary here is due to the degradation of the vegetation as there are two sub-central points (Complex 9 + P) that were taken within the former sub-central area in 2004 that

are mapped as sub-marginal ecotope in 2012.The extent of ARB lost here during the reporting period is estimated to be 0.05ha with the likely cause of the loss being that **Sc17** is located within 20m of the series of drains that encompass D10 that lie in the west of this section of high bog. The drainage in this area is further intensified by the extensive series of cutover drains that are associated with active peat cutting that is ongoing on cutover to the north-west of this section of the high bog.

Sc18: Located in section two of the high bog. This area was discussed under **Sc6** above.

Active flush **Z**: Located in section one of the high bog. This area of ARB is no longer present. However, the 'loss' of ARB here is considered to be due largely to the 2012 survey being more comprehensive than that of 2004 and partly to interpretation differences between the two surveys rather than to any real differences on the ground. The 2004 report notes that flush **Z** was not comprehensively surveyed during the 2004 survey and analysis of the map shows that the active area of the flush was drawn using only four active flush points recorded on the ground. One of these was recorded in an area where relic *Sphagnum austinii* hummocks were frequent (adjacent to the area of former **Sc3**) and this area is not considered to be active using 2012 criteria, another was recorded within 10m of what is now termed **Sc14** while the final two were recorded within 20m of the former extent of **Sc5**. This is the area of **Sc5** (discussed above) that is considered to have degraded to sub-marginal ecotope during the reporting period and thus there may have been a real decline in this area of the flush, but there is insufficient evidence to be certain.

Although direct habitat losses associated with peat cutting in the current reporting period have been confined mostly to the marginal ecotope (2.81ha) and sub-marginal ecotope (0.50ha), there has also been an indirect loss of sub-central ecotope (1.0ha) as a result of associated drying-out processes. These losses have occurred from **Sc1**, **Sc2** and **Sc5** as a result of peat cutting along the eastern margin of section 1 and from **Sc6**, **Sc16**, **Sc17** and **Sc18** in the north-west of section 2, most likely as result of the extensive drainage network associated with the cutting on the cutover to the north-west of this area. The high bog in this area also slopes down to the river in the north and thus the cutting is taking place at a lower elevation than the high bog.

The favourable reference value (FRV) for Area is considered to be the sum of Active Raised Bog (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, Active Raised Bog Area FRV is 163.46ha (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 Active

Raised Bog. The current habitat area value (11.30ha) is 93.09% below the FRV. A current Area value more than 15% below FRV falls into the **Unfavourable Bad** assessment category.

Although a long term (1994/5-2012) trend indicates a reduction in the area of Active Raised Bog at the site (0.33ha) (see table 8.1). A more recent and short term trend analysis (8 years; 2004--2012) also indicates a decrease in the area (1.00ha) of Active Raised Bog. Therefore, the habitat Area is given a **Decreasing** trend assessment.

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

Structure & Functions

The FRV for S&Fs is for at least half of the Active Raised Bog area to be made up of central and active flush, i.e. the higher quality wetter vegetation communities. This value is 5.65ha (half of 11.30ha, the current area of Active Raised Bog). The current value is 0.44ha which is 92.21% below the FRV. As a value falling >25% below FRV falls into the Unfavourable-Bad assessment category, S&Fs are given an **Unfavourable-Bad** assessment.

A long term (1994/5-2012) trend indicates a decrease (of 2.52ha) in the combined area of central ecotope and active flush, whereas a short term trend (8 years; 2004-2012) shows no change and the S&Fs are therefore given a **Stable** trend.

Quadrats analysis (**Qc1**, **Qsc3**, **Qsc4**, **Qsc5, Qsc9**, **Qsm11**, and **Qsm12**) indicates the following (Quadrats **Qsc1**, **Qsc2**, **Qsc6**, **Qsc7**, **Qsm1**, **Qsm2**, **Qsm3**, **Qsm4**, **Qsm5**, **Qsm6**, **Qsm7**, **Qsm8** and **Qsm10** recorded in 2004 were not visited during the 2012 survey due to time constraints).:

Qc1: Complex 35: There was a very slight variation in the quadrat data compared to 2004: the cover of pools has increased slightly (from 34-50% in 2004 to 51-75% in 2012) while the overall *Sphagnum* cover (51-75%) has remained the same. However, there has been an increase in the cover of *S. austinii* (<4% in 2004 to 11-25% in 2012) and *S. papillosum* (4-10% in 2004 to 11-25% in 2012) with the cover of *S. cuspidatum* (34-50%) and *S. capillifolium* (4-10%) remaining the same. A slight decrease in the cover of *Leucobryum glaucum* (<4% in 2004 to absent in 2012) and *Rhynchospora alba* (4-10% in 2004 to <4% in 2012) was also recorded as well as an increase in the cover of *Calluna vulgaris* (4-10% in 2004 to 11-25% in 2012), *Trichophorum germanicum* (<4% in 2004 to 4-10% in 2012) and *Cladonia portentosa* (<4% in 2004 to 4-10% in 2012). These changes may merely be the result of a discrepancy in the quadrat location (up to 2m) between both year surveys, rather than an actual change.

Qsc3: Was classed as Complex 4 + P + Cl, now classed as 4/15 (as a result of interpretation difference between surveys). There was a moderate variation of quadrat data compared to 2004: both the cover of pools (from 11-25% to 34-50%) and the overall *Sphagnum* cover (34-50% to 76-90%) have increased. There was an increase in the cover of *S. papillosum* (4-10% to 11-25%) and a large increase in the cover of *S. cuspidatum* (4-10% to 34-50%) while the cover of *S. denticulatum* decreased (<4% to absent) and that of *S. capillifolium* remained the same (11-25%). A slight decrease in the cover of *Rhynchospora alba* (11-25% to 4-10%) was also recorded as well as an increase in the cover of *Trichophorum germanicum* (absent to <4%). These changes may merely be the result of a discrepancy in the quadrat location (up to 2m) between both year surveys, rather than an actual change. However, there appears to have been an overall positive trend particularly considering the relatively large increase in the cover of *S. cuspidatum* recorded. This may have been caused by changes in hydrology brought about by the ongoing peat cutting as well as the excavation of four new short drains (D68a-d) to east of this location.

Qsc4: Was classed as Complex 9/7/10, now classed as 9/10 (as a result of interpretation difference between surveys). There was a very slight variation of quadrat data compared to 2004: the cover of pools has remained the same (4-10%) while the overall *Sphagnum* cover has decreased (51-75% to 34-50%). There was an increase in the cover of *S. magellanicum* (4-10% to 11-25%), *S. cuspidatum* (4-10% to 11-25%) and *S. denticulatum* (absent to <4%) while the cover of *S. capillifolium* decreased (4-10% to <4%) and that of *S. papillosum* remained the same (11-25%). A slight increase in the cover of *Narthecium ossifragum* (<4% to 4-10%) and *Calluna vulgaris* (4-10% to 11-25%) was also recorded. These changes may merely be the result of a discrepancy in the quadrat location (up to 2m) between both year surveys, rather than an actual change.

Qsc5: Was classed as Complex 9A + P, now classed as 6/15 (as a result of interpretation difference between surveys). There was a slight variation of quadrat data compared to 2004: both the cover of pools (from 11-25% to 34-50%) and the overall *Sphagnum* cover (51-75% to 76-90%) have increased. There was a slight increase in the cover of *S. papillosum* (11-25% to 26-33%), *S. cuspidatum* (11-25% to 26-33%) and *S. capillifolium* (4-10% to 11-25%). A slight decrease in the cover of *Narthecium ossifragum* (4-10% to <4%) was also recorded as well as an increase in the cover of *Calluna vulgaris* (11-25% to 26-33%). These changes may merely be the result of a discrepancy in the quadrat location (up to 2m) between both year surveys, rather than an actual change.

Qsc9 (was Qsm9 in 2004): Was classed as sub-marginal Complex 6 + P + My, now classed as sub-central complex 6/9 + P (as a result of interpretation difference between surveys; the 2012 quadrat notes that this is a 'borderline' sub-marginal/sub-central complex). There was a very slight variation

of quadrat data compared to 2004: both the cover of pools (11-25%) and the overall *Sphagnum* cover (11-25%) remained the same. There was a slight increase in the cover of *S. papillosum* (absent to 4-10%) and *S. cuspidatum* (4-10% to 11-25%) while that of *S. capillifolium* remained the same (4-10%). A slight decrease in the cover of *Rhynchospora alba* (4-10% to <4%) was also recorded as well as a slight increase in the cover of *Narthecium ossifragum* (<4% to 4-10%), *Calluna vulgaris* (4-10% to 11-25%) and *Cladonia portentosa* (<4% to 11-25%). These changes may merely be the result of a discrepancy in the quadrat location (up to 2m) between both year surveys, rather than an actual change.

Qsm11 (was Qaf1 in 2004): Was classed as part of active flush X, now classed as sub-marginal complex 9/7/6. There is significant variation in the quadrat data compared to 2004: the overall *Sphagnum* cover has decreased from 34-50% to 11-25%. There has been a large decrease in the cover of *S. austinii* from 34-50% in 2004 to absent in 2012 as well as a decrease in the cover of *S. papillosum* (4-10% to <4%) and an increase in the cover of *S. capillifolium* (4-10% to 11-25%). There has also been an increase in the cover of *Narthecium ossifragum* (<4% to 11-25%), *Calluna vulgaris* (11-25% to 26-33%), *Carex panicea* (absent to <4%) and *Trichophorum germanicum* (absent to <4%). The changes in the quadrat data at this location are large and it is likely that there was a GPS error in 2004. When the high variance in the quadrat data was noted in 2012, the surrounding area was searched and an area of hummocks of *S. austinii* was located 30m to the north-east of the quadrat.

Qsm12 (was Qsc8 in 2004): Was classed as part sub-central complex 9A/10, now classed as sub-marginal complex 9A/7 (however, an additional note recorded in the quadrat here in 2004 refers to the area as 'relic sub-central' indicating that the area was regarded as borderline sub-marginal/sub-central in 2004). There is significant variation in the quadrat data compared to 2004: the overall *Sphagnum* cover has decreased from 34-50% to 11-25%. There has been a large decrease in the cover of *S. austinii* from 26-33% in 2004 to absent in 2012 while there has been an increase in the cover of *S. capillifolium* (absent to 11-25%). There has also been an increase in the cover of *Trichophorum germanicum* (absent to <4%), *Calluna vulgaris* (11-25% to 26-33%), *Carex panicea* (absent to <4%) and *Cladonia portentosa* (absent to <4%). The changes in the quadrat data at this location are large and it is likely that there was a GPS error in 2004. When the high variance in the quadrat data was noted in 2012, the surrounding area was searched and an area of dense hummocks of *S. austinii* was located 50m to the south-east of the quadrat.

Typical good quality indicators and typical plant species are still found in sub-central and active flush throughout the entire bog.

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

Future Prospects

Habitat Area has decreased while the Structure and Functions are assessed as stable in the current reporting period. However, there are still over 25km of functional and over 3km of reduced functional drains on the high bog as well as numerous drains on the cutover including a particularly extensive drainage network associated with the cutting on the cutover to the north-west of section two. Furthermore, peat-cutting continues at the site, with 50 active turf cutting plots recorded in the reporting period and an approximate 28 identified in 2012. The high bog has been cutaway extensively and the current ARB area (11.3ha) represents a particularly small percentage (3.21%) of the total high bog area. There have been no restoration measures at the site which could override the negative influence of impacting activities.

Habitat **Area** is currently 93.09% below FRV (see table 8.4) and a Decreasing trend is foreseen due to the overriding influence of negatively impacting activities. The habitat Area is expected to be more than 15% below FRV in the following two reporting periods (12 years). Thus, habitat's **Area Future Prospects** are assessed as **Unfavourable Bad-Decreasing**. Habitat's **S&Fs** are currently 92.21% below FRV (see table 8.4) and a Declining trend is also foreseen. Therefore 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).

There is some potential for the restoration of cutover around the entire site, but particularly to the north-west of section two as the cutover is more extensive there. In the long term the restoration of the areas between the separate sections should be considered, but currently local access roads are located in these areas. The blocking of remaining functional and reduced-functional drains both on the high bog and cutover and the cessation of peat cutting is necessary in the short term. With over 25km of functional drains recorded on the site, there is high potential to restore some areas of ARB by the blocking of these drains.

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

Table 8.1 Changes in Active Raised Bog area

Active Ecotopes	1994/5[1]	2004/5	2004/5 (amended)	2012	Change (2004/5-2012)	
	Area (ha)	Area (ha)	Area (ha)	Area (ha)	Area (ha)	%
Central	0.62	0.62	0.44	0.44	0.00	0.00
Sub-central	8.67	8.89	11.86	10.86	(-)1.00	(-)8.43

Active flush	2.34	2.34	0.00	0.00	0.00	0.00
Total	**11.63**	**11.85**	**12.3**	**11.3**	**(-)1.00**	**(-)8.13**

[1]These 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 2004/5 figures and 2004/5 amended figures. The latter shows the ecotope area believed to be present in 2004/5 after surveying improvements in 2012. The comparison between 2004/5 (amended) and 2012 illustrates the actual changes in ecotope area in the 2004/5-2012 period. Any change in ecotope area between the 2004/5 and the 2004/5 (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 (larger). This change is the result of more comprehensive surveying in 2012 which resulted in more accurate mapping.	Slight variation in quadrat data: increase in the pool cover (from 34-50% to 51-75%), in the cover of *S. austinii* (<4% to 11-25%) and *S. papillosum* (4-10% to 11-25%). These changes may merely be the result of a discrepancy in the quadrat location (up to 2m) between both year surveys, rather than an actual change.
C2	None	Stable	Slight changes in boundary (smaller). This change is the result of more comprehensive surveying in 2012 which resulted in more accurate mapping.	
Sc1	Qsc3	Decreasing	Slight changes in boundary (larger). This change is the result of more comprehensive surveying in 2012 which resulted in more accurate mapping. However, the small (0.10ha) isolated polygon of **Sc1** mapped in 2004 to the south-east of the main area of **Sc1** is no longer present. This polygon was located within 50m of active peat cutting and new drains (D68 a-d) were excavated within 30m of the polygon during the reporting period. Water flow was recorded exiting the high bog in these drains during the 2012 survey and thus it is likely that peat cutting and associated drainage are responsible for the loss of ARB from this area. Although only 0.1ha of ARB is calculated as being lost from 2004-2012 in this area, this figure is likely to be an under-estimation as there are an additional four	Moderate variation in quadrat data: increase in the pool cover (from 11-25% to 34-50%), the overall *Sphagnum* cover (34-50% to 76-90%) and in the cover of *S. papillosum* (4-10% to 11-25%) and *S. cuspidatum* (4-10% to 34-50%). These changes may merely be the result of a discrepancy in the quadrat location (up to 2m) between both year surveys, rather than an actual change. However, there appears to have been an overall positive trend particularly considering the relatively large increase in

Area	Quadrats	Trend	Comment	Quadrats analysis
			sub-central points from the 2004 survey lying outside (to the ENE) of the area mapped as **Sc1** in 2012.	the cover of *S. cuspidatum* recorded.
Sc2	None	No longer present (declining)	This area of ARB (0.12ha) is no longer present as the high bog here has degraded from the sub-central complex 4/10 recorded in 2004 to the sub-marginal complex 9a/7/6 recorded in 2012. **Sc2** was located within 60m of the high bog edge in an area where active peat cutting continued to take place during the reporting period and thus this activity is likely to have been responsible for the loss of ARB from this area.	
Sc3	Qsm12	No longer present (stable but possibly declining)	This area of ARB (0.57ha) is no longer present. However, the 'loss' of ARB here is considered to be due to interpretation differences between the 2004 and 2012 survey rather than to any real differences on the ground. An additional note recorded in the quadrat taken in this area in 2004 refers to the area as 'Relic sub-central' indicating that the area was already regarded as borderline sub-central/sub-marginal in 2004. Nevertheless, it should not be ruled out that there may have been some degradation of the vegetation here as it was classed as sub-central complex 9a/10 in 2004 and sub-marginal complex 9a/7 in 2012. The estimated cover of *Eriophorum angustifolium* was much lower in 2012 (4-10% compared to 30-35% in 2004) and the *Sphagnum* cover was also lower (20-25% compared to 30-40% in 2004) while the broad hummocks of *S. austinii* referred to in 2004 were found to be restricted to a relatively small area ca. 50m to the SE of Qsm12 alongside and within Flush Z.	Significant variation in quadrat data: decrease in the overall *Sphagnum* cover (34-50% to 11-25%) and in the cover of *S. austinii* (26-33% to absent) and an increase in the cover of *S. capillifolium* (absent to 11-25%). The changes in the quadrat data at this location are large and it is likely that there was a GPS error in 2004.
Sc4	None	Stable (possibly decreasing)	There are slight changes all around the boundary as a result of the increased mapping accuracy of the 2012 survey resulting in **Sc4** being mapped as slightly smaller than in 2004. Although the difference is being attributed to improved mapping accuracy, it should not be ruled out that there has been a real loss of ARB in this area as one of the sub-central points recorded in 2004 now lies outside (to the south-west) of the area mapped as **Sc4** in 2012.	
Sc5	None	Decreasing	There are slight changes all around the boundary as a result of the increased mapping accuracy of the 2012 survey. However, there is a relatively large area (0.39ha) in the south of former **Sc5** that is now considered to be sub-marginal ecotope.	

Area	Quadrats	Trend	Comment	Quadrats analysis
			This area was mapped as sub-central complex 4/10 in 2004 and as sub-marginal complex 9a/7/6 in 2012. Comparing the descriptions of these complexes there appears to have been a decrease in the cover of *Rhynchospora alba* and *Sphagnum cuspidatum* in this area of former **Sc5**. The loss of ARB in this area may have been caused by the fact that it was located within 140m of the high bog edge in an area where active peat cutting continued to take place during the reporting period.	
Sc6	None	Decreasing	There are changes all around the boundary as a result of the increased mapping accuracy of the 2012 survey. In fact the area of former **Sc6** is now mapped as two separate polygons, **Sc6** and **Sc18**. However, at least part of the change in the boundary here is due to the degradation of the vegetation as there are four sub-central points that were taken within **Sc6** in 2004 that are now outside of both **Sc6** and **Sc18** and are thus mapped as sub-marginal ecotope in 2012. These points have degraded from sub-central complex 6/9a + P (RB) to the sub-marginal complex 6/3 + P with an associated decline in the *Sphagnum* cover from an estimated 30-40% in 2004 to 11-25% in 2012 as well as a decline in the cover of *Eriophorum angustifolium* (from 20% to 4-10%) and *Narthecium ossifragum* (from 25-30% to 4-25%) and an increase in the cover of *Carex panicea*. The extent of ARB lost here during the reporting period is estimated to be 0.04ha with the likely cause of the loss being that **Sc6** is located within 50m of the extensive network of drains (D1-D10) that lie in the north-west of this section of high bog. Indeed, significant water flow exiting the high bog from these drains was recorded during the 2012 survey. The drainage in this area is further intensified by the extensive series of cutover drains that are associated with active peat cutting that is ongoing on cutover to the north-west of this section of the high bog.	
Sc7	None	Stable	There are changes all around the boundary as a result of the increased mapping accuracy of the 2012 survey resulting in **Sc7** being mapped as larger than in 2004. Part of the change in the boundary here is also due to vegetation interpretation differences between the two surveys as a number of sub-marginal complex 6/4 + P points were taken in 2004 within the now extended area of **Sc7**.	

Area	Quadrats	Trend	Comment	Quadrats analysis
			However, this complex would be considered as a sub-central complex using 2012 criteria, the description given in 2004 indicating that this was considered "a relatively good quality sub-marginal complex" with "parts of the complex approaching sub-central quality" and "forming a mosaic with sub-central complexes". Indeed complex 6/4 + P was also described as a variant of the sub-central complex 4 + P in 2004.	
Sc8	None	Stable (possibly decreasing)	There are changes all around the boundary as a result of the increased mapping accuracy of the 2012 survey resulting in **Sc8** being mapped as slightly smaller than in 2004. The changes to the boundary include the amalgamating of the two separate polygons of **Sc8** in 2004 into one polygon in 2012. Although the 0.1ha (0.92 in the 2 polygons combined in 2004 compared to 0.82 in 2012) loss of ARB in this area is attributed to improved mapping accuracy, it should not be ruled out that there may have been some degradation of the vegetation. This is particularly the case in the north of the former extent of **Sc8** where there are now four sub-central points taken in 2004 lying outside of the 2012 mapped extent of **Sc8**. Any loss of ARB in this area of **Sc8** is likely to be attributable to the fact that it is located within 30m of the extensive network of drains (D14 to D22) that lie in the east of this section of high bog. Indeed, significant water flow exiting the high bog from these drains was recorded during the 2012 survey. The vegetation in this area of potential loss of ARB was mapped as sub-central complexes 4 + P and 6/9a + P in 2004 and sub-marginal complex 6/3 + P in 2012 indicating that there may have been a decrease in the *Sphagnum* cover in this area as well as in the cover of *Rhynchospora alba* and *Eriophorum angustifolium* and an increase in the cover of *Carex panicea*.	
Sc9	Qsc4	Stable	There are very slight changes all around the boundary as a result of the increased mapping accuracy of the 2012 survey resulting in **Sc9** being mapped as slightly larger than in 2004.	Slight variation in quadrat data: decrease in the overall *Sphagnum* cover (51-75% to 34-50%) and in the cover of *S. capillifolium* (4-10% to <4) and an increase in the cover of *S. magellanicum* (4-10% to 11-25%), *S. cuspidatum* (4-10% to 11-25%) and *S. denticulatum* (absent to <4%). These changes may merely be the result of a

Area	Quadrats	Trend	Comment	Quadrats analysis
				discrepancy in the quadrat location (up to 2m) between both year surveys, rather than an actual change.
Sc10	Qsc5	Stable	There are very slight changes all around the boundary as a result of the increased mapping accuracy of the 2012 survey resulting in **Sc10** being mapped as slightly larger than in 2004.	Slight variation in quadrat data: both the cover of pools (from 11-25% to 34-50%) and the overall *Sphagnum* cover (51-75% to 76-90%) have increased as well as the cover of *S. papillosum* (11-25% to 26-33%), *S. cuspidatum* (11-25% to 26-33%) and *S. capillifolium* (4-10% to 11-25%). These changes may merely be the result of a discrepancy in the quadrat location (up to 2m) between both year surveys, rather than an actual change.
Sc11	Qsc9	Newly recorded (stable)	This is a newly recorded area of sub-central ecotope and was recorded as a result of the 2012 survey being more comprehensive with an increased mapping accuracy than that of the 2004 survey.	Very slight variation in quadrat data: a slight increase in the cover of *S. papillosum* (absent to 4-10%) and *S. cuspidatum* (4-10% to 11-25%). These changes may merely be the result of a discrepancy in the quadrat location (up to 2m) between both year surveys, rather than an actual change.
Sc12	None	Newly recorded (stable)	This is a newly recorded area of sub-central ecotope and was recorded as a result of the 2012 survey being more comprehensive with an increased mapping accuracy than that of the 2004 survey.	
Sc13	None	Stable	There are very slight changes all around the boundary as a result of the increased mapping accuracy of the 2012 survey resulting in **Sc13** being mapped as slightly larger than in 2004.	
Sc14	None	Newly recorded (stable)	This is a newly recorded area of sub-central ecotope and was recorded as a result of the 2012 survey being more comprehensive with an increased mapping accuracy than that of the 2004 survey. However, part of the difference may be attributed to vegetation interpretation differences as part of **Sc14** was mapped as active flush in 2004.	

Area	Quadrats	Trend	Comment	Quadrats analysis
Sc15	None	Newly recorded (possibly increasing)	This is a newly recorded area of sub-central ecotope and was recorded as a result of the 2012 survey being more comprehensive than that of 2004 and as a result of vegetation interpretation differences between the two surveys. The 2012 extent includes a small area of what was classed as **C2** in 2004 as well as a larger area that was classed as sub-marginal ecotope (complex 6/3/9 + P and 9/7 + P). However, these complexes, 9/7 + P in particular, would likely to be considered as sub-central complexes using 2012 criteria. Nevertheless it is important to realise that some of change here may in fact be as a result of the improvement of the vegetation brought about by re-wetting as a result of the infilling of the drains F1 and F2. The vegetation here in 2012 was classed as the sub-central complex 6/9 + P indicating that there may in fact have been an increase in *Sphagnum* cover as well as a decrease in the cover of *Carex panicea*.	
Sc16	Qsc6	Decreasing	This was mapped as a small isolated polygon of **Sc6** in 2004. There are changes all around the boundary as a result of the increased mapping accuracy of the 2012 survey resulting in **Sc16** being mapped as slightly smaller than in 2004. However, at least part of the change in the boundary here is due to the degradation of the vegetation as there are two sub-central points (Complex 9 + P) that were taken within the former sub-central area in 2004 that are mapped as sub-marginal ecotope in 2012.The extent of ARB lost here during the reporting period is estimated to be 0.3ha with the likely cause of the loss being that **Sc16** is located within 25m of the series of drains that encompass D10 that lie in the west of this section of high bog. The drainage in this area is further intensified by the extensive series of cutover drains that are associated with active peat cutting that is ongoing on cutover to the north-west of this section of the high bog.	
Sc17	None	Decreasing	This was mapped as a small isolated polygon of **Sc6** in 2004. There are changes all around the boundary as a result of the increased mapping accuracy of the 2012 survey resulting in **Sc17** being mapped as slightly smaller than in 2004. However, at least part of the change in the boundary here is due to the degradation of the vegetation as there are two sub-central points (Complex 9 + P) that were taken within the former sub-central area in 2004 that are mapped as sub-	

Area	Quadrats	Trend	Comment	Quadrats analysis
			marginal ecotope in 2012.The extent of ARB lost here during the reporting period is estimated to be 0.05ha with the likely cause of the loss being that **Sc17** is located within 20m of the series of drains that encompass D10 that lie in the west of this section of high bog. The drainage in this area is further intensified by the extensive series of cutover drains that are associated with active peat cutting that is ongoing on cutover to the north-west of this section of the high bog.	
Sc18	None	Decreasing	This area was discussed under **Sc6** above.	
Z	None	Stable (possibly declining)	This area of ARB is no longer present. However, the 'loss' of ARB here is considered to be due largely to the 2012 survey being more comprehensive than that of 2004 and partly to interpretation differences between the two surveys rather than to any real differences on the ground. The 2004 report notes that flush **Z** was not comprehensively surveyed during the 2004 survey and analysis of the map shows that the active area of the flush was drawn using only four active flush points recorded on the ground. One of these was recorded in an area where relic *Sphagnum austinii* hummocks were frequent (adjacent to the area of former **Sc3**) and this area is not considered to be active using 2012 criteria, another was recorded within 10m of what is now termed **Sc14** while the final two were recorded within 20m of the former extent of **Sc5**. This is the area of **Sc5** (discussed above) that is considered to have degraded to sub-marginal ecotope during the reporting period and thus there may have been a real decline in this area of the flush, but there is insufficient evidence to be certain.	

Degraded Raised Bog (7120)

Area

The Degraded Raised Bog FRV for Area is 188.52ha at Callow Bog. This value corresponds with the difference between the current high bog area (351.98ha) and the Active Raised Bog FRV (163.46ha) 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 80.71% bigger than FRV. Any habitat Area value more than 15% above FRV falls into the

Unfavourable Bad assessment category, and therefore that is the assessment that applies to DRB habitat area for Callow Bog (see table 8.4).

Table 8.3 indicates that there has been a decrease (2.31ha) in the area of Degraded Raised Bog. The decrease is the result of a high bog loss of 3.31ha caused by peat cutting coupled with an increase (1.00ha) in DRB from the degradation of ARB. As a result the habitat is given a **Decreasing** trend.

The Area of Degraded Raised Bog at Callow 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 85.17ha (25% of 340.68ha, the current area of Degraded Raised Bog). The current marginal and face bank ecotopes area value (150.30ha) is 76.47% above the FRV (in the particular case of Degraded Raised Bog a current Area value equal or smaller than FRV is desirable) (see Table 8.4). A current value more than 25% above FRV falls into the **Unfavourable Bad** assessment category.

Table 8.3 shows that there has been a net decrease in the area of marginal ecotope of 1.31ha. The area of face-bank ecotope has remained the same. However, the 3.31ha loss of high bog to peat cutting has also largely been taken from marginal ecotope. Indeed it is estimated that 2.81ha of the marginal ecotope present in 2004 was cut from the high bog and thus lost to the high bog completely. This figure needs to be considered in the assessment of the increase in marginal ecotope at Callow Bog so that overall a 1.5ha (2.81ha – 1.31ha) increase should be used for the assessment, which equates to a 0.99% increase in marginal ecotope at Callow Bog during the reporting period. The remaining 0.5ha of high bog lost to peat cutting correspond with sub-marginal ecotope losses. 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 Callow Bog are given a **Declining** trend.

The increase in marginal ecotope during the reporting period was almost exclusively recorded along the eastern margin of section one of the high bog close to an area where active peat cutting is ongoing.

It should also be noted that there are some small areas classed as marginal ecotope that are in fact areas of bare peat since the high bog is used in these areas of Callow Bog to dry the cut peat. The high bog in these areas is severely degraded as it is devoid of vegetation.

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 Callow Bog are assessed as Unfavourable Bad-Declining (see table 8.5).

Future Prospects

The area of Degraded Raised Bog has decreased by 2.31ha as a consequence of a high bog loss of 3.31ha caused by peat cutting coupled with an increase (of 1ha) in DRB from the degradation of ARB. Peat cutting and associated drainage, activity that continues at the site, has also damaged the habitat S&Fs particularly along the eastern margin of section one of the high bog. Furthermore, drainage on the high bog and within the extensive cutover areas continues to damage the habitat and hinder its recovery to FRV's, as well as minimising the chances of converting marginal and face bank ecotopes to sub-marginal and/or Active Raised Bog. In addition there are currently no remediation works at the site that might contribute to the restoration of good quality habitat. Habitat **Area** is currently 80.71% above FRV (see table 8.4) and a Decreasing trend is expected in the following two reporting periods (12 years) due to ongoing losses to peat cutting. As a result 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 76.47% above FRV (see table 8.4). A Declining trend is foreseen in the following two reporting periods, **S&Fs** are expected to remain more than 25% above FRV. Thus, habitat's **S&Fs Future Prospects** are assessed as **Unfavourable Bad-Declining**.

There has been one recent significant fire event affecting 2.5% of the high bog during the reporting period, and such events have been regularly recorded since the 1980s. Fire events should be curtailed in order to minimise potential damage to high bog habitats.

Therefore the Future Prospects for Degraded Raised Bog are considered Unfavourable Bad-Declining (see table 8.5).

Table 8.3 Changes in Degraded Raised Bog area

Inactive Ecotopes	1994/5[1]	2004/5	2004/5 (amended)	2012	Change (2004/5-2012)	
	Area (ha)	Area (ha)	Area (ha)	Area (ha)	Area (ha)	%
Sub-marginal	151.83	141.85	169.71	168.71	(-)1.00	(-)0.59
Marginal[2]	174.08	178.02	149.6	148.29	(-)1.31	(-)0.88
Face bank[2]	2.95	6.14	2.01	2.01	0.00	0.00

Inactive flush	17.47	17.76	19.53	19.53	0.00	0.00
Conifer plantation	2.14	2.14	2.14	2.14	0.00	0.00
Total	**348.47**	**345.91**	**342.99**	**340.68**	**(-)2.31**	**(-)0.67**

[1]These 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 2004/5 figures and 2004/5 amended figures. The latter shows the ecotope area believed to be present in 2004/5 after surveying improvements in 2012. The comparison between 2004/5 (amended) and 2012 illustrates the actual changes in ecotope area in the 2004/5-2012 period. Any change in ecotope area between the 2004/5 and the 2004/5 (amended) values is due to improvement in mapping accuracy and/or the result of a more comprehensive survey in 2012.

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

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 slightly decreased in the reporting period (by 1.00ha) as has the area of sub-marginal ecotope (also by 1.00ha) resulting in a 2.0ha (1.1%) decrease in suitable habitat for Rhynchosporion depressions. As result habitat Area is given a **Decreasing** 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. Impacting activities such as peat cutting and drainage continue to threaten Active and Degraded Raised Bog. Logically this has to have a long term negative effect on Rhynchosporion depressions and its Future Prospects. 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-Stable** 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 Callow 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	163.46	11.30	93.09	5.65	0.44	92.21

[1] 1994/5 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.

	FRV Target (ha) [5]	2012 value (ha) [6]	% above target	FRV 2012 Target (ha) [7]	2012 value (ha) [8]	% above target
7120	188.52	340.68	80.71	85.17	150.30	76.47

[5] Current 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-Decreasing	Unfavourable Bad-Stable	Unfavourable Bad-Declining	Unfavourable Bad-Declining
7120	Unfavourable Bad-Decreasing	Unfavourable Bad-Declining	Unfavourable Bad-Declining	Unfavourable Bad-Declining
7150	Unfavourable Bad-Decreasing	Unfavourable Bad-Stable	Unfavourable Bad-Declining	Unfavourable Bad-Declining

Conclusions

Summary of impacting activities

- Peat cutting still continues at the site and has taken place at 50 locations in the 2004/05-2010 reporting period. 3.31ha of high bog have been lost in this period due to peat cutting and this activity is considered to be one of the reasons for the decrease in area of Active Raised Bog and the decrease and decline of Degraded Raised Bog. 28 plots were recorded as being actively cut in 2012. Peat cutting on the cutover occurs in addition to this and is particularly extensive to the north-west of section two.
- Over 25km of drains on the high bog remain functional and a further 3.3km are classed as reduced functional. Significant water losses through the drains in the north-west (D1-D10) and east (D14-D22) of section 2 were noted during the 2012 survey and water flow was also noted exiting the high bog from the four short newly excavated drains in the east of section one (D68 a-d).
- Cutover drainage (peripheral drainage) associated with either currently active or no longer active peat cutting continue to impact on the high bog habitats. There is a particularly

extensive network of drains on the cutover in the north-west of section two associated with peat cutting on the cutover.

- A small area in the west of section four (8.63ha or 2.5 % of the high bog) was burnt during the reporting period.
- There are two blocks of conifer (*Pinus contorta*) plantations on the high bog close to the centre of the high bog in section 3 measuring approximately 2.14ha in extent with another plantation (3.31ha) to the west of this section and another (1.1ha) between the south of this section and the river. It is unclear whether these two plantations are entirely on the high bog or the cutover. There are further plantations on cutover bog to the south of section 4 (2.39ha) and between section 4 and 5 (9.23ha).

Changes in active peat forming areas

- There has been a decrease (1.00ha) in the extent of Active Raised Bog habitat on Callow Bog from 2004 to 2012. All of this loss has been from sub-central ecotope with 0.61ha lost from areas close to the eastern margin of section one (**Sc1**, **Sc2** and **Sc5**) and 0.39ha lost from areas close to the north-western margin of section two (**Sc6**, **Sc16**, **Sc17** and **Sc18**). The losses from the east of section one can be attributed to ongoing peat cutting (which also involved the excavation of new drains during the reporting period) along the high bog margin in this area while the losses from section two can be attributed to the extensive drainage network associated with the ongoing peat cutting on the cutover to the north-west of the high bog in this area. There have also been some changes to the distribution of habitat and a number of new Active Raised Bog areas have been identified and mapped as a result of the 2012 survey being more comprehensive than previous ones.
- Several new peat forming areas (**Sc11**, **Sc12** and **Sc14** in section one and **Sc15** in section four) have been described at the site. These new sub-central ecotope areas are the result of a more comprehensive survey in 2012 rather than actual changes in Active Raised Bog.
- There are also two areas (**Sc3** and flush **Z**) in section one that were formerly classed as ARB that are no longer classed as such, but the change is considered to be due to interpretation differences rather than to an actual change on the ground.
- There are slight changes around the boundary of the remaining active areas period (**Sc4** in section one**, C1 Sc7** and **Sc8** in section two, **Sc10** and **Sc13** in section three and **C2** and **Sc9** in section four), but these are considered to be as a result of the increased mapping accuracy of the 2012 survey. These areas are considered as have remained stable during the

reporting. However, it should be noted that **Sc4** and **Sc8** did display some evidence (though an insufficient amount to be certain) of degradation. On the other hand there were indications within **Sc15** in section four that this area may be improving due to the infilling of drains, but again there was insufficient evidence to be certain.

Other changes

- The area of marginal ecotope expanded along the eastern margin of section one in an area where active peat cutting (which involved the excavation of four new short drains during the reporting period) is ongoing.
- There have been numerous revisions of ecotope boundaries of marginal/sub-marginal on the high bog resulting from more comprehensive surveying, and differences in the interpretation of habitats.
- The boundaries of the inactive flushes: **Mo, P, Q, R, S, T, U, V, Y** and **Z** have been slightly modified, also as a result of more comprehensive surveying.

Quadrats analysis

- **Qc1**: Greater cover of pools in 2012; higher cover of *S. austinii* and *S. papillosum*; lower cover of *S. cuspidatum*; higher cover of *Calluna vulgaris* and *Cladonia portentosa*; slightly lower cover of *Leucobryum glaucum* and *Rhynchospora alba* and slightly higher cover of *Calluna vulgaris*, *Trichophorum germanicum* and *Cladonia portentosa*. All differences likely to be due to a potential minor difference in quadrat location and/or vegetation interpretation.
- **Qsc3**: Greater cover of pools and overall *Sphagnum* cover in 2012; higher cover of *S. papillosum* and a much increased cover of *S. cuspidatum*; lower cover of *S. denticulatum*; slightly higher cover of *Trichophorum germanicum* and slightly lower cover *Rhynchospora alba*. Some differences likely to be due to potential minor difference in quadrat location and/or vegetation interpretation. However, there has been an overall positive trend particularly considering the relatively large increase in the cover of *Sphagnum cuspidatum* recorded.
- **Qsc4**: Lower overall *Sphagnum* cover; slightly higher cover of *S. magellanicum*, *S. cuspidatum* and *S. denticulatum*; slightly lower cover of *S. capillifolium*; slightly higher cover of *Narthecium ossifragum* and *Calluna vulgaris*. All differences likely to be due to a potential minor difference in quadrat location and/or vegetation interpretation.
- **Qsc5**: Greater cover of pools and overall *Sphagnum* cover in 2012; slightly higher cover of *S. papillosum*, *S. cuspidatum* and *S. capillifolium*; slightly higher cover of *Calluna vulgaris*;

slightly lower cover of *Narthecium ossifragum*. All differences likely to be due to a potential minor difference in quadrat location and/or vegetation interpretation.

- **Qsc9**: Cover of pools and overall *Sphagnum* cover remained the same in 2012; slightly higher cover of *S. papillosum* and *S. cuspidatum*; slightly higher cover of *Narthecium ossifragum*, *Calluna vulgaris* and *Cladonia portentosa*; slightly lower cover of *Rhynchospora alba*. All differences likely to be due to a potential minor difference in quadrat location and/or vegetation interpretation.
- **Qsm11**: Significant variation in the quadrat data compared to 2004; the overall *Sphagnum* cover has decreased from 34-50% to 11-25% with a large decrease in the cover of *S. austinii* from 34-50% in 2004 to absent in 2012; also a slightly lower cover of *S. papillosum* and a slightly higher cover of *S. capillifolium*; large increase in the cover of *Narthecium ossifragum*; slight increase in the cover of *Calluna vulgaris, Carex panicea* and *Trichophorum germanicum*. The changes in the quadrat data at this location are large and it is likely that there was a GPS error in 2004.
- **Qsm12**: Significant variation in the quadrat data compared to 2004; the overall *Sphagnum* cover has decreased from 34-50% to 11-25% with a large decrease in the cover of *S. austinii* from 26-33% in 2004 to absent in 2012; a slightly higher cover of *S. capillifolium*; slight increase in the cover of *Calluna vulgaris*, *Carex panicea*, *Trichophorum germanicum* and *Cladonia portentosa*. The changes in the quadrat data at this location are large and it is likely that there was a GPS error in 2004.

Restoration works

- No restoration works have been undertaken at the site.
- NPWS has engaged in negotiation with landowners in relation to the cessation of peat cutting at the site. Despite negotiations peat cutting continues at All Saints

Summary of conservation status

- **Active Raised Bog** has been given an **Unfavourable Bad–Declining** conservation status at Callow Bog. Habitat Area has slightly decreased (by 1.0ha or 8.1%) while the quality has remained Stable during the reporting period. However both values are substantially below the FRVs. Future Prospects are considered Unfavourable Bad-Declining as impacting activities (peat cutting and drainage) continue to threaten the habitat.
- **Degraded Raised Bog** has been given an **Unfavourable Bad-Declining** conservation status at Callow Bog. Habitat area has decreased due to peat cutting and is substantially above the

FRV. Habitat's structure and functions have also declined due to peat cutting with an increase in marginal ecotope recorded along the eastern margin of section one of high bog. Future Prospects are considered Unfavourable Bad-Declining due to threatening impacting activities.

- **Depressions on peat substrates of the Rhynchosporion** has been given an **Unfavourable Bad-Declining** conservation status at Callow Bog. Habitat Area has decreased and quality (S&Fs) remained Stable during the reporting period. However, Future Prospects are considered Unfavourable Bad-Declining as a result of threatening impacting activities.

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

Recommendations

- **Cessation of peat cutting.**
- **Restoration works** including the blocking of high bog functional and reduced-functional drains. With over 25km of functional drains on the high bog, there is significant potential for the development of Active Raised Bog as a result of the blocking of these drains
- **Further restoration works** recommended include the removal of the conifer plantations (and the blocking of associated drains) from the high bog in section three and from the cutover elsewhere on the site.
- **The blocking of cutover drains** is also to be recommended. There is potential for the restoration of cutover around the entire site, but particularly in the north-west of section two as the cutover is more extensive there. This may be particularly important as reaching the ARB target on the high bog alone may not be achievable.
- **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. Hydrological studies should also aim to understand the impacts on the bog arising from regional drainage works, particularly on the Lung River, which runs between section one and section three at Callow Bog.
- **Further botanical monitoring surveys** on the high bog in order to assess changes in the conservation status of habitats, and also potentially, monitoring surveys of cutover areas if they become part of future restoration programmes at the site.

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Appendix I Detailed vegetation description of the high bog

Active Raised Bog (7110)

Central Ecotope Complex

COMPLEX 14

- **Location**: **C2**
- **Ground**: very soft
- **Physical indicators**: absent
- ***Calluna* height**: 11-20cm
- ***Cladonia* cover**: 4-10%
- **Macro-topography**: dome of the bog
- **Pools**: 26-33%
- ***Sphagnum* cover**: 51-75%
- ***Narthecium* cover**: <4%
- **Micro- topography**: High and low hummocks/hollows and pools
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (26-33%), *Eriophorum vaginatum* (4-10%; 11-25% in places), *E. angustifolium* (<4%; 4-10% in places), *Narthecium ossifragum* (<4%), *Rhynchospora alba* (4-10%), *Menyanthes trifoliata* (<4%), *Molinia caerulea* (<4%), *Racomitrium lanuginosum* (<4%), *Leucobryum glaucum* (<4%), *Pleurozium schreberi* (<4%), *Dicranum scoparium* (<4%), *Sphagnum capillifolium* (H; 11-25%), *S. austinii* (H; <4%), *S. papillosum* (L & P); 4-10%), *S. denticulatum* (P; <4%), *S. cuspidatum* (P; 11-25%).
- **Additional comments**: This complex is found between and around two infilling parallel drains (F1) in an area where water is pooling. Evidence of flushing is present close to the drains with *Aulacomnium palustre* and *Polytrichum strictum* both recorded. Active hummocks of *Sphagnum austinii* are quite frequent (4-10% cover in places) with one very large hummock (1m diameter) of *S. austinii* was also recorded.

COMPLEX 35

- **Location**: **C1**
- **Ground**: quaking

- **Physical indicators**: absent
- ***Calluna* height**: 21-40cm
- ***Cladonia* cover**: 4-10%
- **Macro-topography**: appears to be the dome of the bog (though the area to the south may be as high)
- **Pools**: 34-50% (51-75% in places)
- ***Sphagnum* cover**: 51-75%
- ***Narthecium* cover**: 4-10%
- **Micro- topography**: High and low hummocks/hollows and pools
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (26-33%), *Eriophorum vaginatum* (<4%; 4-10% in places), *E. angustifolium* (<4%; 4-10% in places), *Narthecium ossifragum* (<4%), *Rhynchospora alba* (4-10%; more common in SW of C1), *Menyanthes trifoliata* (<4%), *Drosera anglica* (<4%), *Vaccinium oxycoccos* (<4%), *Trichophorum germanicum* (<4%), *Cladonia uncialis* (<4%), *Racomitrium lanuginosum* (<4%), *Aulacomnium palustre* (<4%), *Pleurozium schreberi* (<4%), *Hylocomium splendens* (<4%), *Pleurozia purpurea* (<4%), *Campylopus atrovirens* (<4%), *Sphagnum capillifolium* (H; 11-25%), *S. austinii* (H; <4%), *S. papillosum* (L & P); 11-25%), *S. cuspidatum* (P; 34-50%).
- **Additional comments**: There are some flush characteristics within this central area as indicated by the presence of species such as *Vaccinium oxycoccos*, *Aulacomnium palustre*, *Pleurozium schreberi* and *Hylocomium splendens*. Where there is an increase in the cover of *Rhynchospora alba* in the south-west of this complex, the area becomes borderline sub-central/central.

Sub-Central Ecotope Complexes

COMPLEX 4/15

- **Location**: parts of **Sc1** in section 1
- **Ground**: very soft
- **Physical indicators**: absent
- ***Calluna* height**: 11-20cm
- ***Cladonia* cover**: 11-25%
- **Macro-topography**: partial depression and gentle slope towards SSE
- **Pools**: 26-33% (interconnecting)

- ***Sphagnum* cover**: 76-90% (51-75% in places)
- ***Narthecium* cover**: <4%
- **Micro- topography**: Low Hummocks/hollows, lawns and pools
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (11-25%), *Eriophorum vaginatum* (4-10%), *E. angustifolium* (4-10%), *Rhynchospora alba* (4-10%), *Narthecium ossifragum* (<4%), *Cladonia uncialis* (<4%), *Menyanthes trifoliata* (<4%), *Drosera anglica* (<4%), *Pedicularis palustris* (<4%), *Sphagnum capillifolium* (H; 11-25%), *S. tenellum* (H; <4%), *S. papillosum* (H & L; 11-25%), *S. cuspidatum* (P; 34-50%).
- **Additional comments:** Complex 4/15 borders on being a central complex. However, there are parts of Sc1 (particularly towards its western extent) where complex 4/15 grades into the poorer quality sub-central complex 6/9 + P. Here the pool cover (10-15%) and the *Sphagnum* cover (30-40%) are lower though the pools are still mostly full of *S. cuspidatum*.

Qsc3 was recorded within this complex.

COMPLEX 6/15

- **Location**: **Sc10**
- **Ground**: soft to very soft
- **Physical indicators**: absent
- ***Calluna* height**: 11-20cm
- ***Cladonia* cover**: 4-10%
- **Macro-topography**: partial depression (higher in the south and the east)
- **Pools**: 11-25% (up to 34-50% in places)
- ***Sphagnum* cover**: 51-75%
- ***Narthecium* cover**: 4-10%
- **Micro- topography**: Hummocks/hollows and pools
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (26-33%), *Erica tetralix* (<4%), *Eriophorum angustifolium* (<4%; 4-10% in places), *E. vaginatum* (<4%), *Rhynchospora alba* (4-10%), *Narthecium ossifragum* (4-10%), *Trichophorum germanicum* (<4%), *Drosera anglica* (<4%), *Menyanthes trifoliata* (<4%), *Hypnum jutlandicum* (<4%), *Racomitrium lanuginosum* (<4%), *Campylopus atrovirens* (<4%), *Pleurozia purpurea* (<4%), *Andromeda polifolia* (<4%), *Dicranum scoparium* (<4%), *Sphagnum capillifolium* (H;

11-25%), *S. subnitens* (H; <4%), *S. fuscum* (H; <4%), *S. austinii* (H; <4%), *S. papillosum* (H & P; 26-33%), *S. cuspidatum* (P; 11-25%).

- **Additional comments:** this complex was classified as 9a + P in 2004/05; this is due to re-interpretation of the data and not due to vegetation change.

COMPLEX 9/10

- **Location**: western parts of **Sc9** in section 4
- **Ground**: very soft
- **Physical indicators**: absent
- ***Calluna* height**: 21-30cm
- ***Cladonia* cover**: 4-10%
- **Macro-topography**: partial depression
- **Pools**: 4-10% (but pools not well defined)
- ***Sphagnum* cover**: 51-75% (34-50% in places)
- ***Narthecium* cover**: <4% (4-10% in places)
- **Micro- topography**: Low Hummocks/hollows, lawns and pools
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (11-25%), *Eriophorum vaginatum* (11-25%), *E. angustifolium* (4-10%), *Rhynchospora alba* (4-10%), *Narthecium ossifragum* (<4%), *Cladonia uncialis* (<4%), *Pleurozia purpurea* (<4%), *Racomitrium lanuginosum* (<4%), *Sphagnum capillifolium* (H; 4-10%), *S. tenellum* (H; <4%), *S. austinii* (H; <4%), *S. fuscum* (H; <4%), *S. papillosum* (H & L; 26-33%), *S. magellanicum* (L; 4-10%), *S. cuspidatum* (P; 4-10%).
- **Additional comments:** an old burn line appears to divide this western section of Sc9 from the eastern section, where complex 4/10 dominates. The eastern section appears to have been burnt more recently (but still prior to the AP of 2005). Where *Eriophorum angustifolium* has a higher cover than *E. vaginatum* such as in parts of **Sc5**, the complex is termed 9A/10.

COMPLEX 4/10

- **Location**: eastern parts of **Sc9** in section 4
- **Ground**: very soft
- **Physical indicators**: absent
- ***Calluna* height**: 11-20cm
- ***Cladonia* cover**: <4% (4-10% in places)

- **Macro-topography**: partial depression
- **Pools**: <4%
- ***Sphagnum* cover**: 34-50% (51-75% in places)
- ***Narthecium* cover**: 4-10%
- **Micro- topography**: Low hummocks/hollows and lawn
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (11-25%), *Erica tetralix* (4-10%), *Eriophorum vaginatum* (4-10%), *E. angustifolium* (<4%), *Rhynchospora alba* (11-25%), *Narthecium ossifragum* (4-10%), *Trichophorum germanicum* (<4%), *Sphagnum capillifolium* (H; 4-10%), *S. tenellum* (H; <4%), *S. papillosum* (H & L; 11-25%), *S. magellanicum* (L; 4-10%), *S. cuspidatum* (Hl; 4-10%).
- **Additional comments:** an old burn line appears to divide this eastern section of Sc9 from the western section (where complex 9/10 dominates). This eastern section appears to have been burnt more recently (but still prior to the AP of 2005).

COMPLEX 6/10

- **Location**: description taken in the southern parts of **Sc5** and **Sc14**
- **Ground**: soft
- **Physical indicators**: absent
- ***Calluna* height**: 11-20cm
- ***Cladonia* cover**: 4-10%
- **Macro-topography**: flat
- **Pools**: absent
- ***Sphagnum* cover**: 34-50% (51-75% in places)
- ***Narthecium* cover**: 4-10% (11-25% in places)
- **Micro- topography**: Hummocks/hollows
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (11-25%), *Erica tetralix* (4-10%), *Eriophorum vaginatum* (4-10%), *E. angustifolium* (4-10%), *Rhynchospora alba* (<4%), *Narthecium ossifragum* (4-10%), *Trichophorum germanicum* (<4%), *Menyanthes trifoliata* (<4%), *Andromeda polifolia* (<4%), *Molinia caerulea* (<4%), *Aulacomnium palustre* (<4%), *Pleurozia purpurea* (<4%), *Pleurozium schreberi* (4-10%), *Dicranum scoparium* (<4%), *Hypnum jutlandicum* (<4%), *Racomitrium lanuginosum* (<4%), *Sphagnum*

capillifolium (H; 11-25%), *S. tenellum* (H; 4-10%), *S. austinii* (H; <4%), *S. subnitens* (H; <4%), *S. papillosum* (H; 11-25%), *S. cuspidatum* (Hl; <4%).

Additional comments: Sc5 is adjacent to flush Z and shows signs of some flushing itself as indicated by the species complement above. Towards the north of Sc5, the area gets wetter and there is an increase in the cover of active hummocks of *S. austinii* (4-10%), *S. cuspidatum* (Hl; 4-10%) and *Eriophorum angustifolium* (11-25%) and a decrease in the cover of *Narthecium ossifragum* (<4%) and *Sphagnum tenellum* (<4%). **Sc5** was mapped as continuing further south in 2004, but not many points were taken south of drain bH. **Sc2**, which was recorded in 2004, to the south-east of **Sc5** is no longer present. However, it also had very few points taken within it in 2004 and thus it is unclear whether this area has degraded or not. A tiny area was recorded in this area in 2012 with a couple of small pools with *S. cuspidatum* and *Eriophorum angustifolium*. This area was considered too small to map, but may be the area that was mapped as **Sc2** in 2004. However, very little *Rhynchospora alba* was recorded here so that in any case, it would not be classed as complex 4/10, which it was in 2004.

Complex 6/10 was also mapped within an area (**Sc13**) that was mapped as part of Flush Z in 2004 (mostly within an inactive but also partially within an active section). Here there is a higher cover of *Calluna vulgaris* (26-33%), *Narthecium ossifragum* (11-25%; 26-33% in places), *Sphagnum cuspidatum* (4-10%), *S. austinii* (4-10%) and more lawn-forming *S. papillosum* (11-25%) while there is a lower cover of *S. tenellum* (<4%) and *S. capillifolium* (4-10%). *Campylopus atrovirens* was also recorded in this area.

COMPLEX 9A + P

- **Location**: **Sc4**
- **Ground**: very soft
- **Physical indicators**: absent
- ***Calluna* height**: 11-20cm
- ***Cladonia* cover**: <4%
- **Macro-topography**: depression
- **Pools**: 4-10% (but more like *Sphagnum*-filled hollows)
- ***Sphagnum* cover**: 34-50% (51-75% in places)
- ***Narthecium* cover**: <4%
- **Micro- topography**: Low hummocks/hollows, lawns and pools
- **Tussocks**: *Trichophorum germanicum* (<4%)

- **Degradation or regeneration evidence**: there is some evidence to suggest that this area is drier than in 2004 as a 20% cover of pools was recorded at that time with most of these containing open water while there was no open water in the 'pools' in 2012, which were described as being more like *Sphagnum*-filled hollows than pools.
- **Species cover**: *Calluna vulgaris* (34-50%), *Eriophorum vaginatum* (4-10%), *E. angustifolium* (4-10%), *Rhynchospora alba* (<4%), *Narthecium ossifragum* (<4%), *Myrica gale* (<4%), *Molinia caerulea* (<4%), *Andromeda polifolia* (<4%), *Sphagnum capillifolium* (H; 4-10%), *S. tenellum* (H; <4%), *S. magellanicum* (L; <4%), *S. papillosum* (L & Hl; 11-25%), *S. cuspidatum* (Hl & P; 4-10%, but 11-25% in places).
- **Additional comments:** This is a very small area of sub-central ecotope measuring ca. 50m x 10m being elongated in a NE/SW direction.

COMPLEX 9 + P

- **Location**: **Sc16** & **Sc17**
- **Ground**: very soft
- **Physical indicators**: absent
- ***Calluna* height**: 11-20cm
- ***Cladonia* cover**: 4-10%
- **Macro-topography**: gentle slope
- **Pools**: 11-25%
- ***Sphagnum* cover**: 34-50%
- ***Narthecium* cover**: <4%
- **Micro- topography**: Low hummocks/hollows, lawns and pools
- **Tussocks**: Absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (34-50%), *Eriophorum vaginatum* (11-25%), *E. angustifolium* (4-10%; 11-25 in places), *Rhynchospora alba* (<4%), *Narthecium ossifragum* (<4%), *Carex panicea* (<4%), *Trichophorum germanicum* (<4%), *Racomitrium lanuginosum* (<4%), *Campylopus atrovirens* (<4%), *Sphagnum capillifolium* (H; 4-10%), *S. magellanicum* (L; 4-10%), *S. papillosum* (L & P; 4-10%), *S. cuspidatum* (P; 11-25%).
- **Additional comments:** None.

COMPLEX 6/9 + P

- **Location**: **Sc1**, **Sc6**, **Sc7**, **Sc8**, **Sc11**, **Sc12**, **Sc15** and **Sc18**.

- **Ground**: soft
- **Physical indicators**: absent
- ***Calluna* height**: 21-30cm
- ***Cladonia* cover**: 4-10%
- **Macro-topography**: flat (possibly top of dome)
- **Pools**: 11-25%
- ***Sphagnum* cover**: 34-50% (51-75% in places)
- ***Narthecium* cover**: 11-25%
- **Micro- topography**: Low Hummocks/hollows and pools
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (26-33%), *Eriophorum vaginatum* (11-25%), *E. angustifolium* (<4%), *Rhynchospora alba* (4-10%), *Narthecium ossifragum* (11-25%), *Carex panicea* (4-10%), *Menyanthes trifoliata* (<4%), *Racomitrium lanuginosum* (<4%), *Sphagnum capillifolium* (H; 11-25%), *S. tenellum* (H; <4%), *S. magellanicum* (L; <4%), *S. austinii* (H; <4%), *S. papillosum* (L & P; 11-25%), *S. cuspidatum* (P; 11-25%).
- **Additional comments:** the above description was taken in **Sc15** in section 4. A large hummock recorded at the sub-central/sub-marginal border supports tall *Calluna vulgaris*, *Sphagnum capillifolium*, *Pleurozium schreberi* and *Hylocomium splendens*. *Pleurozia purpurea* was also recorded, but was rare.

  This complex was also recorded in a number of areas of section 1 of Callow Bog. In **Sc11**, which appeared to be in a partial depression, there was a lower cover of *Sphagnum* (26-33%) and the area was considered borderline sub-marginal/sub-central. There was a very good cover of *S. cuspidatum* in the pools, but the inter-pool areas supported a very poor *Sphagnum* cover dominated by *S. capillifolium* (4-10%). The cover of *Eriophorum vaginatum* (<4%) was lower while the cover of *E. angustifolium* (4-10%) was higher. *Cladonia uncialis*, *Trichophorum germanicum*, *Molinia caerulea*, *Campylopus atrovirens* and *Sphagnum denticulatum* were also recorded. In Sc12, the *Sphagnum* cover was 34-50% composed of *Sphagnum capillifolium* (H; 11-25%), *S. tenellum* (H; <4%), *S. magellanicum* (L; <4%), *S. austinii* (H; <4%), *S. fuscum* (H; <4%), *S. papillosum* (L & P; 4-10%), *S. cuspidatum* (P; 11-25%).

  This complex was also recorded dominating **Sc7** in section 2 (on a gentle slope) where it was of better quality with an overall *Sphagnum* cover of 34-50% (51-75% in places). The inter-pool areas had a good *Sphagnum* cover with extensive lawns/low hummocks of *S. papillosum* (11-25%) as well as hummocks of *S. capillifolium* (11-25%; 4-10% in places) and scattered active

hummocks of *S. austinii* and *S. fuscum*. Lawns of *S. magellanicum* (<4%) were also recorded and most of the pools (which covered 11-25% of the area) had a good cover of *S. cuspidatum* (11-25%). However, there were occasional pools where the *Sphagnum* cover was patchy. Species covers were as follows: *Calluna vulgaris* (26-33%), *Eriophorum vaginatum* (4-10%; 11-25% in places), *E. angustifolium* (4-10%), *Rhynchospora alba* (4-10%; 11-25% in places), *Narthecium ossifragum* (4-10%), *Carex panicea* (<4%), *Trichophorum germanicum* (<4%), *Menyanthes trifoliata* (<4%), *Drosera anglica* (<4%), *Andromeda polifolia* (<4%) and *Aulacomnium palustre* (<4%). In the north-west of **Sc7**, *Sphagnum pulchrum* was recorded as dominating in one pool. This was the only location in Callow Bog where this species was recorded. Peculiarly, it was not recorded even in adjacent pools when searched for. Towards the centre of **Sc7**, the area bordered on becoming central ecotope, and here the vegetation was classed as Complex 6/35, which was considered intermediate between Complex 6/9 + P and Complex 35.

Complex 6/9 + P was also recorded as dominating **Sc6**, **Sc8** and **Sc18** in section 2.

Quadrat **Qsc9** recorded within this complex.

COMPLEX 6/9A + P

- **Location**: **Sc13**
- **Ground**: soft
- **Physical indicators**: absent
- ***Calluna* height**: 11-20cm
- ***Cladonia* cover**: 26-33%
- **Macro-topography**: gentle slope
- **Pools**: 4-10% (11-25% in places)
- ***Sphagnum* cover**: 34-50% (51-75% in places)
- ***Narthecium* cover**: 11-25% (26-33% in places)
- **Micro- topography**: Hummocks/hollows/*Narthecium* flats and pools
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (26-33%), *Erica tetralix* (<4%), *Eriophorum angustifolium* (4-10%), *E. vaginatum* (<4%), *Rhynchospora alba* (<4%), *Narthecium ossifragum* (11-25%), *Carex panicea* (4-10%), *Trichophorum germanicum* (<4%), *Drosera anglica* (<4%), *Menyanthes trifoliata* (<4%), *Racomitrium lanuginosum* (<4%), *Andromeda polifolia* (<4%), *Sphagnum capillifolium* (H; 11-25%), *S. subnitens* (H; 4-10%), *S. tenellum* (H; <4%), *S. fuscum* (H; <4%), *S. austinii* (H; <4%), *S. papillosum* (H & P; 4-10%), *S. cuspidatum* (P; 4-10%).

- **Additional comments:** there are some large relic hummocks of *S. austinii* within this complex. Overall this is considered to be a borderline sub-central/sub-marginal complex with some characteristics of both. Pools cover ca. 10-20% of the complex, but have only a patchy cover of *S. cuspidatum* with algae present in some of the pools. This complex was classified as 9a + P in 2004/05; this is due to re-interpretation of the data and not due to vegetation change.

Degraded Raised Bog (7120)

Sub-Marginal Ecotope Complexes

COMPLEX 9/7

- **Location**: north of section 3; middle of section 1, east of section 4 and south of section 2
- **Ground**: soft
- **Physical indicators**: absent
- ***Calluna* height**: 21-40cm
- ***Cladonia* cover**: 34-50% (higher in places)
- **Macro-topography**: gentle slope
- **Pools**: absent
- ***Sphagnum* cover**: 11-25%
- ***Narthecium* cover**: <4%
- **Micro- topography**: Low hummocks/hollows and occasional tall hummocks
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (34-50%), *Eriophorum vaginatum* (11-25%), *E. angustifolium* (<4%; 4-10% in places), *Narthecium ossifragum* (<4%), *Trichophorum germanicum* (<4%), *Cladonia uncialis* (<4%), *Racomitrium lanuginosum* (<4%), *Sphagnum capillifolium* (H; 11-25%), *S. papillosum* (H; <4%), *S. tenellum* (H; <4%), *S. austinii* (H; <4%), *S. subnitens* (H; 4-10%), *S. cuspidatum* (Hl; <4%).
- **Additional comments:** part of this complex was mapped as marginal 7/9 + Cl in 2004/05; this is due to re-interpretation of the data and not due to vegetation change. Large hummocks were occasional within this complex and these usually supported *Pleurozium schreberi*, *Hylocomium splendens* and *Hypnum jutlandicum* as well as *Sphagnum capillifolium* and *Calluna vulgaris*. Where *Eriophorum angustifolium* was more common than *E, vaginatum* the complex was named 9a/7 and was usually wetter with slightly more *Sphagnum*. Where *Narthecium ossifragum* was more frequent (>10%) the complex was named 9/7/6 and was usually drier and of an overall slightly poorer quality.

Where *Myrica gale* occurred at 4-10% cover within these complex types, the complexes were named 9/7 + My, 9a/7 + My, 9/7/6 + My, 9a/7/6 + My.

Carex panicea often occurred at similar cover values to *Narthecium ossifragum* in section 1, but the complex was still called 9/7/6. In one area to the east of section 1, however, Carex panicea was much more abundant that *Narthecium ossifragum* and the complex was termed 9a/7/3.

Complex 9/7, 9a/7 and 9/7/6 were also recorded in parts of section 1 including in the area that was mapped as Sc3 (complex 9a/10) in 2004. In this area *Eriophorum angustifolium* was recorded as 4-10% cover (not 30-35% as in 2004). The *Sphagnum* cover was estimated to be 20-25% (described as 30-40% in 2004) and the broad hummocks of *S. austinii* referred to in 2004 were restricted to a relatively small area ca. 50m to the SE of Qsm12 alongside and within flush Z.

COMPLEX 6/3 + P

- **Location**: south section 1, west section 4 and across section 2
- **Ground**: soft
- **Physical indicators**: absent (light burn where it occurs to the NW of C2)
- ***Calluna* height**: 11-20cm
- ***Cladonia* cover**: 4-10%
- **Macro-topography**: gentle slope
- **Pools**: 4-10%
- ***Sphagnum* cover**: 11-25%
- ***Narthecium* cover**: 4-10% (11-25% in places)
- **Micro- topography**: hummocks/hollows, flats and pools
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (26-33%), *Eriophorum vaginatum* (<4%), *E. angustifolium* (<4%), *Narthecium ossifragum* (4-10%), *Carex panicea* (11-25%), *Erica tetralix* (<4%), *Menyanthes trifoliata* (<4%), *Racomitrium lanuginosum* (<4%), *Cladonia uncialis* (<4%), *Sphagnum capillifolium* (H; 11-25%), *S. papillosum* (H; 4-10%), *S. tenellum* (H; <4%), *S. austinii* (H; <4%), *S. subnitens* (H; <4%), *S. magellanicum* (H; <4%), *S. cuspidatum* (P; 4-10%).
- **Additional comments:** the pools are mostly open water, but occasionally they are filled with *Sphagnum cuspidatum*.

  This complex is also found in the south of section 1. Here it is of better quality with a higher cover of pools (11-25%). The pools (which may be tear pools as they are mostly orientated E/W) are variable in quality, some having an almost complete cover of *S. cuspidatum*, but others

being mostly open water or algal. The better quality pools are largely in the north-east of the complex, towards Flush Z, where the complex is of borderline sub-central quality. A small number of active hummocks of *S. austinii* were recorded in this area and a couple of sub-central (complex 6/9 + P) points were taken during the survey, but no area was deemed large enough to map. However, on the whole, the *Sphagnum* cover ranges only from 11-33%, averaging at 20-25%. The inter-pool areas, generally, have a very poor *Sphagnum* cover and are firm underfoot and dominated by *Narthecium ossifragum* (11-25%) and *Carex panicea* (11-25%). Other species recorded in and around the pools include *Sphagnum denticulatum*, *S. papillosum*, *Menyanthes trifoliata*, *Campylopus atrovirens* and *Pleurozia purpurea*. In the inter-pool areas the only *Sphagnum capillifolium* (4-10%) and *S. tenellum* are the only frequent *Sphagna*, while also recorded were *Trichophorum germanicum* (<4%), *Calluna vulgaris* (11-25%), *Eriophorum vaginatum* (<4%), *E. angustifolium* (<4%) and *Rhynchospora alba* (4-10%).

This complex was also recorded in parts of section 2. In the north-west of this section, the pools within this complex were tear pools, orientated in a NW/SE direction.

COMPLEX 6/3/9

- **Location**: more widespread sub-marginal community complex within sections 1, 2 and 4
- **Ground**: soft
- **Physical indicators**: absent
- ***Calluna* height**: 11-20cm
- ***Cladonia* cover**: 4-10%
- **Macro-topography**: gentle slope
- **Pools**: <4%
- ***Sphagnum* cover**: 11-25%
- ***Narthecium* cover**: 4-10%
- **Micro- topography**: hummocks/hollows and flats
- **Tussocks**: *Trichophorum germanicum* (<4%)
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (26-33%), *Eriophorum vaginatum* (4-10%), *E. angustifolium* (<4%), *Narthecium ossifragum* (4-10%), *Trichophorum germanicum* (<4%), *Carex panicea* (11-25%), *Erica tetralix* (<4%), *Molinia caerulea* (<4% in localized patches), *Cladonia uncialis* (<4%), *Sphagnum capillifolium* (H; 11-25%), *S. papillosum* (H; 4-10%), *S. tenellum* (H; <4%), *S. austinii* (H; <4%), *S. subnitens* (H; <4%), *S. magellanicum* (H; <4%), *S. cuspidatum* (Hl; <4%).
- **Additional comments:** none.

COMPLEX 4/9

- **Location**: west of section 1
- **Ground**: soft
- **Physical indicators**: absent
- ***Calluna* height**: 11-20cm
- ***Cladonia* cover**: <4%
- **Macro-topography**: gentle slope
- **Pools**: 4-10% (<4% in places)
- ***Sphagnum* cover**: 26-33% (11-25% in places)
- ***Narthecium* cover**: 4-10% (<4% in places)
- **Micro- topography**: Hummocks/hollows, flats and pools
- **Tussocks**: *Trichophorum germanicum* (4-10%)
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (34-50%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (4-10%; 11-25% in places), *E. angustifolium* (<4%), *Narthecium ossifragum* (4-10%), *Rhynchospora alba* (4-10%; 11-25% in places), *Trichophorum germanicum* (4-10%), *Carex panicea* (<4%), *Sphagnum capillifolium* (H; 11-25%), *S. papillosum* (H; 4-10%), *S. fuscum* (H; <4%), *S. austinii* (H; <4%), *S. magellanicum* (P; <4%), *S. cuspidatum* (P; 4-10%; <4% in places).
- **Additional comments**: the pools in this complex are mostly open water/algal with only a patchy cover of *S. cuspidatum*. This complex grades into the marginal complex 4/2.

COMPLEX 6/3 B

- **Location**: description taken in the north-west of section 4
- **Ground**: firm
- **Physical indicators**: bare peat 4-10%; burnt *Sphagnum* hummocks: *Cladonia floerkeana* present
- ***Calluna* height**: <10cm
- ***Cladonia* cover**: absent
- **Macro-topography**: gentle slope
- **Pools**: largely absent (<4% in places)
- ***Sphagnum* cover**: 11-25%
- ***Narthecium* cover**: 11-25%
- **Micro- topography**: Low hummocks/hollows and flats
- **Tussocks**: *Trichophorum germanicum* (4-10%)
- **Degradation or regeneration evidence**: absent

- **Species cover**: *Calluna vulgaris* (11-25%), *Eriophorum vaginatum* (<4%), *E. angustifolium* (<4%), *Narthecium ossifragum* (11-25%), *Trichophorum germanicum* (4-10%), *Carex panicea* (11-25%), *Erica tetralix* (<4%), *Molinia caerulea* (<4% in localized patches), *Leucobryum glaucum* (<4%), *Sphagnum capillifolium* (H; 11-25%), *S. papillosum* (H; 4-10%), *S. tenellum* (H; <4%), *S. austinii* (H; <4%), *S. subnitens* (H; <4%), *S. magellanicum* (H; <4%), *S. cuspidatum* (Hl; <4%).
- **Additional comments:** this area is recovering from a burn that occurred prior to the 2010 AP.

Marginal Ecotope Complexes

COMPLEX 6/7/2

- **Location**: west of section 3
- **Ground**: firm
- **Physical indicators**: absent
- ***Calluna* height**: 21-30cm
- ***Cladonia* cover**: 51-75%
- **Macro-topography**: gentle slope
- **Pools**: <4%
- ***Sphagnum* cover**: 4-10% (11-25% in places)
- ***Narthecium* cover**: 11-25%
- **Micro- topography**: low hummocks/*Narthecium ossifragum* flats/ hollows
- **Tussocks**: *Trichophorum germanicum* (4-10%)
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (34-50%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (<4%), *E. angustifolium* (<4%), *Narthecium ossifragum* (11-25%), *Carex panicea* (4-10%), *Trichophorum germanicum* (4-10%), *Pleurozia purpurea* (<4%), *Cladonia uncialis* (<4%), *Sphagnum capillifolium* (H; 4-10%), *S. tenellum* (H; <4%), *S. subnitens* (H; 4-10%), *S. papillosum* (H; <4%), *S. cuspidatum* (P; <4%).
- **Additional comments**: This complex has some sub-marginal characteristics and is a borderline marginal/sub-marginal type complex. It was classed as complex 2/3/6 in 2005. There are some vehicle tracks adjacent to the forestry plantation in the south-west of section 3 as well as some scattered pine (*Pinus contorta*; up to 1.5m in height) on the high bog in this area. There is also slight poaching damage in parts of the north-west and southern areas of this complex within section 3. *Molinia caerulea* dominated flush vegetation was also recorded along a narrow band within this complex in the NW of section 3 along both sides of drain D64.

COMPLEX 4/2

- **Location**: western parts of section 1
- **Ground**: firm but very wet
- **Physical indicators**: absent
- ***Calluna* height**: 11-20cm
- ***Cladonia* cover**: absent
- **Macro-topography**: gentle slope
- **Pools**: <4%
- ***Sphagnum* cover**: 4-10% (11-25% in places)
- ***Narthecium* cover**: <4%
- **Micro- topography**: low hummocks/*Narthecium ossifragum* flats/ hollows
- **Tussocks**: *Trichophorum germanicum* (4-10%)
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (4-10%), *Eriophorum vaginatum* (<4%), *E. angustifolium* (<4%), *Narthecium ossifragum* (<4%), *Rhynchospora alba* (11-25%), *Carex panicea* (4-10%), *Trichophorum germanicum* (4-10%), *Sphagnum capillifolium* (H; 4-10%), *S. tenellum* (H; <4%), *S. papillosum* (H; <4%), *S. cuspidatum* (P; <4%).
- **Additional comments**: This complex grades into the sub-marginal complex 4/9.

COMPLEX 3/6

- **Location**: found along margin of sections 1,2 and 4
- **Ground**: firm
- **Physical indicators**: bare peat 4-10%
- ***Calluna* height**: 21-40cm
- ***Cladonia* cover**: 4-10% (11-25% in places)
- **Macro-topography**: gentle slope
- **Pools**: absent
- ***Sphagnum* cover**: 4-10%
- ***Narthecium* cover**: 11-25%
- **Micro- topography**: low hummocks/*Narthecium ossifragum* flats/ hollows
- **Tussocks**: *Trichophorum germanicum* (<4%)
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (11-25%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (4-10%), *E. angustifolium* (<4%), *Narthecium ossifragum* (11-25%), *Carex panicea* (11-25%), *Trichophorum*

germanicum (<4%), *Pedicularis sylvatica* (<4%), *Sphagnum capillifolium* (H; <4%), *S. tenellum* (H; <4%).

- **Additional comments**: None.

Inactive flushes

FLUSH FU

- **Location**: north-west of section 4
- **Ground**: soft
- **Physical indicators**: absent
- ***Calluna* height**: 31-40cm
- ***Cladonia* cover**: 4-10%
- **Macro-topography**: gentle slope
- **Pools**: absent
- ***Sphagnum* cover**: 11-25%
- ***Narthecium* cover**: <4%
- **Micro- topography**: Low hummocks/hollows
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (26-33%), *Molinia caerulea* (34-50%), *Eriophorum vaginatum* (4-10%), *Carex panicea* (<4%), *Vaccinium oxycoccos* (<4%), *Polytrichum strictum* (<4%), *Myrica gale* (<4%), *Potentilla erecta* (<4%), *Sphagnum capillifolium* (H; 11-25%).
- **Additional comments:** Parts of flush U could be old cutover with the boundary between the high bog and the cutover difficult to see. There are apparent shallow face-banks that are likely to have been the result of old hand-cutting. A stream also runs along/through this flush. This is also likely to be associated with old peat cutting and it is fringed with *Ulex europaeus, Salix* sp. (*cinerea* type), *Crataegus monogyna*, *Pteridium aquilinum*, *Molinia caerulea*, *Rubus fruticosus* and *Betula pubescens*. This stream is full of water and it is 2-3m wide. This stream and narrow fringe of scrub-like vegetation (up to 6m high) was mapped as being part of flush U in 2005, but is probably best mapped as old cutover.

FLUSH Y

This inactive flush is found towards the north-east of section 1 and is linear in shape, being aligned in a N/S and NE/SW direction. In 2004 it was mapped as a continuous flush, but in 2012, it is

mapped as two areas separated by a band of sub-marginal vegetation. Both parts of the flush are dominated by *Molinia caerulea*. The southern part has large swallow holes and also has *Myrica gale*, *Vaccinium oxycoccos* and tall *Calluna vulgaris*. Kelly *et al*. (1995) described this flush as "an internal drainage system with swallow holes typical of these more westerly sites."

FLUSH Z

This is a relatively large inactive flush that occurs across much of the centre of section 1. It is dominated mostly by *Molinia caerulea*, which occurs essentially in wide bands that are aligned in a N/S direction. Kelly *et al*. (1995) noted that the flush's occurrence is coincident with a low mineral relief mineral ridge that runs under the site and surmised that the peat layer is thus likely to be quite thin in this area. Active flush was mapped in the southern extent of flush Z in 2004, but it was also noted at the time that the flush was not comprehensively surveyed. In 2012, no area of active flush was mapped within flush Z, but an area of sub-central ecotope was mapped within part of the area mapped as active flush in 2004.

Occurring alongside the *Molinia caerulea*, the following species were recorded: *Calluna vulgaris* (up to 0.5m); *Potentilla erecta*; *Aulacomnium palustre*; *Hypnum jutlandicum* and *Polytrichum strictum*. The *Sphagnum* cover was estimated at 15-20% composed mainly of hummocks of *S. capillifolium*, but also with *S. papillosum* and *S. austinii*.

In the south-west, there is a band of *Betula pubescens*, *Salix* sp. and *Pinus* (*contorta*?) with some of the *Pinus* being up to 4m tall. *Rubus fruticosus* was also recorded in this area as well as tall *Calluna vulgaris*, *Myrica gale* and *Molinia caerulea*.

In the north of the flush swallow holes were recorded containing *Osmunda regalis*.

FLUSH MO

This was mapped as Mo in 2004 (*Molinia caerulea*). It is a linear flush aligned NE/SW and is dominated by *Molinia caerulea* (76-90%) and tall *Calluna vulgaris* with occasional *Betula pubescens* (up to 2, tall) and *Myrica gale*. The *Sphagnum* cover is ca. 10%.

FLUSH O

This inactive flush is found close to the centre of section 2 and is dominated by *Molinia caerulea* with tall *Calluna vulgaris*, *Sphagnum capillifolium*, *S. tenellum*, *Hypnum jutlandicum* and *Racomitrium lanuginosum* also recorded.

FLUSH P

This inactive flush is found in the south-east of section 2 and is dominated by *Molinia caerulea* with tall *Calluna vulgaris* and some *Betula pubescens* (up to 2m tall)..

FLUSH S

This inactive flush is found in the south of section 2 and is dominated by *Molinia caerulea* with tall *Calluna vulgaris*, *Sphagnum capillifolium* and *Polytrichum strictum*. A couple of *Sphagnum austinii* hummocks were also recorded. The overall Sphagnum cover was estimated to be 5%.

FLUSH T

This inactive flush is found in the west of section 2 and is likely to be associated with water drawn across the drains in the area (D10). The ground is firm underfoot and *Molinia caerulea* dominates the vegetation with tall (up to 1m) *Calluna vulgaris* and scattered trees (*Betula pubescens*; up to 4m) also present in a deep depression.

FLUSH N, Q, R, V & X

These inactive flushes were not visited in 2012.

Face bank Complexes

COMPLEX 1

- **Location**: this complex was found along the bog margin
- **Ground**: firm
- **Physical indicators**: bare peat (4-10%)
- ***Calluna* height**: <50cm
- ***Cladonia* cover**: <4%
- **Macro-topography**: steep slope
- **Pools**: absent
- ***Sphagnum* cover**: generally absent but <4% in places
- ***Narthecium* cover**: <4%
- **Micro- topography:** tall robust *Calluna vulgaris*/low hummocks
- **Tussocks:** *Trichophorum germanicum* (<4%)
- **Degradation or regeneration evidence**: absent

- **Species cover**: *Calluna vulgaris* (76-90%), *Erica tetralix* (4-10%), *Trichophorum germanicum* (<4%), *Narthecium ossifragum* (<4%), *Sphagnum capillifolium* (H; <4%), *Hypnum jutlandicum* (<4%).
- **Additional comments**: none

Depressions on peat substrates of the Rhynchosporion (7150)

The habitat occurs at Callow Bog in both Active and Degraded Raised Bog, but it is only occasional found on degraded habitat. Only *Rhynchospora alba* was recorded within the 2012 survey at this site.

R. alba is found in all ecotopes in Callow Bog, such as: central ecotope (14 & 35) sub-central ecotope (4/15; 9/10; 4/10; 6/10; 9A + P, 9 + P; 6/9 +P & 6/9A + P); sub-marginal ecotope (4/9) and marginal ecotope (4/2).

The species becomes very frequent within complexes 14 and 35 (central); 4/15, 9/10, 4/10 and 6/9 +P (sub-central); 4/9 (sub-marginal) and 4/2 (marginal).

The species is always found associated with wet features such as *Sphagnum* pools, *Sphagnum* lawns and hollows, along with *Sphagnum magellanicum*, *S. papillosum*, *S. cuspidatum*. It was also found within *Narthecium ossifragum* dominated hollows in sub-marginal and marginal ecotope complexes.

Appendix II Photographical records

Photograph Number	Aspect	Type	Feature	Date
DSCF3598	NE	Overview	Qsc5	02/11/2012
DSCF3600	NE	Overview	Qsc4	06/11/2012
DSCF3602	NE	Overview	Qsc3	07/11/2012
DSCF3604	NE	Overview	Qsm12; was formerly Qsc8	07/11/2012
DSCF3605	NE	Overview	Qc1	09/11/2012
DSCF3603	NE	Overview	Qsm11; was formerly QAf1	07/11/2012
DSCF3601	NE	Overview	Qsc9;was Qsm9	07/11/2012

Appendix III Quadrats

Ecotope type	Central	Central	Active flush	Sub-marginal
Complex Name	**35**	**35**	**na**	**9/7/6**
Quadrat Name	Qc1	Qc1	Qaf1	Qsm11
Easting	166669	166671.06	167313	167315.44
Northing	295108	295110.62	295832	295836.30
Date	21/06/04	09/11/2012	21/06/04	07/11/2012
Firmness	very soft	Quaking	soft	Soft
Burnt	No	No	No	No
Algae in hollows %	Absent	Absent	1-3 (many indiv)	Absent
Algae in pools %	1-3 (many indiv)	Absent	Absent	Absent
Bare peat %	1-3 (many indiv)	Absent	Absent	Absent
High hummocks %	na	4-10	na	Absent
Low hummocks %	11-25	11-25	34-50	34-50
Hollows %	4-10	1-3 (many indiv)	4-10	34-50
Lawns %	1-3 (many indiv)	Absent	Absent	Absent
Pools %	34-50	51-75	Absent	Absent
Pool type	Interconnecting	Interconnecting	Absent	Absent
S.austinii hum type	na	Active	na	Absent
S.austinii hum %	1-3 (many indiv)	11-25	34-50	Absent
S.austinii height(cm)	na		na	Absent
S.fuscum hum type	Absent	Absent	Absent	Absent
S.fuscum hum %	Absent	Absent	Absent	Absent
S.fuscum height(cm)	Absent	Absent	Absent	Absent
Leucobryum glaucum	1-3 (few indiv)	Absent	Absent	Absent
Trichophorum type	Flats	Flats	Absent	Flats
Trichophorum %	1-3 (few indiv)	4-10	Absent	1-3 (few indiv)
S.magellanicum %	na	Absent	Absent	Absent
S.cuspidatum %	34-50	34-50	Absent	Absent
S.papillosum %	4-10	11-25	4-10	1-3 (many indiv)
S.denticulatum %	na	Absent	Absent	Absent
S.capillifolium%	4-10	4-10	4-10	11-25
S.tenellum %	na	Absent	na	1-3 (several indiv)
S.subnitens %	na	Absent	na	Absent
R.fusca %	Absent	Absent	Absent	Absent

Ecotope type	**Central**	**Central**	**Active flush**	**Sub-marginal**
Complex Name	**35**	**35**	**na**	**9/7/6**
R.alba %	4-10	1-3 (several indiv)	Absent	Absent
N.ossifragum %	4-10	4-10	1-3 (many indiv)	11-25
Sphag pools %	34-50	51-75	Absent	Absent
Dominant pool Sphag	S.cuspidatum	S.cuspidatum	Absent	
Sphag lawns %	1-3 (many indiv)	Absent	Absent	Absent
Sphag humm %	11-25	11-25	34-50	11-25
Sphag holl %	1-3 (many indiv)	1-3 (many indiv)	4-10	4-10
Total Sphag %	51-75	51-75	34-50	11-25
Hummocks indicators	S.austinii	S.austinii	S.austinii	Absent
Cladonia portent %	1-3 (many indiv)	4-10	1-3 (many indiv)	1-3 (many indiv)
Other Cladonia sp	na	C.uncialis	na	C.uncialis
C. panicea %	na	Absent	na	1-3 (many indiv)
Calluna cover %	4-10	11-25	11-25	26-33
Calluna height(cm)	21-30	21-30	11-20	11-20
Other NotableSpecies		V.oxy, Pleurozium schreberi, Aulacomium pal, D.ang		Pleurozia purpurea
Other comment				S.cusp/austinii & Molinia adj to quad (was Qaf1 in 2004)

Ecotope type	**Sub-central**	**Sub-central**	**Sub-central**	**Sub-central**
Complex Name	**4 + P + Cl**	**4/15**	**9/7/10**	**9/10**
Quadrat Name	Qsc3	Qsc3	Qsc4	Qsc4
Easting	167937	167939.42	167856	167856.25
Northing	296111	296113.54	294959	294959.81
Date	21/06/04	07/11/2012	21/06/04	06/11/2012
Firmness	Quaking	Soft	Quaking	Very soft
Burnt	No	No	No	No
Algae in hollows %	Absent	Absent	Absent	Absent
Algae in pools %	4-10	Absent	Absent	Absent
Bare peat %	Absent	Absent	Absent	Absent
High hummocks %	na	Absent	na	Absent
Low hummocks %	26-33	26-33	26-33	34-50

Ecotope type	**Sub-central**	**Sub-central**	**Sub-central**	**Sub-central**
Complex Name	**4 + P + Cl**	**4/15**	**9/7/10**	**9/10**
Hollows %	4-10	4-10	4-10	4-10
Lawns %	4-10	4-10	26-33	34-50
Pools %	11-25	34-50	4-10	4-10
Pool type	Interconnecting	Interconnecting	na	Regular
S.austinii hum type	Absent	Absent	Absent	Absent
S.austinii hum %	Absent	Absent	Absent	Absent
S.austinii height(cm)	Absent	Absent	Absent	Absent
S.fuscum hum type	Absent	Absent	Absent	Absent
S.fuscum hum %	Absent	Absent	Absent	Absent
S.fuscum height(cm)	Absent	Absent	Absent	Absent
Leucobryum glaucum	Absent	Absent	Absent	Absent
Trichophorum type	Absent	Flats	Flats	Flats
Trichophorum %	Absent	1-3 (several indiv)	1-3 (few indiv)	1-3 (many indiv)
S.magellanicum %	Absent	Absent	4-10	11-25
S.cuspidatum %	4-10	34-50	4-10	11-25
S.papillosum %	4-10	11-25	11-25	11-25
S.denticulatum %	1-3 (few indiv)	Absent	Absent	26-33
S.capillifolium%	11-25	11-25	4-10	1-3 (many indiv)
S.tenellum %	na	4-10	na	1-3 (many indiv)
S.subnitens %	Absent	Absent	Absent	Absent
R.fusca %	Absent	Absent	Absent	Absent
R.alba %	11-25	4-10	4-10	4-10
N.ossifragum %	1-3 (several indiv)	1-3 (several indiv)	1-3 (many indiv)	4-10
Sphag pools %	11-25	34-50	4-10	4-10
Dominant pool Sphag	S.cuspidatum	S.cuspidatum	S.cuspidatum	S.cuspidatum
Sphag lawns %	4-10	4-10	26-33	34-50
Sphag humm %	11-25	11-25	11-25	34-50
Sphag holl %	1-3 (many indiv)	4-10	1-3 (many indiv)	4-10
Total Sphag %	34-50	76-90	51-75	34-50
Hummocks indicators	Absent	Absent	Absent	Absent
Cladonia portent %	4-10	4-10	4-10	4-10
Other Cladonia sp	na	C.uncialis	na	C. uncialis
C. panicea %	Absent	Absent	Absent	Absent
Calluna cover %	11-25	11-25	4-10	11-25
Calluna height(cm)	21-30	11-20	11-20	21-30

Ecotope type	**Sub-central**	**Sub-central**	**Sub-central**	**Sub-central**
Complex Name	**4 + P + Cl**	**4/15**	**9/7/10**	**9/10**
Other NotableSpecies		Menyanthes D.ang Pedicularis	Racomitrium	Raco lang; Pleu purp
Other comment				

Ecotope type	**Sub-central**	**Sub-central**	**Sub-central**	**Sub-marginal**
Complex Name	**9A + P**	**6/15**	**9A/10**	**9a/7**
Quadrat Name	Qsc5	Qsc5	Qsc8	Qsm12
Easting	166630	166630.35	167198	167194.02
Northing	297139	297140.13	295850	295850.55
Date	21/06/04	02/11/2012	21/06/04	07/11/2012
Firmness	soft	Very soft	firm	
Burnt	No	No	No	No
Algae in hollows %	1-3 (many indiv)	Absent	Absent	Absent
Algae in pools %	1-3 (many indiv)	Absent	Absent	Absent
Bare peat %	1-3 (many indiv)	Absent	Absent	Absent
High hummocks %	na	Absent	na	Absent
Low hummocks %	26-33	34-50	34-50	34-50
Hollows %	4-10	4-10	4-10	34-50
Lawns %	4-10	1-3 (many indiv)	Absent	Absent
Pools %	11-25	34-50	Absent	Absent
Pool type	na	Interconnecting	Absent	Absent
S.austinii hum type	na	Absent	na	Absent
S.austinii hum %	1-3 (many indiv)	Absent	26-33	Absent
S.austinii height(cm)	na	Absent	na	Absent
S.fuscum hum type	na	Absent	Absent	Absent
S.fuscum hum %	1-3 (few indiv)	Absent	Absent	Absent
S.fuscum height(cm)	na	Absent	Absent	Absent
Leucobryum glaucum	Absent	Absent	Absent	Absent
Trichophorum type	Flats	Flats	Absent	Flats
Trichophorum %	1-3 (few indiv)	1-3 (several indiv)	Absent	1-3 (several indiv)
S.magellanicum %	Absent	Absent	Absent	Absent
S.cuspidatum %	11-25	26-33	Absent	Absent
S.papillosum %	11-25	26-33	Absent	Absent
S.denticulatum %	Absent	Absent	Absent	Absent
S.capillifolium%	4-10	11-25	Absent	11-25

Ecotope type	**Sub-central**	**Sub-central**	**Sub-central**	**Sub-marginal**
Complex Name	**9A + P**	**6/15**	**9A/10**	**9a/7**
S.tenellum %	na	1-3 (several indiv)	na	1-3 (several indiv)
S.subnitens %	Absent	1-3 (several indiv)	Absent	Absent
R.fusca %	Absent	Absent	Absent	Absent
R.alba %	4-10	4-10	Absent	Absent
N.ossifragum %	4-10	1-3 (many indiv)	1-3 (many indiv)	1-3 (many indiv)
Sphag pools %	11-25	34-50	Absent	Absent
Dominant pool Sphag	S.cuspidatum	S.cuspidatum	Absent	
Sphag lawns %	4-10	1-3 (many indiv)	Absent	Absent
Sphag humm %	11-25	26-33	26-33	11-25
Sphag holl %	1-3 (many indiv)	1-3 (many indiv)	4-10	4-10
Total Sphag %	51-75	76-90	34-50	11-25
Hummocks indicators	S.austinii&S.fuscum	Absent	Absent	Absent
Cladonia portent %	4-10	4-10	Absent	1-3 (many indiv)
Other Cladonia sp	na	C.uncialis	na	C.uncialis
C. panicea %	Absent	Absent	Absent	1-3 (few indiv)
Calluna cover %	11-25	26-33	11-25	26-33
Calluna height(cm)	21-30	11-20	21-30	21-30
Other NotableSpecies	Campylopus atrovirens	Pleurozia purpurea Racomitrium Menyantes Drosera anglica Dicranum scop		
Other comment		S.austinii & C. atrovirens adj to quad	Relic SC	Former Qsc8

Ecotope type	**Submarginal**	**Sub-central**	**Sub-central**	**Sub-central**
Complex Name	**6 + P + My**	**6/9 + P**	**9A + P**	**9A/4 + P + Cl**
Quadrat Name	Qsm9	Qsc9	Qsc1	Qsc2
Easting	167571	167571.01	167585	168035
Northing	295850	295850.00	296165	296235
Date	21/06/04	07/11/2012	21/06/04	21/06/04
Firmness	firm	Soft	soft	very soft
Burnt	No	No	No	No

Ecotope type	**Submarginal**	**Sub-central**	**Sub-central**	**Sub-central**
Complex Name	**6 + P + My**	**6/9 + P**	**9A + P**	**9A/4 + P + Cl**
Algae in hollows %	Absent	Absent	1-3 (many indiv)	Absent
Algae in pools %	4-10	Absent	Absent	1-3 (many indiv)
Bare peat %	Absent	Absent	Absent	Absent
High hummocks %	na	Absent	na	na
Low hummocks %	11-25	26-33	11-25	26-33
Hollows %	4-10	11-25	11-25	4-10
Lawns %	Absent	Absent	Absent	Absent
Pools %	11-25	11-25	11-25	34-50
Pool type	Tear	Regular	na	Interconnecting
S.austinii hum type	Absent	Absent	Absent	na
S.austinii hum %	Absent	Absent	Absent	4-10
S.austinii height(cm)	Absent	Absent	Absent	na
S.fuscum hum type	Absent	Absent	Absent	Absent
S.fuscum hum %	Absent	Absent	1-3 (few indiv)	Absent
S.fuscum height(cm)	Absent	Absent	Absent	Absent
Leucobryum glaucum	Absent	Absent	Absent	Absent
Trichophorum type	Flats	Flats	Tussocks	Flats
Trichophorum %	1-3 (many indiv)	1-3 (several indiv)	1-3 (few indiv)	1-3 (few indiv)
S.magellanicum %	Absent	Absent	Absent	Absent
S.cuspidatum %	4-10	11-25	4-10	4-10
S.papillosum %	Absent	4-10	4-10	4-10
S.denticulatum %	1-3 (many indiv)	1-3 (several indiv)	Absent	Absent
S.capillifolium%	4-10	4-10	11-25	11-25
S.tenellum %	na	Absent	na	na
S.subnitens %	Absent	1-3 (many indiv)	na	Absent
R.fusca %	Absent	Absent	Absent	Absent
R.alba %	4-10	1-3 (many indiv)	4-10	34-50
N.ossifragum %	1-3 (many indiv)	4-10	4-10	4-10
Sphag pools %	4-10	11-25	11-25	11-25
Dominant pool Sphag	S.cuspidatum	S.cuspidatum	S.cuspidatum	S.cuspidatum
Sphag lawns %	Absent	Absent	Absent	Absent
Sphag humm %	4-10	4-10	11-25	11-25
Sphag holl %	1-3 (many indiv)	4-10	1-3 (many indiv)	1-3 (many indiv)
Total Sphag %	11-25	11-25	34-50	34-50
Hummocks indicators	Absent	Absent	S.fuscum	S.austinii

Ecotope type	**Submarginal**	**Sub-central**	**Sub-central**	**Sub-central**
Complex Name	**6 + P + My**	**6/9 + P**	**9A + P**	**9A/4 + P + Cl**
Cladonia portent %	1-3 (many indiv)	11-25	1-3 (many indiv)	11-25
Other Cladonia sp	na	C.uncialis	na	na
C. panicea %	4-10	4-10	na	Absent
Calluna cover %	4-10	11-25	11-25	11-25
Calluna height(cm)	21-30	11-20	21-30	41-50
Other NotableSpecies	clumps of Myrica _ 1 m tall scattered	Raco C.atro Pleurozia purp Menyanthes D.anglica	Myrica gale	
Other comment		Sphagnum cover 25%. borderline sm/sc (was Qsm9)		

Ecotope type	**Subcentral**	**Subcentral**	**Submarginal**	**Submarginal**
Complex Name	**9 + P**	**4 + P**	**9A**	**6/3 + My**
Quadrat Name	Qsc6	Qsc7	Qsm1	Qsm2
Easting	166157	166496	167739	167655
Northing	295362	295225	296174	296108
Date	21/06/04	21/06/04	21/06/04	21/06/04
Firmness	very soft	soft	soft	firm-soft
Burnt	No	No	No	No
Algae in hollows %	1-3 (many indiv)	1-3 (many indiv)	na	1-3 (many indiv)
Algae in pools %	4-10	4-10	Absent	Absent
Bare peat %	1-3 (many indiv)	1-3 (many indiv)	na	na
High hummocks %	na	na	na	na
Low hummocks %	26-33	26-33	34-50	34-50
Hollows %	4-10	4-10	11-25	11-25
Lawns %	Absent	4-10	Absent	Absent
Pools %	11-25	4-10	Absent	Absent
Pool type	Tear	Tear	Absent	Absent
S.austinii hum type	na	na	Absent	Absent
S.austinii hum %	1-3 (many indiv)	1-3 (many indiv)	Absent	Absent
S.austinii height(cm)	na	na	Absent	Absent
S.fuscum hum type	Absent	Absent	Absent	Absent
S.fuscum hum %	Absent	Absent	Absent	Absent

Ecotope type	**Subcentral**	**Subcentral**	**Submarginal**	**Submarginal**
Complex Name	**9 + P**	**4 + P**	**9A**	**6/3 + My**
S.fuscum height(cm)	Absent	Absent	Absent	Absent
Leucobryum glaucum	Absent	Absent	Absent	Absent
Trichophorum type	Tussock	Tussock	Tussock	Tussock
Trichophorum %	4-10	4-10	4-10	1-3 (many indiv)
S.magellanicum %	Absent	Absent	Absent	Absent
S.cuspidatum %	4-10	4-10	4-10	Absent
S.papillosum %	4-10	11-25	4-10	4-10
S.denticulatum %	Absent	Absent	Absent	Absent
S.capillifolium%	11-25	4-10	4-10	4-10
S.tenellum %	na	na	na	na
S.subnitens %	Absent	Absent	Absent	Absent
R.fusca %	Absent	Absent	Absent	Absent
R.alba %	4-10	11-25	1-3 (many indiv)	na
N.ossifragum %	4-10	4-10	4-10	34-50
Sphag pools %	11-25	4-10	1-3 (many indiv)	Absent
Dominant pool Sphag	S.cuspidatum	S.cuspidatum	S.cuspidatum	Absent
Sphag lawns %	Absent	4-10	Absent	Absent
Sphag humm %	11-25	11-25	4-10	11-25
Sphag holl %	1-3 (many indiv)	1-3 (many indiv)	1-3 (many indiv)	Absent
Total Sphag %	34-50	34-50	11-25	11-25
Hummocks indicators	S.austinii	S.austinii	Absent	Absent
Cladonia portent %	4-10	4-10	1-3 (many indiv)	1-3 (many indiv)
Other Cladonia sp	na	na	na	na
C. panicea %	Absent	Absent	Absent	na
Calluna cover %	4-10	4-10	4-10	11-25
Calluna height(cm)	21-30	11-20	21-30	31-40
Other NotableSpecies				Myrica 5%
Other comment				

Ecotope type	**Submarginal**	**Submarginal**	**Submarginal**	**Submarginal**
Complex Name	**6/3/9 + P (B)**	**6/7/9 + P**	**6/3/9**	**4/2**
Quadrat Name	Qsm3	Qsm4	Qsm5	Qsm6
Easting	167989	167633	167148	167337
Northing	295603	296249	296192	295955
Date	21/06/04	21/06/04	21/06/04	21/06/04

Ecotope type	**Submarginal**	**Submarginal**	**Submarginal**	**Submarginal**
Complex Name	**6/3/9 + P (B)**	**6/7/9 + P**	**6/3/9**	**4/2**
Firmness	very soft	firm-soft	firm-soft	soft
Burnt	Recently (2003?)	No	na	na
Algae in hollows %	Absent	1-3 (many indiv)	Absent	4-10
Algae in pools %	Absent	4-10	na	na
Bare peat %	1-3 (many indiv)	na	na	na
High hummocks %	na	na	na	na
Low hummocks %	34-50	34-50	11-25	26-33
Hollows %	11-25	11-25	4-10	4-10
Lawns %	Absent	Absent	Absent	Absent
Pools %	4-10	4-10	Absent	Absent
Pool type	Regular	Tear	Absent	Absent
S.austinii hum type	Absent	Absent	Absent	na
S.austinii hum %	Absent	Absent	Absent	4-10
S.austinii height(cm)	Absent	Absent	Absent	na
S.fuscum hum type	Absent	Absent	Absent	na
S.fuscum hum %	Absent	Absent	Absent	1-3 (many indiv)
S.fuscum height(cm)	Absent	Absent	Absent	na
Leucobryum glaucum	Absent	Absent	Absent	Absent
Trichophorum type	Tussock	Tussock	Tussock	Tussock
Trichophorum %	4-10	4-10	1-3 (many indiv)	4-10
S.magellanicum %	Absent	Absent	Absent	Absent
S.cuspidatum %	1-3 (many indiv)	Absent	Absent	Absent
S.papillosum %	11-25	4-10	na	4-10
S.denticulatum %	Absent	Absent	na	na
S.capillifolium%	11-25	4-10	4-10	4-10
S.tenellum %	na	na	na	na
S.subnitens %	4-10	Absent	na	na
R.fusca %	Absent	Absent	na	na
R.alba %	na	4-10	na	34-50
N.ossifragum %	26-33	26-33	11-25	4-10
Sphag pools %	4-10	Absent	Absent	Absent
Dominant pool Sphag	S.cuspidatum	Absent	Absent	Absent
Sphag lawns %	Absent	Absent	Absent	Absent
Sphag humm %	26-33	11-25	4-10	11-25
Sphag holl %	Absent	Absent	na	na

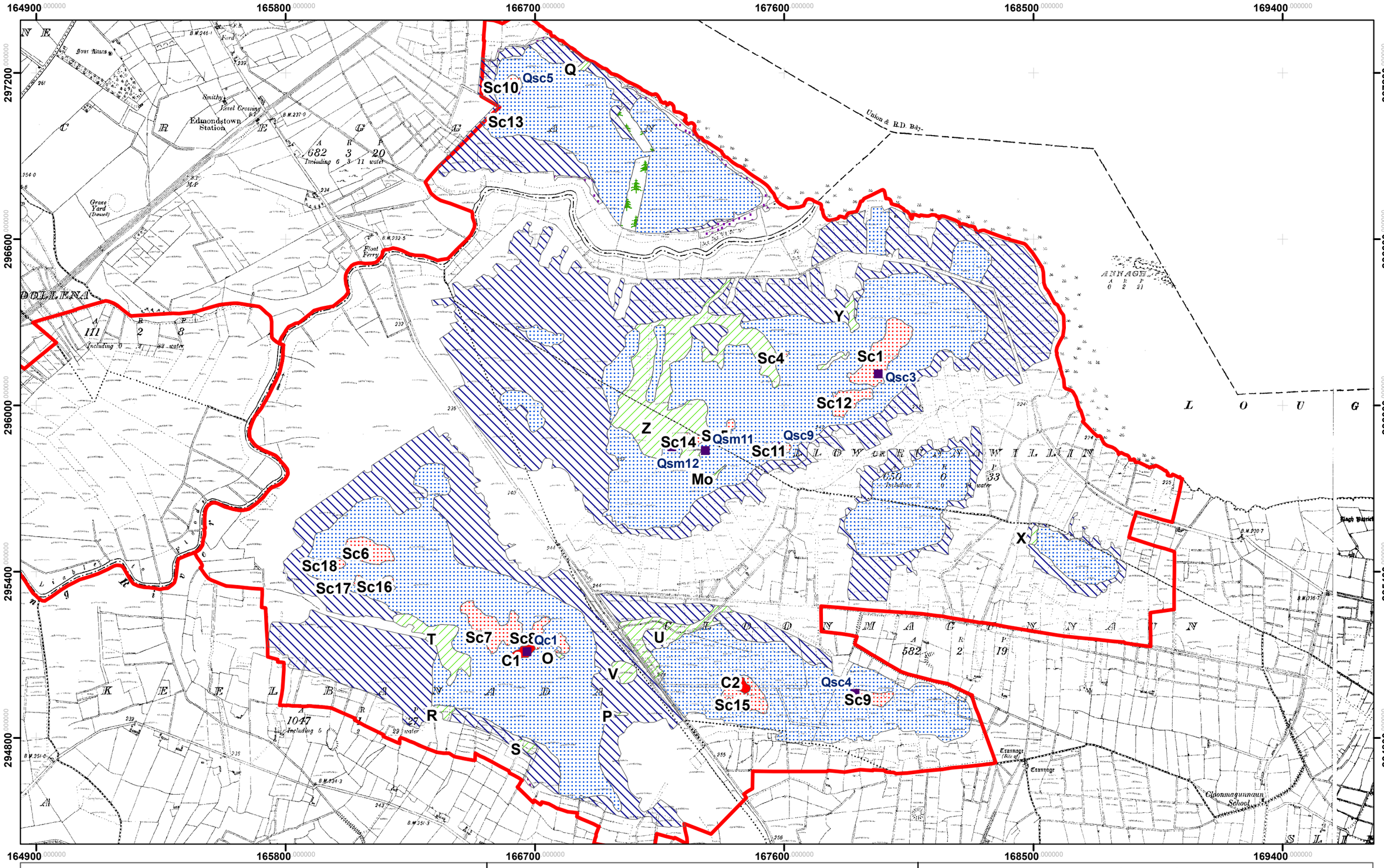
Ecotope type	**Submarginal**	**Submarginal**	**Submarginal**	**Submarginal**
Complex Name	**6/3/9 + P (B)**	**6/7/9 + P**	**6/3/9**	**4/2**
Total Sphag %	26-33	11-25	4-10	11-25
Hummocks indicators	Absent	Absent	Absent	S.austinii&S.fuscum
Cladonia portent %	Absent	1-3 (many indiv)	1-3 (many indiv)	1-3 (many indiv)
Other Cladonia sp	na	na	na	na
C. panicea %	na	na	11-25	na
Calluna cover %	na	4-10	11-25	1-3 (many indiv)
Calluna height(cm)	11-20	11-20	11-20	11-20
Other NotableSpecies				
Other comment				

Ecotope type	**Submarginal**	**Submarginal**	**Submarginal**
Complex Name	**6/3**	**9A/4 + AP**	**6/3 + P**
Quadrat Name	Qsm7	Qsm8	Qsm10
Easting	168252	168127	167105
Northing	296543	296284	295690
Date	21/06/04	21/06/04	21/06/04
Firmness	soft	soft	soft
Burnt	Yes	No	No
Algae in hollows %	Absent	4-10	4-10
Algae in pools %	Absent	4-10	4-10
Bare peat %	Absent	Absent	Absent
High hummocks %	na	na	na
Low hummocks %	11-25	34-50	34-50
Hollows %	4-10	4-10	4-10
Lawns %	Absent	Absent	Absent
Pools %	Absent	4-10	4-10
Pool type	Absent	Regular	Tear & Regular
S.austinii hum type	na	Absent	Absent
S.austinii hum %	1-3 (many indiv)	Absent	Absent
S.austinii height(cm)	na	Absent	Absent
S.fuscum hum type	Absent	Absent	Absent
S.fuscum hum %	Absent	Absent	Absent
S.fuscum height(cm)	Absent	Absent	Absent
Leucobryum glaucum	Absent	Absent	Absent

Ecotope type	**Submarginal**	**Submarginal**	**Submarginal**
Complex Name	**6/3**	**9A/4 + AP**	**6/3 + P**
Trichophorum type	Tussock	Absent	Flats
Trichophorum %	4-10	Absent	4-10
S.magellanicum %	Absent	Absent	Absent
S.cuspidatum %	Absent	Absent	1-3 (many indiv)
S.papillosum %	1-3 (many indiv)	1-3 (many indiv)	4-10
S.denticulatum %	Absent	Absent	Absent
S.capillifolium%	4-10	11-25	4-10
S.tenellum %	na	na	na
S.subnitens %	Absent	Absent	Absent
R.fusca %	Absent	Absent	Absent
R.alba %	Absent	34-50	Absent
N.ossifragum %	4-10	na	4-10
Sphag pools %	Absent	1-3 (many indiv)	1-3 (many indiv)
Dominant pool Sphag	Absent	Absent	S.cuspidatum
Sphag lawns %	Absent	Absent	Absent
Sphag humm %	4-10	11-25	4-10
Sphag holl %	na	na	1-3 (many indiv)
Total Sphag %	4-10	11-25	11-25
Hummocks indicators	S.austinii	Absent	Absent
Cladonia portent %	1-3 (many indiv)	1-3 (many indiv)	1-3 (many indiv)
Other Cladonia sp	na	na	na
C. panicea %	11-25	Absent	11-25
Calluna cover %	4-10	11-25	11-25
Calluna height(cm)	0-10	11-20	41-50
Other NotableSpecies	S. fuscum, Andromeda	Aulacomnium, Drosera, Menyanthes	
Other comment			

Note: Data for those 2004/5 quadrats re-surveyed in 2012 is given to the right of the original 2004/5 quadrat data in table above. Not all quadrats reported in 2004/5 were re-surveyed in 2012. Nonetheless, all 2004/5 quadrat data is given above. Additional quadrats were recorded where necessary. Some 2004/5 quadrats may have been classified under a different ecotope category in 2012; further detail is given within the report.

Appendix IV Survey maps



Raised Bog Monitoring & Assessment Survey 2013

Map 1: Ecotopes Map and Quadrats

Ecology and Environmental Consultants Ireland Ltd.

Callow SAC (000595)
Co. Roscommon

1:13,000

N

0 160 320 640 960 1,280 Meters

Legend

- Quadrat

Ecotope type

- Central
- Sub-central
- Bog Woodland
- Active Flush
- Sub-marginal
- Marginal
- Inactive Flush
- Woodland
- Face bank
- Open water
- Conifer plantation
- Clear felled area
- SAC

Raised Bog Monitoring & Assessment Survey 2013

Map 2: Vegetation community complexes

Ecology and Environmental Consultants Ireland Ltd.

Callow SAC (000595)
Co. Roscommon

1:13,000

N

0 185 370 740 1,110 1,480 Meters

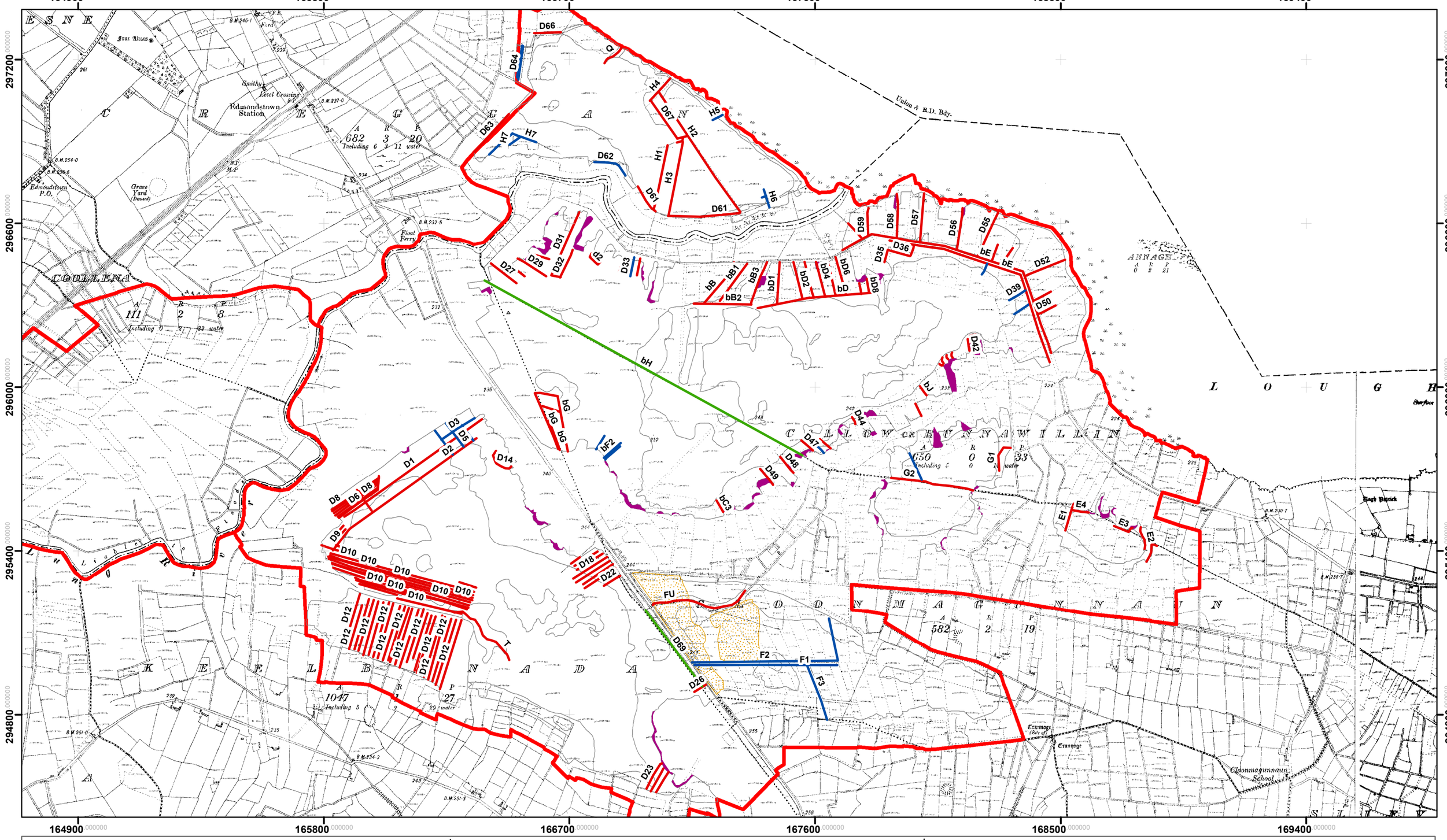
Legend

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



Raised Bog Monitoring & Assessment Survey 2013

Map 3: Impacts (High bog drainage; Turf cutting;Fire events)

Ecology and Environmental Consultants Ireland Ltd.

Callow SAC (000595)
Co. Roscommon

1:13,000

N

0 180 360 720 1,080 1,440 Meters

Legend

High Bog drainage

- Blocked:non-functional
- Blocked:reduced functional
- Not blocked:functional
- Not blocked:non-functional
- Not blocked:reduced functional
- Burnt high bog (2004/05-12/13)
- High bog cutaway (2004/05-10)
- SAC