Camderry Bog (SAC 002347), Co. Galway

Executive Summary

This survey, carried out in October 2012, aimed to assess the conservation status of habitats listed on Annex I of the European Habitats Directive (92/43EEC) on the high bog at Camderry 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 6.17 ha (3.16%) of the high bog area. A small area (0.21ha) of central ecotope, the highest quality Active Raised Bog, is found in the southwest of the site. Here there are interconnecting *Sphagnum* pools dominated by *Sphagnum cuspidatum* and an overall *Sphagnum* cover of 51-75% with some evidence of flushing indicated by the presence of *Aulacomnium palustre* and *Polytrichum strictum*. An active peat forming flush is present on a gentle slope in the north of the site in which there is a local depression that may be a small soak. In the 'soak' area there is a quaking lawn of *Sphagnum* including *S. papillosum*, *S. magellanicum* and *S. fallax* with an overall *Sphagnum* cover of 51-75% while elsewhere within the flush the *Sphagnum* cover is 34-50%. Sub-central ecotope (4.63ha) is more variable in quality and is found in three areas; one in the northern lobe and two in the southern lobe of high bog.

Degraded Raised Bog covers 189.27ha (96.84%) of the high bog area. It is drier than Active Raised Bog and supports a lower density of *Sphagnum* mosses. It has a less developed micro-topography with permanent pools and *Sphagnum* lawns generally absent. It is composed of sub-marginal (100.63ha), marginal (62.57ha) and facebank (3.33ha) ecotope as well as several inactive flushes (9.30ha), some of which are associated with old peat cutting.

Depressions on peat substrates of the Rhynchosporion are found in both Active and Degraded Raised Bog, but tend to be best developed and most stable in the wettest areas of Active Raised Bog. On Camderry Bog, the habitat was most frequent in the wetter parts of the south-west of the site and along the steeply sloping ridge between the northern and southern lobes of high bog.

Restoration works took place at the site from 2005-07 when a 13.44ha, mainly *Pinus contorta*, plantation on the west of the northern lobe of high bog was felled as part of Coillte's LIFE-funded raised bog restoration project. Restoration activities involved the clear-felling and removal of the mature conifer plantation, the wind-rowing of the remaining brash and the blocking of drains with peat dams. Follow-up work included the control of the natural regeneration of conifer seedlings. Conifers regenerating on the open bog surface were also felled as part of this project. These restoration works have led to an increase in the water table in the clear-felled area, which should allow Active Raised Bog habitat to develop (Derwin, 2008). An improvement in the condition of the Degraded Raised Bog in the areas adjacent to the felled plantation was recorded during the 2012 survey.

The current conservation objective for Camderry 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 31.00ha. The objective in relation to Structure and Functions (S&Fs) is that at least half of the Active Raised Bog area should be made up of the central ecotope and active flush (i.e. the wetter vegetation communities). These values have been set as Favourable Reference Values 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 to 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 in the area of Active Raised Bog (1.21ha) at Camderry Bog in the 2004 to 2012 period. This loss has taken place in the north-east and south-west of the site due to ongoing drying out affects. One new peat forming area has been described at the site, which is the result of a more comprehensive field mapping rather than an actual change.

Peat cutting and drainage are the most threatening current activities at the site. 0.79ha of high bog have been lost in the reporting period due to peat cutting while 2.58km of drains remain functional and 3.26km reduced functional. On a positive note, only one turf plot was cut in 2012 compared with 19 in 2010/2011 and none in 2013. Nevertheless this activity cannot be considered phased out at the site. No fire events have affected the bog in the reporting period.

Active Raised Bog has been given an overall **Unfavourable Bad–Declining** conservation status assessment. Habitat Area has slightly decreased and quality (S&Fs) declined in the reporting period. Furthermore, the current Area value as well as the S&Fs are below reference values. Future Prospects are considered Unfavourable Bad-Declining as drainage and peat cutting 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 **Camderry SAC** has been given an **Unfavourable Bad-Declining** assessment.

A series of **recommendations** have been also given, these include: cessation of peat cutting; ongoing monitoring and management of existing restoration works; further restoration works, including drain blocking on the high bog and perhaps adjacent cutover; further hydrological and topographical studies to ascertain more accurate FRVs and to assess the impacts of regional drainage works; further botanical monitoring surveys to assess the efficiency of restoration works; and the revision of the SAC boundary to include all of the high bog as currently a small area in the west of the northern lobe is outside of the SAC.

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Site identification

SAC Site Code	002347	**6" Sheet:**	GA 019, GA032
Grid Reference:	E 170000 / N 257300	**1:50,000 Sheet:**	39
High Bog area (ha):	195.44ha		
Dates of Visit:	15 to 17/10/12		
Townlands:	Boggauns, Camderry, Corracullin, Cloonshivna and Cialsallagh.		

[1] The current extent of the high bog is 195.44ha, while that reported in 2004 was 192.58ha (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 0.79ha in the 2004/05-2010 period due to peat cutting. The actual high bog extent in 2004 was 196.23ha (see tables 8.1 and 8.3 2004 (amended) figures).

Site location

Camderry Bog is located 12km north-northeast of Mountbellew and 9km south-east of Glenamaddy in east Co. Galway. A tributary of the Shiven River borders the north, north-western and south-western margins of the site while the eastern margin is bounded by a mineral ridge.

The site may be accessed from a track that leads from a road running NE/SW at the southern side of the site and from tracks that access the now felled conifer plantation at the north-west of the site.

Kelly *et al*. (1995) grouped Camderry Bog with the raised bogs of East Galway. Leaha Bog (NHA 282) lies immediately adjacent to the site in the north, separated from it only by a tributary of the Shiven River. Clooncullaun Bog (NHA 245) and Funshin Bog (NHA 267) are, in turn, immediately adjacent to Leaha Bog. Lough Lurgeen Bog (SAC 000301) lies 2.5km to the north-west and Lisnageeragh Bog (SAC 000296) and Kelloges Bog (NHA 281) 5km to the north-west of the site while Curraghlehanagh Bog (SAC 002350) is 3km to the south-west and Kilmore Bog (NHA 283) 3km to the south-east of Camderry Bog.

Description of the survey

The survey was carried out in October 2012 and involved a vegetation survey of the high bog at Camderry 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 Camderry Bog was re-surveyed. Sections mapped as sub-marginal, sub-central and central ecotope in 2004 were surveyed in more detail. These are the areas where changes were likely to have occurred. Quadrats, which describe the micro-topographical features and indicator species, recorded in the 2004 project (Fernandez *et al*. 2005) were re-surveyed and additional quadrats were recorded where necessary (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

Camderry Bog is an example of a Ridge Basin Bog (Kelly *et al*., 1995) and occupies two basins with drumlin ridges separating the basins. The northern lobe is the largest and is shaped in a rough square. The southern lobe is smaller and is roughly triangular shaped. There is a general slope to the south over the whole site, and the southern lobe is at a lower level to the northern lobe. It is almost separated from the north lobe by a NW/SE trending drumlin ridge. The two lobes are joined at a narrow point, coincident with the break in slope of the NW tip of the drumlin. Camderry Bog has also been classified as an Intermediate or Western Raised Bog (Cross 1990).

Ecological Information

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

The following Raised Bog EU Annex I habitats, are found in Camderry 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 Camderry Bog is 6.17ha (3.16% of the high bog), which is a decrease of 2.52ha since 1994.

Active Raised Bog includes central and sub-central ecotope as well as active flush.

Central ecotope (0.21ha) was found at two locations (**C1** & **C2**) (see Appendix IV, Map 1), both being found in the southern lobe of the high bog. Complex 15 characterised both of these areas and consisted of high and low hummocks, hollows, lawns and pools. There was a 51-75% cover of *Sphagnum* dominated by *S. cuspidatum* in pools, *S. papillosum* and *S. capillifolium* with *S. magellanicum*, *S. subnitens* and *S. fuscum* also present. *Calluna vulgaris* and *Eriophorum vaginatum* dominated the vegetation with *Rhynchospora alba* also frequent. There was also some evidence of flushing as indicated by the presence of *Aulacomnium palustre* and *Polytrichum strictum*.

Sub-central ecotope (4.63ha) was found in three areas; one in the northern lobe (**Sc3**) and two in the southern lobe (**Sc4** & **Sc5**) of high bog (see Appendix IV, Map 1). Two community complex types were recorded, the most frequent being complex 9/7 + P. This complex was characterised by low hummocks, hollows, flats and pools. Pool cover was 11-25% and *Sphagnum* cover 34-50%. *S. cuspidatum* dominated in pools although cover was patchy in places while hummocks of *S. capillifolium* dominated the inter-pool *Sphagna* layer. *Calluna vulgaris*, *Eriophorum vaginatum* and *Eriophorum angustifolium* dominated the vegetation. Where this complex occurred in **Sc3**, the cover of *Cladonia portentosa* was notably high and the area was borderline sub-central/sub-marginal in places. Complex 6 + P was restricted to parts of **Sc4** in the southern lobe of the high bog. The pool and *Sphagnum* cover were similar to Complex 9/7 + P, but here *Narthecium ossifragum* flats dominated, interspersed with *Calluna vulgaris* dominated hummocks and shallow pools. Many of the pools were algal with *Rhynchospora alba* and some *Eriophorum angustifolium*, but most pools had a good cover of *Sphagnum cuspidatum* and/or *S. papillosum* with *S. papillosum* lawns at the edges.

One active peat forming flush was recorded at Camderry Bog (flush **T**), located in the north of the northern lobe. The flush occurred on a gentle slope and local depression and was characterised by low hummocks, hollows, flats, lawns and pools. Pool cover was 11-25% and *Sphagnum* cover 51-75%. The central depression is a quaking lawn of *Sphagnum* and may be a small soak. Here, *S. papillosum* and *S. magellanicum* are abundant and *S. fallax* and *Aulacomnium palustre* are frequent. Where the flush grades into the surrounding sub-marginal ecotope, a flushed sub-central type of vegetation with 34-50% *Sphagnum* cover, mainly *S. magellanicum*, is present. Where drier but still active, the vegetation grades into vigorous *Eriophorum vaginatum* and *Calluna vulgaris* with some *Empetrum nigrum*.

Degraded Raised Bog (7120)

The current area of Degraded Raised Bog at Camderry Bog is 189.27ha (96.84% of the high bog).

Degraded Raised Bog includes the sub-marginal, marginal and face bank ecotope, as well as inactive flush. 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 (100.63ha) features the most developed micro-topography within Degraded Raised Bog. Although pools are mostly absent from the high bog, they are found within the wettest sub-marginal ecotope community complex (9/7/3+P). However, these pools generally feature a low *Sphagnum* cover and are mostly covered with algae. This complex is found is an area previously classified as sub-central ecotope and there are signs of flushing/water movement to the edge of the high bog. Pools were also recorded within complex 6/4 + P, which was found adjacent to **Sc4** in the southern lobe and adjacent to Sc3 in the northern lobe. The pools were again mostly algal within this complex. The most common sub-marginal complex at Camderry Bog was complex 9/7/6. This was found in large areas across the entire high bog. The *Sphagnum* cover, which ranged from 11 to 25%, was composed almost entirely of hummocks of *S. capillifolium* and *S. papillosum*. *Calluna vulgaris* dominated the vegetation along with *Eriophorum vaginatum* and *Narthecium ossifragum* while *Racomitrium lanuginosum* was notably abundant in places. Complex 9/7 was similar to 9/7/6, but the habitat quality was slightly better and there was less *Narthecium ossifragum*. Complex 9a/7/3 was also of a slightly better habitat quality and had more *Eriophorum angustifolium* and *Carex panicea*, while complex 9/7/3 was similar to 9/7/6 with more *Carex panicea* and less *Narthecium ossifragum*.

Marginal ecotope (62.57ha) is slightly drier than sub-marginal ecotope and mainly occurs as a narrow band near the margins of the high bog. The *Sphagnum* cover is even lower here than in the

sub-marginal ecotope (<10%). Four marginal complexes were recorded on Camderry Bog; complex 7/9 + My was the best quality marginal and was recorded in the east of the southwest lobe. It appeared to be slightly flushed and was dominated by *Calluna vulgaris*, *Eriophorum vaginatum* and *Myrica gale*. It was similar to sub-marginal ecotope, but was firmer underfoot and had a lower *Sphagnum* cover. Complex 6/7/3 was the most common marginal complex on Camderry Bog and was dominated by *Carex panicea, Calluna vulgaris* and *Narthecium ossifragum* with prominent *Trichophorum germanicum* in places. Complex 6/2 + P was found surrounding flush X in the east of the northern lobe and complex 4/2 + Erosion channels was found on the steeply sloping ridge between the northern and southern lobes. These two complexes had some very wet areas, but the *Sphagnum* cover was low and the ground was firm underfoot.

Face bank ecotope (3.33ha) is characterised by firm ground, tall *Calluna vulgaris*, poor *Sphagnum* cover and a flat micro-topography. This ecotope was found in a very narrow band along the bog margin in parts of the high bog.

The high bog also features several inactive flushes (flush **U, V, W, X, Y & Z**) as well as the northern arm of the active flush **T**. These cover an area of 9.3ha in total and are all located in the northern lobe of the high bog. Flush **V**, **W** and **Z** as well as the inactive part of **T** are all dry flushes dominated by *Molinia caerulea* with a *Sphagnum* cover of <10% dominated by *S. capillifolium*. Flush **U** and **Y** were two small features; **Y** appeared to be largely based around two artificial looking pools that were dominated by *Molinia caerulea* while **U**, which was found adjacent to the clearfell's south-eastern corner, was relatively wet and had a higher *Sphagnum* cover (11-25%) including small patches of *S. fallax* and *S. palustre*. This flush was dominated by *Calluna vulgaris* and *Eriophorum vaginatum* with other species recorded including *Aulacomnium palustre*, *Andromeda polifolia, Polytrichum commune, Empetrum nigrum, Dryopteris dilatata*, *Vaccinium myrtillus* and *Pinus contorta*. Flush **X** also had a *Sphagnum* cover of 11-25% and occurred in a broad linear depression that was, at least partially, formed as a result of very old turf cutting. It appeared to receive water from a large portion of the northern lobe of the high bog and was thus wet in places, but evidence suggested that the water levels here fluctuated greatly.

There was also an area of clearfell (13.44ha) on the high bog. The conifer plantation here, which was composed mainly of *Pinus contorta* with a small area of *Picea sitchensis,* was removed in 2005. *Sphagnum* regeneration has occurred, but as yet is mainly concentrated in the blocked former forestry drains with *S. cuspidatum*, *S. fallax* and *S. palustre* recorded as well as *S. capillifolium*.

This vegetation is dominated mainly by *Eriophorum vaginatum* and *Calluna vulgaris* with *Molinia caerulea*, *Juncus effusus* and small amounts of *Rubus fruticosus, Ulex europaeus* and *Dryopteris dilatata*

also recorded as well as scattered *Betula pubescens* saplings (c. 1 m tall). Many *Pinus contorta* saplings and some *Picea sitchensis* saplings up to 3 m tall were present at the edges of the clearfell.

Depressions on peat substrates of the Rhynchosporion (7150)

Rhynchosporion vegetation is widespread on Camderry 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. In these areas, the Rhynchosporion vegetation occurs within *Sphagnum* hollows and along *Sphagnum* pool edges and on lawns. It was found to be most common on Camderry Bog in complex 15 (central), complex 6 + P (sub-central) and complex 6/4 + P (sub-marginal). Typical plant species include *Rhynchospora alba*, *Sphagnum cuspidatum, S. magellanicum, 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. It was particularly common along the steeply sloping ridge between the northern and southern lobes of the high bog where bare peat and erosion channels were found (complex 4/2 + EC).

Detailed vegetation description of the high bog

A detailed description of high bog vegetation recorded during the 2012 survey of Camderry 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 Camderry 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	M	-1	0.79ha of the	Inside High	**7110/7150**

				high bog cut away	Bog: 17 different locations along NW, SE and west of high bog	
C01.03	Peat extraction	H	-1	0.79ha of the high bog cut away	""	**7120**
J02.07	Drainage	H	-1	5.48km [1]	Inside High Bog	**7110/7120/7150**
J02.07	Drainage	M	-1	n/av	Outside High Bog	**7110/7120/7150**
I01	Invasive alien species	L	-1	<0.1ha [3]	Inside High Bog	**7110/7120/7150**
B02.02	Forestry clearance	M	+1	13.44ha	Inside High Bog	**7110**
B02.02	Forestry clearance	H	+1	13.44ha	Inside High Bog	**7120/7150**
4.2	Restoring/Improving the hydrological regime	M	+1	0.635km^2	Inside High Bog	**7110**
4.2	Restoring/Improving the hydrological regime	H	+1	0.635km^2	Inside High Bog	**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 17 locations along the northwest (4 locations (plots)), southeast (9 locations) and west (4 locations) sections of high bog in the 2004-2010 period. This has reduced the area of high bog by 0.79ha. 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 19 plots were cut on the high bog at Camderry Bog in 2010/2011; only one plot was cut in 2012 and none in 2013. Thus the area of high bog lost on Camderry Bog during the reporting period is in excess of 0.79ha, but since there is no aerial photography available post 2010, the area lost from 2010 to 2012 cannot be estimated.

This activity is considered to have a high importance/impact on Degraded Raised Bog and a medium importance impact on Active Raised Bog and Rhynchosporion depressions. Although peat

cutting has been reduced in the reporting period at the site, it cannot confirmed that this activity has been completely stopped at the site and will not be reinitiated in other locations on the bog. In addition, old face banks and high bog and cutover drainage associated with cutting continue to cause negative impacts on the high bog habitats. The continuation of these peat cutting will prevent the recovery of the high bog, and the recovery of ARB towards FRVs as further 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 (6.17ha or 3.16% of the high bog) and is 80.10% below the FRV target.

Drainage

High bog drainage

Table 6.2 shows that there has been a decrease of 0.635km in the length of functional drains and 0.361km in reduced functional drains (not blocked) as a result of the blocking of drains in the 2004-2012 reporting period. It should be noted that this figure under-estimates the actual length of drains blocked within the clearfell in the west of the northern lobe under the Coillte Life project (discussed below under the Conservation activities section). However, the real figure is unavailable and as these drains are unclear on the 2010 aerial photograph, their length is difficult to estimate.

On the other hand, there are still 5.48km on the high bog that remain either functional (2.58km), or reduced functional (3.26km). Significant water losses through some of these drains were noted during the 2012 survey with a large volume of water observed exiting the high bog from drain bA. Reduced functional drains are still impacting on high bog habitats and will continue to do so until they are blocked and become completely in-filled and thus non-functional.

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

Table 6.2 High bog drainage summary

Status	2004 (km) [1]	2012 (km)	Change
NB: functional	3.213	2.578	(-)0.635
NB: reduced functional	3.258	2.897	(-)0.361
NB: non- functional	4.434	4.434	0.000
B: functional	0.000	0.000	0.000
B: reduced functional	0.000	0.996[2]	(+)0.996
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)

[2] This figure under-estimates the actual length of drains blocked under the Coillte Life project (discussed below under the Conservation activities section). However, the real figure is unavailable and as these drains are unclear on the 2010 aerial photograph, their length is difficult to estimate.

Table 6.3 below provides a more detail description of the drainage present on the high bog at Camderry Bog including any change in their functionality in the 2004 – 2012 reporting period (see Map 3).

Table 6.3 High bog drainage detail

Drain Name	Length (km)	2004 status	2012 status	Change	Comment
bA	0.048	NB: functional	NB: functional	No	Fast flowing water recorded leaving the high bog at this point
bB	0.748	NB: functional	NB: functional	No	
bC	0.043	NB: functional	NB: functional	No	
bD	0.124	NB: functional	NB: functional	No	
bD1;4-6;8;9;11-13	1.983	NB: non-functional	NB: non-functional	No	
bD2;3	0.635	NB: functional	B: reduced functional	Yes	
bD7	0.116	NB: reduced functional	NB: reduced functional	No	
bD10	0.303	NB: functional	NB: functional	No	This drain was wrongly classified as non-functional in 2004
bE	0.179	NB: reduced functional	NB: reduced functional	No	This drain was wrongly classified as functional in 2004
bF	0.112	NB: functional	NB: functional	No	
bG	0.091	NB: reduced functional	NB: reduced functional	No	This drain was wrongly classified as functional in 2004
bH1-2	0.174	NB: functional	NB: functional	No	Water flowing recorded during visit
bL	0.724	NB: functional	NB: functional	No	Western section of drain
bL	0.566	NB: non-functional	NB: non-functional	No	Eastern section of drain
bM	1.129	NB: non-functional	NB: non-functional	No	
bN	0.371	NB: reduced functional	NB: reduced functional	No	
bN	0.361	NB: reduced functional	B: reduced functional	Yes	

bO	0.322	NB: non-functional	NB: non-functional	No	
bP	0.205	NB: functional	NB: functional	No	
bP1	1.449	NB: reduced functional	NB: reduced functional	No	Drain complex
bQ	0.396	NB: reduced functional	NB: reduced functional	No	
bR	0.110	NB: non-functional	NB: non-functional	No	
bS	0.228	NB: non-functional	NB: non-functional	No	
bT	0.096	NB: non-functional	NB: non-functional	No	
bV	0.256	NB: reduced functional	NB: reduced functional	No	This drain was wrongly classified as functional in 2004
bW	0.040	NB: reduced functional	NB: reduced functional	No	Drain already present in 2004 but not mapped
bX	0.097	NB: functional	NB: functional	No	Drain already present in 2004 but not mapped
bY	n/av	NB: functional	B: reduced functional	Yes	This drainage complex was blocked as part of the Coillte Life restoration works. The drains are not illustrated on the drainage map, but occur within the clearfell area in the west of the northern lobe.

Bog margin drainage

The cutover areas were not surveyed for drains during 2012. The cutover areas were also not surveyed for drains during 2004. See Kelly *et al.* (1995) for a detailed description of the drainage in the cutover areas.

Although there isn't an extensive network of cutover drains on Camderry Bog, there are drains associated with former peat cutting present along the entire south, east and north-west of the northern lobe and along the west of the southern lobe. These drains continue to drain the high bog and impacting on high bog habitats. There is also a small spring present to the east of the northern lobe at the break of slope of the drumlin.

Kelly *et al.* (1995) noted that the tributary of the Shiven River, which runs close to the bog at its north, north-west and south-west edges appeared to have been recently drained at the time. This

could lead to a lowering of the regional ground water table. It is unknown whether maintenance (i.e. drain clearance or additional dredging) of these drainage works has been carried out recently.

Bog margin drainage, including arterial drainage and river dredging works, is considered to have a medium importance/impact on high bog habitats.

Fire history

No fire events have been reported on the high bog in the 2004-2012 reporting period. Fernandez *et al*. (2005) noted that an area of approximately 10ha in the south-west of the northern lobe had been significantly damaged by a fire prior to their 2004 site visit. Kelly *et al*. (2005) recorded only small areas that had been recently burnt prior to their site visit, but noted that there were indications that this site had been subject to frequent burning.

Invasive species

Pinus contorta saplings and *Picea sitchensis* saplings up to 3 m tall were present at the edges of the clearfell in the west of the northern lobe. *Campylopus introflexus* was also recorded, particularly in the east of the northern lobe close to flush X.

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

Afforestation and forestry management

The *Pinus contorta* (Lodgepole pine) plantation on the west of the northern lobe of high bog reported by Kelly *et al.* (1995) and Fernandez *et al*. (2005) was felled in 2005-2007 as part of the Coillte LIFE project to restore raised bogs (Derwin, 2008). A small test plot plantation of *Picea sitchensis* (Sitka spruce) in the same area was also removed as part of the LIFE project. These areas are now mapped as **CF1** (Appendix IV, Map 1) and the vegetation is described in detail in Appendix I. The project also included some drain blocking. Removal of the plantation is considered as having a positive influence on the high bog hydrology and thus on the high bog habitats.

Other impacting activities

No other significant impacting activities were noted or recorded in 2012 impacting high bog habitats in the 2004-2012 reporting period.

Conservation activities

As noted above, the *Pinus contorta* and *Pinus sitchensis* plantations (measuring 13.44ha in total; given as 13.8ha by Derwin, 2008) on the west of the northern lobe of high bog were felled as part of Coillte's (http://www.raisedbogrestoration.ie/life04/raised-bog-project-sites/camderry-bog-galway-ireland.html) LIFE-funded raised bog restoration project. Restoration activities took place on Camderry Bog in 2005-2007 (Derwin, 2008). These works involved the clear-felling and removal of the mature conifer plantations from the high bog, the wind-rowing of the remaining brash and the blocking of drains with peat dams. Follow-up work included the control of the natural regeneration of conifer seedlings. Conifers regenerating on the open bog surface were also felled as part of this project.

Although no new areas of Active Raised Bog were recorded as having developed as a result of these works, a 25ha expansion of sub-marginal ecotope at the expense of marginal ecotope was recorded. Much of this improvement of former marginal ecotope is likely to be due to the restoration works although some may be due to the recovery of areas from the severe fire recorded in 2004 as having affected 10ha of the high bog. The project ecological monitoring report notes that following conifer removal and drain blocking, there was a rise in the water table in the felled plantations with the water table now remaining within 10cm of the bog surface for most of the year, which should allow active raised bog habitat to develop (Derwin, 2008). Although the clear-fell was not classed as being actively peat forming during the current survey, there were some small areas noted where there was a dense cover of *Sphagnum*. However, these areas were largely concentrated in old forestry drains many of which were very wet with standing water and clumps of *S. palustre, S. fallax, S. cuspidatum* and *S. capillifolium*.

Both conifer removal and drain blocking are reported as positive management actions under Restoring/Improving the hydrological regime (4.2) within table 6.1. A high importance/impact on 7120 and 7150 habitats has been given as improvements on both habitats have taken place, whereas a medium importance/impact on 7110 habitat has been given, as no variation on its extent has been noted in the reporting period. Nevertheless, restoration works would have halted further habitat losses.

The NPWS has also engaged in negotiation and agreements with landowners and this has contributed to the fact that peat cutting only took place at one plot in 2012 at Camderry Bog. Nonetheless some plots and turbary rights remain in private ownership.

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 a decrease in the area of Active Raised Bog of 1.21ha from 2004 to 2012.

There are some very minor changes in the boundary of **C1** (slightly smaller), mostly as result of a more comprehensive survey and increased mapping accuracy in the 2012 survey.

C2 has also seen some very minor changes in the boundary (slightly larger), mostly as result of a more comprehensive survey and increased mapping accuracy in the 2012 survey. Note that this polygon was labelled as **C1** in 2004. However, **C1** at that time referred to three separate central ecotope patches.

C3 is no longer present. This area (0.17ha) was recorded as complex 15 (central ecotope) in 2004, but is now classed as complex 6 + P (sub-central ecotope). This change is the result of ongoing drying out processes resulting in the degradation of high bog habitats.

The former **Sc1** is now re-classified as an active flush (flush **T**) due to the presence of the flush indicators *Sphagnum fallax*, *S. palustre* and *Aulacomnium palustre*. This change is considered to be the

result of the re-interpretation of vegetation. There are also slight changes in the boundary (it is now slightly larger), but these changes are considered to be the result of more comprehensive surveying in 2012. However, it should be noted that there may have been a small expansion of active raised bog in this area brought about by the removal of the conifers to the south-west of the area and the blocking of associated drains.

Sc2 is no longer present. Signs of water movement northwards towards the edge of the bog through this area were noted during the 2012 survey, which may explain the loss of active raised bog in this area. However, it would also appear that the extent of **Sc2** was over-estimated in 2004 and that it was a borderline sub-central/sub-marginal complex even at that time. There is no mention of the *Sphagnum* cover in the description from 2004, but in the quadrat (which in 2012 was observed as being recorded in the best quality area of this complex), the *Sphagnum* cover was estimated at 30% of which 15% was *S. capillifolium*. Furthermore, the ground was recorded as "firm to soft" and *Carex panicea* at 30% cover and *Narthecium ossifragum* at 20% cover. Thus, although the entire area of **Sc2** has been lost, only ca. 50% (1.0ha) of this loss is considered real and is attributed to ongoing drying out effects.

Sc3 has also seen slight changes in its boundary (slightly larger), mostly as result of a more comprehensive survey and increased mapping accuracy in the 2012 survey. However, some actual changes may have also taken place. Overall the area has increased in extent and it may be that the restoration works (the removal of the conifers to the west of the area and the blocking of associated drains) have resulted in a small expansion of active raised bog in this area.

Sc4 has also seen some very minor changes in its boundary, mostly as result of a more comprehensive survey and increased mapping accuracy in the 2012 survey. However, the small (0.21ha) isolated polygon that was recorded to the south-west of the main area of **Sc4** in 2004 is no longer present. This was considered to be part of **Sc4** and thus **Sc4** is considered to be decreasing in extent.

Sc5 was recorded in 2012 in an area of high bog that was not surveyed in 2004 and thus its recording can be attributed as being the result of more comprehensive surveying in 2012.

Flush **T** is discussed above under **Sc1** as it was classed as sub-central ecotope in the past but the vegetation has been re-interpreted as being active flush.

The active area of flush **X** was over-estimated in 2004 as being 0.45ha. The entire area of this flush is essentially an area of very old cutover and the active area is restricted to an extremely narrow strip of very wet conditions, which appears to be the central axis of water flow. This active strip was not mapped in 2012 due to its small size.

To summarise it is estimated that there has been an overall loss of 1.21ha of active raised bog; 1.0ha from **Sc2** in the north-east of the site and 0.21ha from **Sc4** in the south-west of the site. On the other hand, both the active flush **T** and **Sc3** in the northern lobe of the site appear to be expanding slightly. However, this expansion has not been confirmed and cannot be estimated.

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 31.00ha (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 (6.17ha) is 80.10% below the FRV. A current Area value more than 15% below FRV falls into the **Unfavourable Bad** assessment category.

A long term (1994-2012) trend indicates a reduction in the area of Active Raised Bog at the site (2.52ha) (see table 8.1). A more recent and short term trend analysis (8 years; 2004-2012) also indicates a decrease in the area (1.21ha or 16.4%) of Active Raised Bog. Therefore, the habitat Area is given a **Decreasing** trend assessment.

The Area of Active Raised Bog at Camderry 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 3.09ha (half of 6.17ha, the current area of Active Raised Bog). The current value is 1.54ha which is 50.16% below the FRV. Therefore S&Fs are given an **Unfavourable Bad** assessment.

The long term (1994-2012) trend appears to indicate an increase in the combined area of central ecotope and active flush from 0.99ha in 1994 to 1.54ha in 2012. However, this increase is due to the re-interpretation of the vegetation within **Sc1** as active flush (flush **T**) in 2012 from sub-central ecotope in 1994. A short term trend (2004-2012) indicates a decrease in the combined area of central ecotope and active flush from 1.68ha in 1994 to 1.54ha in 2012. This is a loss of 0.17ha or 11.04% and therefore the S&Fs are given a **Declining** trend.

Quadrats analysis (**Qc1, Qsc2, Qaf1** and **Qsm1**) indicates the following:

Qc1: There was very little variation in the quadrat data compared to 2004: This quadrat was classified as complex 15 by both surveys; the total *Sphagnum* cover (51-75%) and pool cover (11-25%) have not changed from 2004-2012 and overall the quadrats appear very similar. The individual cover of each of the *Sphagna* has also remained largely the same: *S. cuspidatum* (11-25% in both 2004 & 2012); *S. magellanicum* (4-10% in both 2004 & 2012); *S. papillosum* (11-25% in both 2004 & 2012); *S. capillifolium* (decreased from 11-25% in 2004 to 4-10% in 2012); *S. denticulatum* (4-10% in 2004 to "absent" in 2012); *S. subnitens* and *S. tenellum* were not recorded in 2004, but were recorded at 4-10% and <4% in 2012. The presence and cover of higher plants has also remained similar to 2004.

Qsc2: There was a slight variation in the quadrat data compared to 2004 (classified as complex 9/7 + P in both years): Although the total *Sphagnum* cover has increased from 26-33% in 2004 to 34-50% in 2012, its composition remains broadly similar; *S. capillifolium* (4-10% in 2004; 26-33% in 2012), *S. papillosum* (4-10% in both years), *S. magellanicum* (<4% in 2004; "absent" in 2012), *S. cuspidatum*, (4-10% in both years) and *S. denticulatum* (4-10% in 2004; "absent" in 2012). A slight decrease in the cover of *Trichophorum germanicum*, *Rhynchospora alba* and *Narthecium ossifragum* (4-10% in 2004 to <4% in 2012) was also recorded as well as an increase in the cover of *Calluna vulgaris* (11-25% in 2004 to 26-33% in 2012). However, 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.

Qaf1: This quadrat was classed as sub-central ecotope (Qsc3: complex 15-) in 2004. However, due to the presence of flush indicator species such as *Aulacomnium palustre*, the area has been re-mapped as active flush in 2012. Nevertheless there is still only slight variation in the quadrat data between the two years. The pool cover has remained the same (11-25%) while the total *Sphagnum* cover has increased from 26-33% in 2004 to 34-50% in 2012. There has been a significant increase in the cover of *S. magellanicum* (from <4% in 2004 to 11-25% in 2012) while the cover of *S. capillifolium* (4-10% in both years), *S. papillosum* (4-10% in both years) and *S. cuspidatum* (4-10% in both years) has remained stable. There has also been a decrease in the cover of *S. austinii* (4-10% in 2004; "absent" in 2012) and *S. denticulatum* (4-10% in 2004; "absent" in 2012). A slight decrease in the cover of *Trichophorum germanicum* 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* (11-25% in 2004 to 26-33% in 2012). However, it should be remembered that all of 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.

Qsm1: This quadrat was previously classified as sub-central ecotope (Qsc1; complex 3/6 + P), but is now classed as sub-marginal ecotope. The precise area where the quadrat was recorded in 2012 was

considered a borderline sub-marginal/sub-central area, but the surrounding area supported typical sub-marginal type vegetation and any area of sub-central that was present was considered too small to map. Despite the fact that the quadrat has been re-classified as sub-marginal ecotope, there has been a slight increase in the cover of *Sphagnum* recorded (from 26-33% in 2004 to 34-50% in 2012) although the cover of pools has decreased (from 11-25% to 4-10%). The *Sphagnum* composition has also remained broadly similar with no change in the cover of *S. papillosum* (4-10% in both years) and *S. cuspidatum* (4-10% in both years), but with an increase in the cover of *S. capillifolium* (11-25% in 2004 to 34-50% in 2012) and a decrease in the cover of *S. denticulatum* (4-10% in 2004; "absent" in 2012). A slight decrease in the cover of *Trichophorum germanicum* 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 26-33% in 2012) and *Narthecium ossifragum* (4-10% in 2004 to 11-25% in 2012). However, it should be remembered that all of 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.

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

Future Prospects

Although the habitat Area and S&Fs have slightly decreased and declined in the 2004-2012 reporting period, restoration works have also taken place and there is evidence (although limited) that expansion of Active Raised Bog is taking place in the northern lobe in the areas closest to these restoration works. Derwin (2008) also reported a rise in water table levels within the clearfell area as a result of clear-felling and drain blocking and predicted that active peat formation is likely in the wetter areas of this clearfell if conditions remain favourable. Furthermore only one turf plot was cut in 2012 and none in 2013 indicating that this activity may be about to cease on Camderry Bog (19 were cut in 2010/2011). However, there are still 2.578km of functional drains and 3.258km of reduced functional drains on the high bog at Camderry Bog, which have not been blocked that are thus still draining the high bog habitats. There is also a significant number of cutover drains in the west of the southern lobe and the south of the northern lobe that are continuing to drain the bog and these may also need to be blocked to prevent further losses of Active Raised Bog and promote its expansion. In addition, *Kelly et al.* (1995) reported that the river which bounds the site on three sides appeared to have been recently dredged at the time of their survey. The effect of this activity on the high bog habitats is unknown and it is also unknown whether such dredging occurred

during the reporting period. Thus, a hydrological investigation of the high bog, cutover and the River Shiven in relation to cutover drainage and regional arterial drainage works should be carried out.

Habitat **Area** is currently 80.10% 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 50.16% 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)**.** Blocking of remaining reduced-functional and functional drains both on the high bog and cutover and cessation of peat cutting is necessary.

The overall conservation status of Active Raised Bog at Camderry 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	2004 (amended)	2012	Change (2004-2012)	
	Area (ha)	Area (ha)	Area (ha)	Area (ha)	Area (ha)	%
Central	0.54	0.54	0.38	0.21	(-)0.17	(-)44.74
Sub-central	7.70	6.42	5.67	4.63	(-)1.04	(-)18.34
Active flush	0.45[2]	0.45	1.33	1.33	0.00	0.00
Total	**8.69**	**7.41**	**7.38**	**6.17**	**(-)1.21**	**(-)16.40**

[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]Note that Sc1, which was classed as sub-central by Kelly *et al.*, (1995) was re-interpreted as active flush in 2012. This is accounted for in the 2004/05 (amended) figures, but not in the 1994/95 and 2004/05 figures.

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

Table 8.2 Assessment of changes in individual Active Raised Bog areas

Area	Quadrats	Trend	Comment	Quadrats analysis

Area	Quadrats	Trend	Comment	Quadrats analysis
C1	Qc1	Stable	Slight changes in boundary (slightly smaller). This change is the result of more comprehensive surveying in 2012 which resulted in more accurate mapping.	Quadrat data from 2004 and 2012 is extremely similar with the total *Sphagnum* cover (51-75%) and pool cover (11-25%) remaining unchanged and the individual cover of each of the *Sphagna* species and of the higher plants remaining largely the same.
C2	None	Stable	Slight changes in boundary (slightly larger). This change is the result of more comprehensive surveying in 2012 which resulted in more accurate mapping. Note that this polygon was also labelled as C1 in 2004; however C1 consisted of three separate central ecotope patches at that time.	
C3	None	No longer present (declining)	This area (0.17ha) was recorded as complex 15 (central ecotope) in 2004, but is now classed as complex 6 + P (sub-central ecotope). This change is the result of drying out processes resulting in the degradation of the high bog habitats. Note that this polygon was also labelled as C1 in 2004; however C1 consisted of three separate central ecotope patches at that time.	
Sc1	Qaf1 (was Qsc3)	No longer present (stable - reclassified as an active flush)	This former sub-central ecotope area is now considered to correspond with active flush T. This is the result of reinterpretation of vegetation.	Discussed under flush **T**.
Sc2	Qsm1 (was Qsc1)	No longer present (declining)	This SC area was composed entirely of complex 3/6 + P in 2004. The description of the complex at the time suggested a borderline complex intermediate between SM and SC ecotope. Thus although the entire area of SC that was mapped here in 2004 has been lost, only ca. 50% (1.0ha) of this loss is considered real and this loss is attributed to ongoing drying out effects.	Despite the fact that the quadrat has been re-classified as sub-marginal ecotope, there has been a slight increase in the cover of *Sphagnum* (from 26-33% in 2004 to 34-50% in 2012) although the cover of pools has decreased (from 11-25% to 4-10%). There has been no change in the cover of *S. papillosum* and *S. cuspidatum*. An increase in the cover of *S. capillifolium* and a decrease in the cover of *S. denticulatum* were recorded. These changes are likely to be due to re-interpretation of vegetation and quadrat

Area	Quadrats	Trend	Comment	Quadrats analysis
				location.
Sc3	Qsc2	Stable (possibly expanding)	Slight changes in boundary (slightly larger). This change is the result of more comprehensive surveying in 2012 which resulted in more accurate mapping. It should be noted that some of the expansion of SC here may be real. However, a lack of points recorded in the area in 2004 makes this assessment difficult. Any expansion of SC in this area could be attributed to the restoration works carried out to the west of this area (conifer removal and drain blocking).	The total *Sphagnum* cover has increased from 26-33% in 2004 to 34-50% in 2012, but its composition remains broadly similar. Changes are likely to be due to re-interpretation of vegetation and quadrat location.
Sc4	None	Declining	There have been slight changes in boundary of the main polygon of Sc4 (slightly larger). These changes are the result of more comprehensive surveying in 2012 which resulted in more accurate mapping. However, the small (0.21ha) isolated polygon that was recorded to the south-west of the main area of Sc4 in 2004 is no longer present. This was considered to be part of Sc4 and thus Sc4 is considered to be decreasing in extent.	
Sc5	Newly recorded	Stable	This sub-central area was recorded in 2012 in an area of high bog that was not surveyed in 2004 and thus its recording can be attributed as being the result of more comprehensive surveying in 2012.	
T	Qf1 (was Qsc3)	Stable (possibly expanding)	This former sub-central ecotope area (Sc1) is now considered to correspond with active flush T. This is the result of reinterpretation of vegetation with flush indicators such as *Sphagnum fallax*, *S. palustre*, *Molinia caerulea* and *Aulacomnium palustre* found in the wider area of Flush T (former Sc1). There are also slight changes in the boundary of the active area (it is now slightly larger), but these changes are considered to be the result of more comprehensive surveying in 2012. However, it should be noted that there may have been a small expansion of active raised bog in this area brought about by the removal of the conifers to the south-west of the area and the blocking of associated drains.	Despite the re-classification of the area from sub-central ecotope to active flush, there is only slight variation in the quadrat data. The pool cover has remained the same (11-25%) while the total *Sphagnum* cover has increased from 26-33% in 2004 to 34-50% in 2012. The cover of individual *Sphagnum* species has remained largely the same although there has been an increase in the cover of *S. magellanicum* (from <4% to 11-25%) and a decrease in *S. austinii* (from 4-10% to "absent"). Changes are likely to be due to re-interpretation of vegetation and quadrat location.

Area	Quadrats	Trend	Comment	Quadrats analysis
X	None	No longer present (Stable)	Active section of flush X is no longer present. This is the result of reinterpretation of vegetation. The active area of flush **X** was over-estimated in 2004 as being 0.45ha. The entire area of this flush is essentially an area of very old cutover and the active area is restricted to an extremely narrow strip of very wet conditions, which appears to be the central axis of water flow. This active strip was not mapped in 2012 due to its small size.	

Degraded Raised Bog (7120)

Area

The Degraded Raised Bog FRV for Area is 164.44ha at Camderry Bog. This value corresponds with the difference between the current high bog area (195.44ha) and the Active Raised Bog FRV (31.00ha) 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 15.10% bigger than FRV and therefore the habitat Area is given an **Unfavourable Inadequate** assessment (see table 8.4).

Table 8.3 indicates that there has been an increase (0.42ha) in the area of Degraded Raised Bog. This figure is the result of an increase brought about by the degradation of Active Raised Bog (1.21ha) coupled with a decrease brought about by a high bog loss of 0.79ha caused by peat cutting. Thus as the increase has been brought about by the degradation of Active Raised Bog and there has been a loss of habitat due to peat cutting, the habitat is given an **Increasing** trend.

The Area of Degraded Raised Bog at Camderry Bog is assessed as Unfavourable Inadequate-Increasing (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 47.32ha (25% of 189.27ha, the current area of Degraded Raised Bog). The current marginal and face bank ecotopes area value (65.90ha) is 39.27% 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.

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). Table 8.3 does not show any change in the area of facebank ecotope (3.33ha in 2004 and in 2012). However, marginal ecotope has decreased overall by 25.79ha. This decrease is a combination of a 0.79ha loss due to peat cutting combined with an improvement in the condition of a further 25.0ha of high bog that was previously classed as marginal ecotope, but is now sub-marginal. This is also seen in table 8.3 as a 26.21ha increase in sub-marginal ecotope. However, 1.21ha of this increase was as a result of the degradation of sub-central ecotope.

The improvement of 25ha (28.29%) of marginal ecotope indicates that conditions on the high bog are improving. Much of this improvement was recorded in the south of the northern lobe, which is relatively close to where the restoration works took place. However, some of this improvement is also likely to be associated with recovery after the fire event recorded in 2004 as severely affecting 10ha of the high bog.

Thus, the DRB's S&Fs at Camderry Bog are given an **Improving** trend since the positive results from the restoration works have outweighed the negative effects of peat cutting and drainage during the reporting period.

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 Camderry Bog are assessed as Unfavourable Bad-Improving (see table 8.5).

Future Prospects

Degraded Raised Bog has overall slightly increased (0.42ha) as a result of ARB degradation. Nevertheless, over 0.79ha have been lost due to peat cutting in the reporting period. Peat cutting is likely to continue to decrease the habitat's extent unless there is a complete cessation of peat cutting. Furthermore, drainage on the high bog continues to damage the habitat and to hinder its recovery to FRVs, as well as minimising the chances to convert face bank and marginal ecotope into sub-marginal and/or Active Raised bog. However, rewetting due to blocked drains (and the removal of conifer plantation) in the west of the high bog has resulted in the expansion of sub-marginal ecotope.

The results of the restoration works appear likely to override any negative influences in the habitat's future S&Fs since peat cutting appears to be about to be phased out (only one plot was cut in 2012 and none in 2013).

The complete cessation of peat cutting and further restoration works would be necessary such as the blocking of any functional or reduced functional high bog and cutover drains.

Habitat **Area** is currently 15.10% above FRV (see table 8.4) and a negative Decreasing trend is expected in the following two reporting periods (12 years) unless peat cutting is completely phased out at the site. As a result habitat Area is expected to remain between 5 and 15% above FRV. Thus, habitat's **Area Future Prospects** are assessed as **Unfavourable Inadequate-Decreasing**. Habitat's **S&Fs** are currently 39.27% above FRV (see table 8.4). Although an overall Improving 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-Improving**.

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**	**2004 (amended)**	**2012**	**Change (2004-2012)**	
	Area (ha)	**Area (ha)**	**Area (ha)**	**Area (ha)**	**Area (ha)**	**%**
Sub-marginal	22.31	42.70	74.42	100.63	(+)26.21	(+)35.22
Marginal [2]	138	120.14	88.36	62.57	(-)25.79	(-)29.19
Face bank[2]	Na	2.43	3.33	3.33	0.00	0.00
Inactive flush	10.08	7.58	9.30	9.30	0.00	0.00
Conifer plantation (Clear felled area) [3]	14.33	11.68	13.44	13.44	0.00	0.00
Total[4]	**184.72**	**184.53**	**188.85**	**189.27**	**(+)0.42**	**(+)0.22**

[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.

[3]Although the figures suggest otherwise, the area of conifer plantation (now clearfell) has remained the same since 1994. However, now that it has been removed it is more obvious how much of it was planted on high bog and thus the 2012 figure is the most accurate.

[4]The total extent of high bog appears to be larger in 2012 when comparing with previous figures. However, this is due to mapping improvements particularly in the area where the conifer plantation has been removed. The actual area of high bog has decreased due to peat cutting.

Note: Table 8.3 includes 2004 figures and 2004 amended figures. The latter shows the ecotope area believed to be present in 2004 after surveying improvements in 2012. The comparison between 2004

(amended) and 2012 illustrates the actual changes in ecotope area in the 2004-2012 period. Any change in ecotope area between the 2004 and the 2004 (amended) values is due to improvement in mapping accuracy and/or the result of a more comprehensive survey in 2012.

The overall conservation status of Degraded Raised Bog at Camderry 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 (by 1.21ha) in the reporting period. However, there has been an increase of 26.21ha of sub-marginal ecotope resulting in an overall increase of 25ha of the potential habitat of depressions on peat substrates of the Rhynchosporion (a 30.56% increase in the combined area of ARB and sub-marginal ecotope. As result habitat Area is given an **Increasing** 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. However, the restoration works carried out in the northern lobe of this site combined with the fact that peat cutting appears to be about to be phased out (only one plot was cut in 2012) balance these negatively impacting activities and further increases in sub-marginal ecotope are expected. Nevertheless, further declines in Active Raised Bog cannot be ruled out. Therefore, the habitat's Area Future Prospects are given an **Unfavourable Bad-Increasing** assessment.

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

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

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

The conservation status of depressions on peat substrates of the Rhynchosporion at Camderry 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	31.00	6.17	80.10	3.09	1.54	50.16

[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	164.44	189.27	15.10	47.32	65.90	39.27

[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-Declining	Unfavourable Bad-Declining	Unfavourable Bad-Declining
7120	Unfavourable Inadequate-Increasing	Unfavourable Bad-Improving	Unfavourable Bad-Declining	Unfavourable Bad-Declining
7150	Unfavourable Bad-Increasing	Unfavourable Bad-Declining	Unfavourable Bad-Declining	Unfavourable Bad-Declining

Conclusions

Summary of impacting activities

- Peat cutting still continues at the site and was recorded at 17 locations in the 2004/05-2010 period resulting in a 0.79ha loss of high bog during this time. 19 actively cut plots were reported by the NPWS in 2010/2011. However, on a more positive note, only one plot was reported by the NPWS as being cut in 2012 and none in 2013. Nevertheless this activity cannot be considered phased out at the site.
- 5.84km of drains on the high bog remain functional (2.58km) or reduced functional (3.26km). Significant water losses through the drains were noted during the 2012 survey with a large volume of water observed exiting the high bog from drain bA.
- Cutover drainage (peripheral drainage) associated with either currently active or no longer active peat cutting continue to impact on the high bog habitats.
- A tributary of the Shiven River runs close to the bog at its north, north-west and south-west edges and Kelly *et al.* (1995) noted that this appeared to have been recently drained at the time. It is unknown whether maintenance (i.e. drain clearance or additional dredging) of these drainage works has been carried out recently and what affect such works may have on the regional ground water table.
- No fire events have damaged the high bog in the reporting period. A severe fire event severely damaged approximately 10ha of the high bog in 2004.

Changes in active peat forming areas

- There has been a 1.21ha decrease in Active Raised Bog, with a loss of 1.0ha from the north-east of the site (**Sc2**) and a loss of 0.21ha from the south-west (from **Sc4**). 0.17ha of central ecotope in the south-west of the site (**C3**) has also degraded to sub-central ecotope.

- One small new peat forming areas (**Sc5**) has been described at the site. This is the result of a more comprehensive survey in 2012 rather than actual changes in Active Raised Bog.
- There have been slight changes in the boundary as a result of more comprehensive surveying and mapping at **C1**, **C2**, **Sc3** and **Sc4**. The area formerly mapped as **Sc1** has been re-interpreted as an active flush (**T**). Its boundary has also changed slightly, most likely as a result of improved accuracy. However, as with **Sc3**, it may be that this area is expanding as a result of the restoration works, but this is difficult to confirm.
- The active area of flush **X** was over-estimated in 2004. The entire area of this flush is essentially an area of very old cutover and the active area is restricted to an extremely narrow strip of very wet conditions, which appears to be the central axis of water flow. This active strip was not mapped in 2012 due to its small size.

Other changes

- There have been slight changes in the boundary as a result of more comprehensive surveying and mapping at flushes **U**, **W**, **X**, **Y** and **Z**.
- The high bog extent (195.44ha) is slightly larger (2.87ha) than mapped in 2004 (192.57ha) as result of the more accurate mapping of the high bog edge. A couple of high bog sections (2.13ha in extent) to the SW of the clear-felled area had previously been erroneously omitted and are now mapped as high bog. The extent of the conifer plantation (now clear-felled) on the high bog has also been increased with an additional area (1.76ha) to the west added on. With the conifers removed, it is more obvious that this area is part of the high bog and that it was also erroneously omitted in the past. However, some of this area (1.15ha) is outside of the SAC and thus the SAC boundary here may need to be revised. These additions are countered somewhat by the exclusion of some of the areas mapped as scrub (0.23ha) in 2004 from the high bog and the loss of high bog to peat cutting from 2004-2010 (0.79ha).

Quadrats analysis

- **Qc1**: quadrat data from 2004 and 2012 is extremely similar with the total *Sphagnum* cover (51-75%) and pool cover (11-25%) remaining unchanged and the individual cover of each of the *Sphagna* species and of the higher plants remaining largely the same.
- **Qsm1** (was Qsc1): Despite the fact that the quadrat has been re-classified as sub-marginal ecotope, there has been a slight increase in the cover of *Sphagnum* (from 26-33% in 2004 to

34-50% in 2012) although the cover of pools has decreased (from 11-25% to 4-10%). These changes are likely to be due to re-interpretation of vegetation and quadrat location.

- **Qsc2**: The total *Sphagnum* cover has increased from 26-33% in 2004 to 34-50% in 2012, but its composition remains broadly similar. Changes are likely to be due to re-interpretation of vegetation and quadrat location.
- **Qaf1** (was Qsc3): Despite the re-classification of the area from sub-central ecotope to active flush, there is only slight variation in the quadrat data. The pool cover has remained the same (11-25%) while the total *Sphagnum* cover has increased from 26-33% in 2004 to 34-50% in 2012. The cover of individual *Sphagnum* species has remained largely the same although there has been an increase in the cover of *S. magellanicum* (from <4% to 11-25%) and a decrease in *S. austinii* (from 4-10% to "absent"). Changes are likely to be due to re-interpretation of vegetation and quadrat location.

Restoration works

- Restoration works took place on Camderry Bog from 2005-07 as part of Coillte's LIFE-funded raised bog restoration project (Derwin, 2008). These works involved the clear-felling and removal of the mature conifer plantation from the high bog, the wind-rowing of the remaining brash and the blocking of drains with peat dams. Follow-up work included the control of the natural regeneration of conifer seedlings. A rise in water levels from these works was noted in the clearfell area, which should help promote active peat formation.
- NPWS has engaged in negotiation with landowners in relation to the cessation of peat cutting at the site. Despite negotiations peat cutting continues at Camderry Bog (although only one plot was cut in 2012).

Summary of conservation status

- **Active Raised Bog** has been given an **Unfavourable Bad–Declining** conservation status at Camderry Bog. Habitat Area has slightly decreased and quality (S&Fs) declined in the reporting period. Both values are also 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 Camderry Bog. Habitat Area has slightly increased despite the losses associated with peat cutting due to a decrease in Active Raised Bog. Habitat's S&Fs have improved due to restoration works and the recovery from a severe fire in 2004. However, both habitat Area

and S&FS are above the FRV, which is deemed negative for this habitat as regards conservation status. Future Prospects are considered Unfavourable Bad-Declining due to threatening impacting activities such as the ongoing (though much reduced) peat cutting and drainage.

- **Depressions on peat substrates of the Rhynchosporion** has been given an **Unfavourable Bad-Declining** conservation status at Camderry Bog. Habitat Area is considered to have increased and quality (S&Fs) declined in the reporting period. Future Prospects are considered Unfavourable Bad-Declining.

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

Recommendations

- **Cessation of peat cutting.**
- **Ongoing monitoring and management of restoration works** that are being carried out as part of Coillte's LIFE-funded raised bog restoration project should be continued. This includes monitoring of walrags and removal of regenerating conifers.
- **Further restoration works** including blocking of high bog reduced-functional and functional drains, and possibly cutover drains.
- **Further hydrological and topographical studies** should be carried out 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.
- **Further botanical monitoring surveys** on the high bog, should be carried out in order to assess changes in habitat conservation status.
- **SAC boundary should be revised** to include all of the high bog as currently a small area in the west of the northern lobe is outside of the SAC.

References

Cross, J.R. 1987. Unusual stands of birch on bogs. *Irish Naturalist Journal 22: 305-310*

Cross, J. R. 1990. *The Raised Bogs of Ireland: their Ecology, Status and Conservation*. Report to the Minister of State at the Department of Finance.

Derwin, J. 2008. *Restoring Raised Bog in Ireland, Project Reference: LIFE04 NAT/IE/000121. A Report on the Restoration of Project Site No. 2, Camderry, Bog, Co. Galway.* Unpublished report, Coillte.

Fernandez, F., Fanning, M., McCorry, M. and Crowley, W. 2005. *Raised Bog Monitoring Project 2004-05*. Unpublished report, National Parks & Wildlife Service, Department of Environment, Heritage and Local Government, Dublin.

Kelly, L., Doak, M. and Dromey, M. 1995. *Raised Bog Restoration Project: An Investigation into the Conservation and Restoration of Selected Raised Bog Sites in Ireland*. Unpublished report, National Parks & Wildlife, Department of Environment, Heritage and Local Government, Dublin.

Kelly, L. & Schouten, M.G.C. 2002. Vegetation. In: M. G. C. Schouten (Ed.), *Conservation and Restoration of Raised Bogs: Geological, Hydrological and Ecological Studies*, pp.110-169, Department of Environment and Local Government, Dublin, Ireland/Staatabosbeheer, The Netherlands.

Appendix I Detailed vegetation description of the high bog

Active Raised Bog (7110)

Central Ecotope Complex

COMPLEX 15

- **Location**: **C1 and C2** in the southern lobe
- **Ground**: quaking
- **Physical indicators**: absent
- ***Calluna* height**: 11-20 cm (-30 cm in places)
- ***Cladonia* cover**: 10-25%
- **Macro-topography**: depression/gentle slope NW
- **Pools**: 11-25% regular
- ***Sphagnum* cover**: 51-75% (c. 60%)
- ***Narthecium* cover**: <4%
- **Micro- topography**: High and low hummocks, hollows, pools & lawns
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (26-33%), *Eriophorum vaginatum* (11-25%), *Narthecium ossifragum* (<4%, occasional), *Rhynchospora alba* (4-10%), *Sphagnum capillifolium* (11-25%), *S. fuscum* (<4%, frequent), *S. papillosum* (11-25%), *S. magellanicum* (4-10%), *S. cuspidatum* (11-25%), *S. subnitens* (4-10%), *Aulacomnium palustre* (<4%, occasional to locally abundant), *Polytrichum strictum* (<4%, occasional to locally abundant).
- **Additional comments**: This complex was very much as described in 2004. High hummocks were occasional and linear pools were oriented northeast – southwest. Pools were mainly occupied by *Sphagnum cuspidatum*. There were some signs of flushing in this complex.
  Quadrat **Qc1** was recorded in **C1** within this complex.

Sub-Central Ecotope Complexes

COMPLEX 6+P

- **Location**: **Sc4** in southern lobe
- **Ground**: quaking to very soft
- **Physical indicators**: none
- ***Calluna* height**: 11-20cm
- ***Cladonia* cover**: 11-25%
- **Macro-topography**: gentle slope
- **Pools**: 11-25% regular
- ***Sphagnum* cover**: 34-50% (sometimes 26-33%)
- ***Narthecium* cover**: 11-25% (-33% in places)
- **Micro- topography**: Low hummocks, hollows, flats, pools
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (25-33%), *Cladonia portentosa* (11-25%), *Eriophorum angustifolium* (<4%, occasional), *E. vaginatum* (<4%, frequent), *Rhynchospora alba* (4-10%), *Narthecium ossifragum* (11-25%), *Sphagnum capillifolium* (4-10%), *S. papillosum* (11-25%), *S. cuspidatum* (11-25%) , *S. subnitens* (4-10%), *S. magellanicum* (<4%, occasional), *S. fuscum* (<4%, occasional).
- **Additional comments:** *Narthecium* flats dominated this complex, interspersed with *Calluna* dominated hummocks and shallow pools. Many pools were algal with *Rhynchospora alba* and some *Eriophorum angustifolium.* Most pools, however, supported a good cover of *Sphagnum cuspidatum* and/or *S. papillosum* with *S. papillosum* lawns at the edges.

COMPLEX 9/7+P

- **Location**: **Sc3; Sc4** and **Sc5**
- **Ground**: soft, quaking around pools
- **Physical indicators**: none
- ***Calluna* height**: 21-30cm
- ***Cladonia* cover**: 34-50%
- **Macro-topography**: gentle slope eastward
- **Pools**: 11-25% regular
- ***Sphagnum* cover**: 34-50% (c. 40%)
- ***Narthecium* cover**: <4%
- **Micro- topography**: Low hummocks, hollows, flats, pools
- **Tussocks**: *Eriophorum vaginatum* and *Trichophorum germanicum* <4% each
- **Degradation or regeneration evidence**: absent

- **Species cover**: *Calluna vulgaris* (11-25%), *Cladonia portentosa* (34-50%), *Eriophorum angustifolium* (11-25%), *E. vaginatum* (4-10%), *Rhynchospora alba* (<4%, occasional), *Carex panicea* (<4%, frequent), *Sphagnum capillifolium* (11-25%), *S. papillosum* (4-10%), *S. cuspidatum* (11-25%),
- **Additional comments: Sc3** and this community complex were much as described in 2004. Pools were isolated; many were *Sphagnum papillosum* dominated, some were *S. cuspidatum* dominated. Interpool *Sphagnum* was mainly *S. capillifolium*, and cover was sparse. *Cladonia portentosa* was notably abundant. This complex was borderline sub-marginal.

  Towards the north-west of the **Sc3**, there is a flushed area with *Betula pubescens* (1.5m), *Vaccinium myrtillus*, *Molinia caerulea*, *Pleurozium schreberi*, *Hylocomium splendens* and *Polytrichum strictum*.

Quadrat **Qsc2** was recorded in **Sc3** within this complex.

Active flushes

FLUSH T

- **Location**: northern part of site at location of former **Sc1**
- **Ground**: very soft
- **Physical indicators**: absent
- ***Calluna* height**: 31-40 cm
- ***Cladonia* cover**: 11-25% (patchy)
- **Macro-topography**: gentle slope & local depression
- **Pools**: 11-25% regular
- ***Sphagnum* cover**: 51-75%
- ***Narthecium* cover**: <4%
- **Micro-topography**: Low hummocks/hollows/pools/lawns/flats
- **Tussocks**: *Eriophorum vaginatum* and *Trichophorum germanicum* <4% each
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (11-25%), *Eriophorum angustifolium* (4-10%), *E. vaginatum* (11-25%), *Narthecium ossifragum* (<4%), *Trichophorum germanicum* (<4%), *Sphagnum capillifolium* (4-10%), *S. papillosum* (11-25%), *S. magellanicum* (26-33%(-50% locally)), *S. cuspidatum* (4-10%), *S. fallax* (4-10%), *S. palustre* (<4%, occasional), *Aulacomnium palustre* (<4%, frequent).
- **Additional comments:** Formerly mapped as sub-central ecotope **Sc1**, this is actually an active flush flowing northward to a local depression, at which point inactive flush extends northward. The central depression is a quaking lawn of *Sphagnum* and may be a small soak.

Here, *S. papillosum* and *S. magellanicum* are abundant and *S. fallax* and *Aulacomnium palustre* are frequent. Where the flush grades into the surrounding sub-marginal ecotope, a sub-central type of vegetation with 34-50% *Sphagnum* cover, mainly *S. magellanicum*, is present. Quadrat **Qaf1** was recorded in this vegetation formerly identified as sub-central complex 9/7+P. Where drier but still active, the vegetation grades into vigorous *Eriophorum vaginatum* and *Calluna vulgaris* with some *Empetrum nigrum*.

FLUSH X

Flush X was located in a broad, linear depression sloping southeast. This depression was partly the result of very old turf cutting associated with defunct drains. Most of the flush was inactive and is described below. Flush X exhibited a peculiar hydrological function, receiving water from a large part of the northern lobe of the bog, which then rose again to the surface at a series of pools that appeared to function much like swallow-holes in turloughs. This function was evident during the 2012 survey, which took place the morning after a heavy overnight rainfall.

At the top of the flush was a 6-7 m diameter, steep-sided, deep pool. This was described in 2004 as a "circular depression (0.4 m deep with a 5 m diameter)" with "20-30% cover of *Sphagnum cuspidatum* that appears to be suffering from desiccation". This had obviously changed at the time of the 2012 survey in that there was no cover of *Sphagnum* and the pool was much deeper. Water was flowing out of the pool following heavy rain the night before the survey day. The fluctuating nature of water levels in the pool was demonstrated by *Calluna vulgaris, Molinia caerulea* and *Eriophorum angustifolium* growing on the sides of the pool to a depth of c. 70 cm below water level at the time of survey. Vegetation fringing the pool was inactive flush (as described below) with increased cover of *S. capillifolium* and *S. papillosum* downhill in the path of water seepage.

A similar, much smaller seasonal pool – also deep and with submerged *Calluna* during field survey – was located to the northwest of this main pool.

A 4 m diameter central pool was recorded covered with a mat of senescent *Sphagnum cuspidatum*. During the 2012 survey, this hollow was distended like a blister and expelling water through the *Sphagnum* mat. In the 2004 report, this location is described as an 8 m x 2 m lawn.

Degraded Raised Bog (7120)

Sub-Marginal Ecotope Complexes

COMPLEX 9/7/3+P

- **Location**: northeast part of site (former **Sc2**)
- **Ground**: soft
- **Physical indicators**: absent
- ***Calluna* height**: 11-20 cm
- ***Cladonia* cover**: 4-10%
- **Macro-topography**: steep slope
- **Pools**: 4-10% tear pools
- ***Sphagnum* cover**: 33-50%
- ***Narthecium* cover**: 11-25%
- **Micro- topography**: Low hummocks, hollows, pools, flats
- **Tussocks**: *Eriophorum vaginatum* and *Trichophorum germanicum* <4% each
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (26-33%), *Eriophorum vaginatum* (11-25%), *Narthecium ossifragum* (11-25%), *Carex panicea* (11-25), *Trichophorum germanicum* (<4%), *Empetrum nigrum* (<4%), *Sphagnum capillifolium* (34-50%), *S. papillosum* (4-10% (-25% in patches by pools)), *S. cuspidatum* (4-10%).

  Additional comments: Borderline complex approaching but not reaching sub-central quality. **Sc2** and this complex (called sub-central complex 3/6+P in 2004) were redefined as this complex in 2012 due to poor quality. There were signs of flushing / water movement to the edge of the bog through **Sc2**. There was a small area with good quality *Sphagnum cuspidatum* pools. Overall, there was a mixture of algal and *S. cuspidatum* pools with *S. papillosum* lawns at margins. *S. capillifolium* was, however, the dominant *Sphagnum* by far, occupying low hummocks grading to pool margins.

Quadrat **Qsm1** was recorded in the area formerly mapped as **Sc2** within this complex.

COMPLEX 9/7

- **Location**: northeast of **Sc3**
- **Ground**: soft
- **Physical indicators**: absent
- ***Calluna* height**: 11-20 cm (-30 cm in places)
- ***Cladonia* cover**: 34-50%
- **Macro-topography**: gentle slope
- **Pools**: absent or 4-10% in places
- ***Sphagnum* cover**: 11-25% (towards the high end of the range)

- ***Narthecium* cover**: 4-10%
- **Micro- topography**: Low hummocks, hollows, pools, flats
- **Tussocks**: *Eriophorum vaginatum* and *Trichophorum germanicum* <4% each
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (11-25%), *Eriophorum vaginatum* (11-25%), *E. angustifolium* (4-10%), *Narthecium ossifragum* (4-10%), *Carex panicea* (<4%, frequent), *Sphagnum capillifolium* (11-25% - low end of range), *S. papillosum* (4-10%), *S. cuspidatum* (4-10%), *Campylopus atrovirens* (<4%, occasional).
- **Additional comments:** Higher quality than 9/7/6. In some places, *Eriophorum angustifolium* is higher and *E. vaginatum* has lower cover; where *E. angustifolium* is clearly dominant, this complex is mapped as 9a/7. Pools are occasional near sub-central ecotope; they are shallow and mainly occupied by *S. cuspidatum* and *S. papillosum*. At the junction of the two lobes of the bog is a somewhat flushed variant with scattered *Myrica gale* mapped as 9/7+My.

COMPLEX 6/4+P

- **Location**: around **Sc4** in southern lobe; east of **Sc3** and along southern section of northern lobe
- **Ground**: very soft
- **Physical indicators**: none
- ***Calluna* height**: 21-30cm
- ***Cladonia* cover**: 11-25%
- **Macro-topography**: gentle slope
- **Pools**: 4-10% regular
- ***Sphagnum* cover**: 11-25%
- ***Narthecium* cover**: 10-25% (-33% in places)
- **Micro- topography**: Low hummocks, hollows, flats, pools
- **Tussocks**: absent
- **Degradation or regeneration evidence**: signs of drying out at pool margins
- **Species cover**: *Calluna vulgaris* (34-50%), *Cladonia portentosa* (11-25%), *Eriophorum angustifolium* (<4%, occasional), *E. vaginatum* (<4%, frequent), *Rhynchospora alba* ((4-)10-25%), *Narthecium ossifragum* (11-25%), *Sphagnum capillifolium* (4-10%), *S. papillosum* (4-10%), *S. cuspidatum* (4-10%), *S. subnitens* (<4%, occasional), *S. magellanicum* (<4%, occasional), *S. fuscum* (<4%, occasional).
- **Additional comments:** This complex was similar to and transitional from sub-central complex 6+P. Pools were smaller and all algal. Cover of *Sphagnum*, especially *S. papillosum*, was much reduced.

COMPLEX 9A/7/3

- **Location**: surrounding **Sc3**; **Sc4** and **Sc5**
- **Ground**: soft (locally very soft)
- **Physical indicators**: absent
- ***Calluna* height**: 11-20 cm
- ***Cladonia* cover**: 51-75%
- **Macro-topography**: gentle slope
- **Pools**: <4% regular
- ***Sphagnum* cover**: 11-25%
- ***Narthecium* cover**: <4%
- **Micro-topography**: Low hummocks, hollows, pools, flats
- **Tussocks**: *Trichophorum germanicum* <4%
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Cladonia portentosa* (51-75%), *Calluna vulgaris* (26-33%), *Eriophorum vaginatum* (<4%), *E. angustifolium* (4-10%), *Carex panicea* (4-10%), *Narthecium ossifragum* (<4%), *Trichophorum germanicum* (<4%), *Menyanthes trifoliata* (<4%, occasional in pools), *Sphagnum capillifolium* (11-25%), *S. papillosum* (4-10%), *S. cuspidatum* (<4%, occasional in pools), *S. austinii* (<1%, occasional).
- **Additional comments:** Characterised by rolling, low hummocks. *Cladonia* and *Eriophorum angustifolium* are the most visually distinctive species in the complex. This complex is wetter and better than 9/7/6 with scattered pools with some *Sphagnum cuspidatum* and *Menyanthes trifoliata* and *S. papillosum* margins.

COMPLEX 9/7/6

- **Location**: this community complex is found across entire high bog
- **Ground**: soft
- **Physical indicators**: absent
- ***Calluna* height**: 11-20 cm
- ***Cladonia* cover**: 4-10% (c. 10%)
- **Macro-topography**: steep slope
- **Pools**: 4-10% regular, algal
- ***Sphagnum* cover**: 11-25% (low end of range)
- ***Narthecium* cover**: 11-25%
- **Micro-topography**: Low hummocks, high hummocks (rare), hollows, pools, flats

- **Tussocks**: *Eriophorum vaginatum* <4%
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (26-33%), *Eriophorum vaginatum* (11-25%), *Narthecium ossifragum* (11-25%), *Carex panicea* (<4%, occasional to 4-10%, frequent), *Rhynchospora alba* (<4%, occasional), *Sphagnum capillifolium* (4-10%), *S. papillosum* (<4%), *S. cuspidatum* (<4%), *S. tenellum* (<4%), *Racomitrium lanuginosum* (4-10%).
- **Additional comments:** Numerous small hummocks characterised this complex. *Racomitrium lanuginosum* was notably abundant. Scattered, very small algal pools were present, occasionally with *Sphagnum cuspidatum*. *Cladonia uncialis* was noted from here. A variant with little *Narthecium* and higher *Carex panicea* cover was recorded west of flush **V**. This was mapped as complex 9/7/3.

Marginal Ecotope Complexes

COMPLEX 7/9+MY

- **Location**: east side of southwest lobe
- **Ground**: firm
- **Physical indicators**: absent
- ***Calluna* height**: 31-40 cm
- ***Cladonia* cover**: 10-25%
- **Macro-topography**: gentle slope
- **Pools**: absent
- ***Sphagnum* cover**: 4-10%
- ***Narthecium* cover**: absent
- **Micro- topography**: low hummocks, hollows
- **Tussocks**: *Eriophorum vaginatum* (11-25%)
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (51-75%), *Eriophorum vaginatum* (11-25%), *Myrica gale* (<4%, occasional), *Sphagnum capillifolium* (4-10%).
- **Additional comments**: This ecotope was characterised by tall, dry *Calluna vulgaris* hummocks and *Eriophorum vaginatum* tussocks. It was most likely slightly flushed, and distinguished from sub-marginal ecotopes with abundant *E. vaginatum* by the distinctly firm ground underfoot.

COMPLEX 6/7/3

- **Location**: this is the most frequent marginal ecotope community complex and is found across entire high bog margin
- **Ground**: firm
- **Physical indicators**: bare peat <4%, frequent
- ***Calluna* height**: 21-30cm
- ***Cladonia* cover**: 26-33%
- **Macro-topography**: steep slope
- **Pools**: absent
- ***Sphagnum* cover**: <4%
- ***Narthecium* cover**: 11-25%
- **Micro- topography**: low hummocks, hollows, flats
- **Tussocks**: *Trichophorum germanicum* (4-10%) (-25% in places)
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (11-25%), *Erica tetralix* (4-10%), *Narthecium ossifragum* (11-25%), *Trichophorum germanicum* (4-10% (25% in places)), *Carex panicea* (11-25%)
- **Additional comments**: None.

COMPLEX 6/2 + P

- **Location**: surrounding flush **X**
- **Ground**: firm to soft
- **Physical indicators**: *Campylopus introflexus* (<4%)
- ***Calluna* height**: 11-20cm
- ***Cladonia* cover**: 4-10% (11-25% in places)
- **Macro-topography**: gentle slope towards flush
- **Pools**: 4-10% (mostly algal with little or no *Sphagnum* cover)
- ***Sphagnum* cover**: 4-10%
- ***Narthecium* cover**: 11-25%
- **Micro- topography**: low hummocks/*Narthecium ossifragum* flats/ hollows & pools
- **Tussocks**: *Trichophorum germanicum* (<4%; 4-10% in places).
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (11-25%), *Erica tetralix* (4-10%), *Eriophorum vaginatum* (<4%), *E. angustifolium* (<4%), *Narthecium ossifragum* (11-25%), *Trichophorum germanicum* (<4%), *Rhynchospora alba* (<4%; 4-10% in places), *Carex panicea* (<4%), *Carex panicea* (<4%), *Andromeda*

polifolia (H; <4%), *Hypnum jutlandicum* (<4%), *S. tenellum* (H; <4%), *S. cuspidatum* (P; <4%), *S. papillosum* (H & P; <4%).

- **Additional comments**: None.

COMPLEX 4/2+ EROSION CHANNELS (4/2+EC)

- **Location**: ridge between northern and southern lobes, as well as area between flushes **X** and **Z**
- **Ground**: firm, soft in channels
- **Physical indicators**: erosion channels, bare peat 4-10%
- ***Calluna* height**: 11-20cm
- ***Cladonia* cover**: 26-33%
- **Macro-topography**: steep slope to west
- **Pools**: 4-10% in erosion channels
- ***Sphagnum* cover**: 4-10%
- ***Narthecium* cover**: <4%
- **Micro- topography**: high hummocks, flats, erosion channels
- **Tussocks**: *Trichophorum germanicum* (10-25%)
- **Degradation or regeneration evidence**: erosion channels
- **Species cover**: *Calluna vulgaris* (11-25%), *Erica tetralix* (<4%), *Narthecium ossifragum* (<4%), *Trichophorum germanicum* (10-25%), *Eriophorum angustifolium* (4-10%), *Rhynchospora alba* (4-10%), *Sphagnum capillifolium* (<4%), *S. papillosum* (4-10%).
- **Additional comments**: This complex was similar to eroding blanket bog habitats. Hummocks and ridges of peat were situated over 20-30 cm deep erosion channels. Channels were wet with bare peat, *Trichophorum germanicum*, *Eriophorum angustifolium* and some *Sphagnum* in ponded channels.

Inactive flushes

FLUSH T

The inactive northern arm of flush T was dominated by *Molinia caerulea* with abundant *Cladonia portentosa*. Tall *Calluna vulgaris* was frequent, associated with tall *Hylocomium splendens* hummocks. *Sphagnum cuspidatum* and *S. papillosum* were occasional in wet hollows.

FLUSH U

- **Location**: southeast corner of clearfell **CF1**

- **Ground**: soft
- **Physical indicators**: felled pines
- ***Calluna* height**: 31-40 cm
- ***Cladonia* cover**: 4-10%
- **Macro-topography**: gentle slope to northeast
- **Pools**: absent
- ***Sphagnum* cover**: 11-25%
- ***Narthecium* cover**: <4%
- **Micro-topography**: low hummocks, hollows
- **Tussocks**: *Eriophorum vaginatum* (26-33%)
- **Degradation or regeneration evidence**: none
- **Species cover**: *Calluna vulgaris* (11-25%), *Eriophorum vaginatum* (26-33%), *Carex panicea* (4-10%), *Aulacomnium palustre* (<4%, frequent), *Andromeda polifolia* (<4%, occasional), *Polytrichum commune* (<4%, occasional), *Empetrum nigrum* (<4%, occasional), *Dryopteris dilatata* (<4%, frequent), *Vaccinium myrtillus* (<4%, occasional), *Pinus contorta* (<4%, frequent), *Sphagnum capillifolium* (11-25%), *S. palustre* (<4%, occasional), *S. fallax* (<4%, frequent).

  Additional comments: Flush U was very hummocky and tussocky with very wet hollows. (<4% cover each). During the previous survey, this area was occupied by natural regeneration of *Pinus contorta*. These have been mainly felled in the course of the Coillte LIFE project, leaving several saplings < 1 m tall. A *Salix aurita* sapling was also recorded.

FLUSH V

Flush V was similar to flush T in that it was dominated by *Molinia caerulea* with abundant *Cladonia portentosa*. Also occurring at low frequency and <4% cover were *Erica tetralix, Potentilla erecta, Calluna vulgaris, Sphagnum capillifolium, S. papillosum* and *S. magellanicum*.

FLUSH W

- **Location**: northeast margin of site
- **Ground**: very soft
- **Physical indicators**: absent
- ***Calluna* height**: 40+ cm
- ***Cladonia* cover**: 11-25%
- **Macro-topography**: steep slope to north
- **Pools**: absent

- ***Sphagnum* cover**: 4-10%
- ***Narthecium* cover**: absent
- **Micro-topography**: *Molinia* tussocks, hollows
- **Tussocks**: *Molinia caerulea* (76-90%)
- **Degradation or regeneration evidence**: none
- **Species cover**: *Molinia caerulea* (76-90%), *Calluna vulgaris* (<4%, occasional), *Erica tetralix* (<4%, frequent), *Polygala serpyllifolia* (<4%, occasional), *Potentilla erecta* (<4%, occasional), *Myrica gale* (<4%, frequent), *Sphagnum capillifolium* (4-10%).
- **Additional comments**: A typical inactive flush with low diversity.

FLUSH X

- **Location**: east corner of north lobe
- **Ground**: soft
- **Physical indicators**: standing water abundant during 2012 survey
- ***Calluna* height**: 31-40+ cm
- ***Cladonia* cover**: 4-10% (locally abundant)
- **Macro-topography**: depression & gentle slope southeast
- **Pools**: absent
- ***Sphagnum* cover**: 11-25%
- ***Narthecium* cover**: absent
- **Micro-topography**: Low and high hummocks, hollows
- **Tussocks**: *Molinia caerulea* (11-25%), patchy
- **Degradation or regeneration evidence**: none
- **Species cover**: *Molinia caerulea* (10-25%), *Calluna vulgaris* (26-33%), *Eriophorum vaginatum* (34-50%), *Erica tetralix* (4-10%), *Potentilla erecta* (<4%, frequent), *Vaccinium oxycoccos* (<4%, occasional), *Polytrichum strictum* (<4%, occasional), *Sphagnum capillifolium* (11-25%).
- **Additional comments**: Flush X was mainly inactive. It was located in an area of very old, light turf cutting in a distinct, wide channel associated with some old drains running southeast. The flush was very wet with much standing water at the time of survey, following heavy overnight rain. Vegetation was similar to sub-marginal complex 9/7 with flush elements.

FLUSH Y

Flush Y consisted of two small pools, each 4-5 m diameter. These appeared artificial in origin because of a low ridge or berm of *Calluna vulgaris* dominated peat around the downhill sides of the pools. The pools were 1.5 m deep with about 10 cm of water at the bottom. Each was choked with *Molinia caerulea*. The species complement around the pools was similar to that of flush X. A firmer area to the west was mapped as part of the flush in 2004, but this was excluded in 2012 as it supported typical sub-marginal complex 9/7 vegetation. This area appeared to have been a drain that was dug in the past to feed the two pools. A pool was recorded in 2012 and was similar to that described in 2004. *Sphagnum cuspidatum* and *Eriophorum angustifolium* were present in the pool, which seemed to be the last open water remnant of the now-defunct drain.

FLUSH Z

- **Location**: southeast corner of site
- **Ground**: firm
- **Physical indicators**: central drain
- ***Calluna* height**: 40+ cm
- ***Cladonia* cover**: 4-10%
- **Macro-topography**: gentle slope eastward
- **Pools**: absent
- ***Sphagnum* cover**: <4%
- ***Narthecium* cover**: absent
- **Micro-topography**: *Molinia* tussocks, hollows
- **Tussocks**: *Molinia caerulea* (76-90%)
- **Degradation or regeneration evidence**: none
- **Species cover**: *Molinia caerulea* (76-90%), *Calluna vulgaris* (4-10%), *Myrica gale* (<4%, frequent)
- **Additional comments**: A deep central drain ran through this flush in which *Salix aurita* bushes occurred. Topography was very uneven with old, former drains feeding into the main drain. The ground was very tussocky with 75-90% cover of *Molinia caerulea*. *Myrica gale* was frequent and increased towards the transition to marginal ecotope. The central drain is a major feature draining southward. A substantial amount of water leaves the bog from this drain.

Face bank Complexes

The facebank vegetation was dominated by tall *Calluna vulgaris* and had a very poor *Sphagnum* cover (<4%) and was usually found on firm ground with a sometimes steep slope to the high bog margin.

Clearfells

CLEARFELL 1

On the west side of the northern lobe was a former *Pinus contorta* plantation that had been felled since the 2004 survey as part of the Coillte LIFE project. The clearfell was not actively peat forming at the time of survey. It supported a dense cover of vegetation, with 90+% cover of vascular plants. These included mainly *Eriophorum vaginatum* (51-75% cover), *Calluna vulgaris* (11-25%), *Molinia caerulea* (4-10%) and *Juncus effusus* (4-10%) with small amounts of *Rubus fruticosus, Ulex europaeus* and *Dryopteris dilatata*. Scattered *Betula pubescens* saplings c. 1 m tall were present; many showed signs of browsing, most likely by deer, judging by the signs of deer (hoof-prints, droppings) that were present elsewhere on site. Overall *Sphagnum* cover was 4-10%, concentrated in old forestry drains many of which were very wet with standing water and clumps of *S. palustre, S. fallax, S. cuspidatum* and *S. capillifolium*. Several patches of bare peat were frequent and supported colonising *Campylopus introflexus*. Many *Pinus contorta* saplings and some *Picea sitchensis* saplings up to 3 m tall were present at the edges of the clearfell.

Depressions on peat substrates of the Rhynchosporion (7150)

The habitat occurs at Camderry 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 Camderry Bog, such as: central (15); sub-central ecotope (6 + P; 9/7 + P); sub-marginal ecotope (6/4 + P; 9/7/6) and marginal ecotope (6/2 + P; 4/2 + EC).

The species becomes very frequent within complexes 15 (central); 6 + P (sub-central); 6/4 + P (sub-marginal) and 6/2 + P and 4/2 + EC (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. *R. alba* was also recorded in more degraded areas of the bog such as the steeply sloping ridge

between the northern and southern lobes of the high bog where bare peat and erosion channels were found.

Appendix II Photographical records

Photograph Number	Aspect	Type	Feature	Date
DSC00349	NE	Overview	Qc1	16/10/2012
DSC00347	NE	Overview	Qsc2	15/10/2012
DSC00348	NE	Overview	Qaf1	15/10/2012
DSC00350	NE	Overview	Qsm1	17/10/2012

Appendix III Quadrats

Ecotope type	**Central**	**Central**	**Sub-central**	**Sub-marginal**
Complex Name	**15**	**15**	**3/6 + P**	**9/7/3 + P**
Quadrat Name	Qc1	Qc1	Qsc 1	Qsm1
Easting	169569	169582.93	170991	170983.33
Northing	256876	256868.74	257891	257899.09
Date	12/09/2004	16/10/2012	12/09/2004	17/10/2012
Firmness	Quaking	Quaking	very soft	Soft
Burnt	No	No	No	No
Algae in hollows %	Absent	Absent	4-10	1-3 (many indiv)
Algae in pools %	Absent	Absent	na	1-3 (few indiv)
Bare peat %	Absent	Absent	Absent	Absent
High hummocks %	na	Absent	na	4-10
Low hummocks %	26-33	51-75	11-25	34-50
Hollows %	4-10	4-10	4-10	4-10
Lawns %	11-25	4-10	Absent	Absent
Pools %	11-25	11-25	11-25	4-10
Pool type	Interconnecting	Regular	Interconnecting	Regular
S.austinii hum type	na	Absent	na	Absent
S.austinii hum %	Absent	Absent	Absent	Absent
S.austinii height(cm)	na	Absent	na	Absent
S.fuscum hum type	na	Absent	na	Absent
S.fuscum hum %	Absent	Absent	Absent	Absent
S.fuscum height(cm)	na	Absent	na	Absent
Leucobryum glaucum	Absent	Absent	Absent	Absent
Trichophorum type	Absent	Flats	Flats	Absent

Ecotope type	**Central**	**Central**	**Sub-central**	**Sub-marginal**
Complex Name	**15**	**15**	**3/6 + P**	**9/7/3 + P**
Trichophorum %	Absent	1-3 (several indiv)	4-10	1-3 (many indiv)
S.magellanicum %	4-10	4-10	na	Absent
S.cuspidatum %	11-25	11-25	4-10	4-10
S.papillosum %	11-25	11-25	4-10	4-10
S.denticulatum %	4-10	Absent	4-10	Absent
S.capillifolium%	11-25	4-10	11-25	34-50
S.tenellum %	na	1-3 (many indiv)	na	1-3 (many indiv)
S.subnitens %	na	4-10	na	1-3 (many indiv)
R.fusca %	Absent	Absent	Absent	Absent
R.alba %	4-10	4-10	4-10	1-3 (many indiv)
N.ossifragum %	4-10	1-3 (many indiv)	4-10	11-25
Sphag pools %	11-25	11-25	11-25	4-10
Dominant pool Sphag	S.cuspidatum	S.cuspidatum	S.cuspidatum	S.cuspidatum
Sphag lawns %	11-25	4-10	Absent	Absent
Sphag humm %	26-33	34-50	11-25	11-25
Sphag holl %	4-10	4-10	4-10	1-3 (many indiv)
Total Sphag %	51-75	51-75	26-33	34-50
Hummocks indicators	Absent	Absent	Absent	Absent
Cladonia portent %	4-10	11-25	4-10	1-3 (many indiv)
Other Cladonia sp	na	C.uncialis	na	C.uncialis
C. panicea %	na	1-3 (several indiv)	na	11-25
Calluna cover %	11-25	26-33	4-10	26-33
Calluna height(cm)	31-40	11-20	21-30	21-30
Other NotableSpecies		Menyanthes & Aulacomnium palustre		Aulacomnium palustre
Other comment				Empetrum adj to quad. Quad borderline SC/SM but SM in

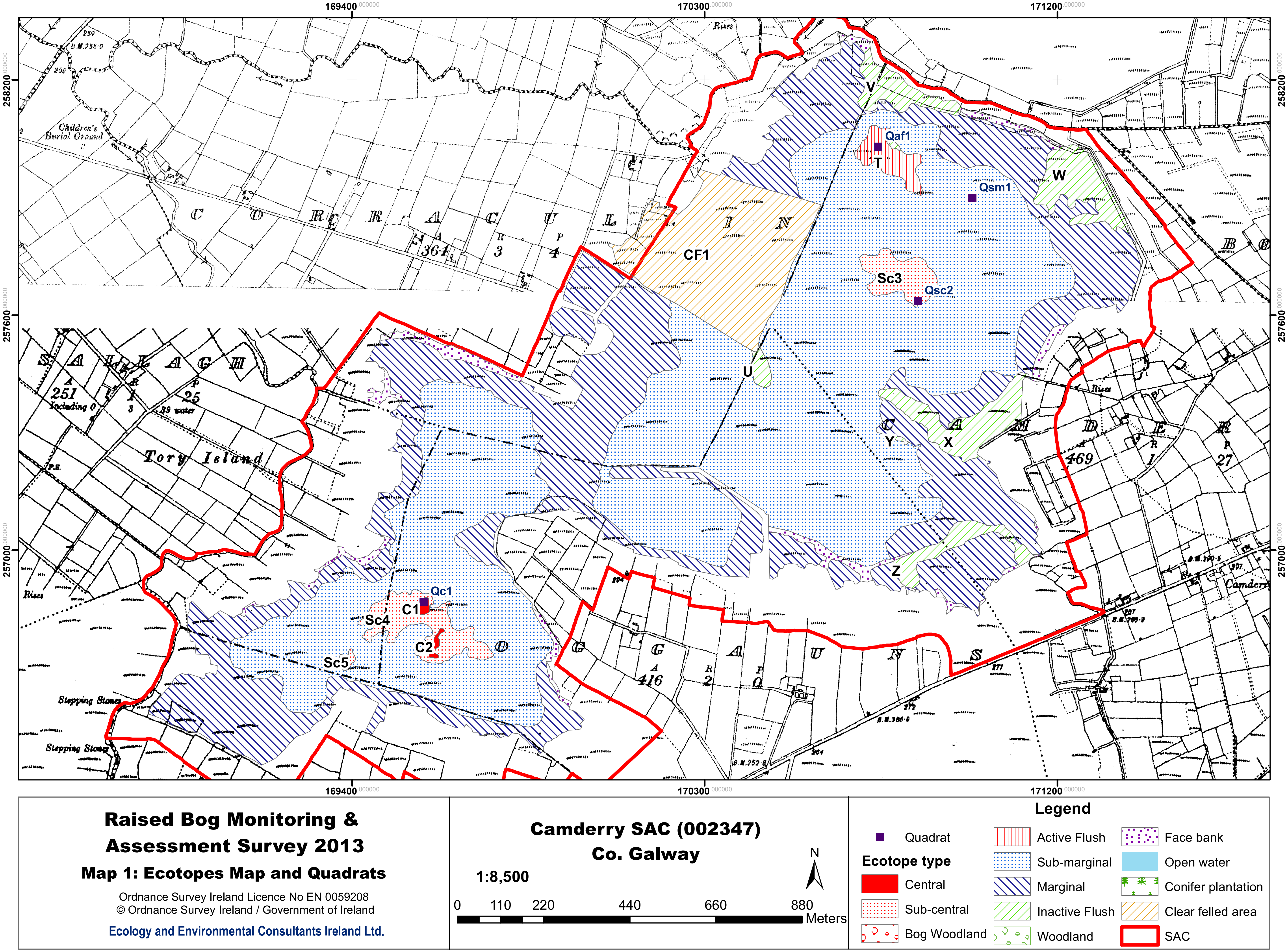
Ecotope type	**Central**	**Central**	**Sub-central**	**Sub-marginal**
Complex Name	**15**	**15**	**3/6 + P**	**9/7/3 + P**
				surrounding area (Previously Qsc1)

Ecotope type	**Sub-central**	**Sub-central**	**Sub-central**	**Active Flush**
Complex Name	**9/7 + p**	**9/7 + P**	**15-**	**(9/7 + P)**
Quadrat Name	Qsc 2	Qsc2	Qsc3	Qaf1
Easting	170837	170844.39	170745	170743.20
Northing	257636	257636.06	258036	258029.69
Date	12/09/2004	15/10/2012	12/09/2004	15/10/2012
Firmness	soft	Soft	quaking	Quaking
Burnt	No	No	No	No
Algae in hollows %	Absent	1-3 (many indiv)	Absent	1-3 (many indiv)
Algae in pools %	4-10	Absent	Absent	Absent
Bare peat %	Absent	Absent	Absent	Absent
High hummocks %	na	Absent	na	Absent
Low hummocks %	4-10	51-75	11-25	51-75
Hollows %	11-25	4-10	11-25	4-10
Lawns %	Absent	1-3 (many indiv)	Absent	4-10
Pools %	11-25	4-10	11-25	11-25
Pool type	Regular	Regular	na	Regular
S.austinii hum type	na	Absent	na	Absent
S.austinii hum %	na	Absent	4-10	Absent
S.austinii height(cm)	na	Absent	na	Absent
S.fuscum hum type	na	Absent	na	Absent
S.fuscum hum %	Absent	Absent	Absent	Absent
S.fuscum height(cm)	na	Absent	na	Absent
Leucobryum glaucum	Absent	Absent	Absent	Absent
Trichophorum type	Flats	Flats	Flats	Flats

Ecotope type	**Sub-central**	**Sub-central**	**Sub-central**	**Active Flush**
Complex Name	**9/7 + p**	**9/7 + P**	**15-**	**(9/7 + P)**
Trichophorum %	4-10	1-3 (many indiv)	4-10	1-3 (several indiv)
S.magellanicum %	1-3 (many indiv)	Absent	1-3 (many indiv)	11-25
S.cuspidatum %	4-10	4-10	4-10	4-10
S.papillosum %	4-10	4-10	4-10	4-10
S.denticulatum %	4-10	Absent	4-10	Absent
S.capillifolium%	4-10	26-33	4-10	4-10
S.tenellum %	na	1-3 (many indiv)	na	1-3 (many indiv)
S.subnitens %	na	1-3 (few indiv)	na	Absent
R.fusca %	Absent	Absent	Absent	Absent
R.alba %	4-10	1-3 (many indiv)	4-10	1-3 (many indiv)
N.ossifragum %	4-10	1-3 (many indiv)	1-3 (many indiv)	1-3 (few indiv)
Sphag pools %	11-25	4-10	11-25	11-25
Dominant pool Sphag	S.cuspidatum;S. denticulatum	S.cuspidatum	S.cuspidatum;S. denticulatum	S.cuspidatum
Sphag lawns %	4-10	1-3 (many indiv)	Absent	4-10
Sphag humm %	11-25	26-33	11-25	11-25
Sphag holl %	4-10	1-3 (many indiv)	11-25	1-3 (many indiv)
Total Sphag %	26-33	34-50	26-33	34-50
Hummocks indicators	S.austinii	Absent	S.austinii	Absent
Cladonia portent %	11-25	34-50	4-10	26-33
Other Cladonia sp	na	C.uncialis	na	C. uncialis
C. panicea %	na	1-3 (many indiv)	na	Absent
Calluna cover %	11-25	26-33	11-25	26-33
Calluna height(cm)	31-40	11-20	31-40	21-30
Other NotableSpecies		Menyanthes trifoliata		Aulacomnium palustre
Other comment				This area should be mapped as a flush

Note: Data for those 2004 quadrats re-surveyed in 2012 is given to the right of the original 2004 quadrat data in table above. Not all quadrats reported in 2004 were re-surveyed in 2012. Nonetheless, all 2004 quadrat data is given above. Additional quadrats were recorded where necessary. Some 2004 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

Ordnance Survey Ireland Licence No EN 0059208

Ecology and Environmental Consultants Ireland Ltd.

Camderry SAC (002347)
Co. Galway

168500 169400 170300 171200

258200 257600 257000

Raised Bog Monitoring & Assessment Survey 2013

Map 2: Vegetation community complexes

Ecology and Environmental Consultants Ireland Ltd.

Camderry SAC (002347)
Co. Galway

1:8,500

N

0 125 250 500 750 1,000 Meters

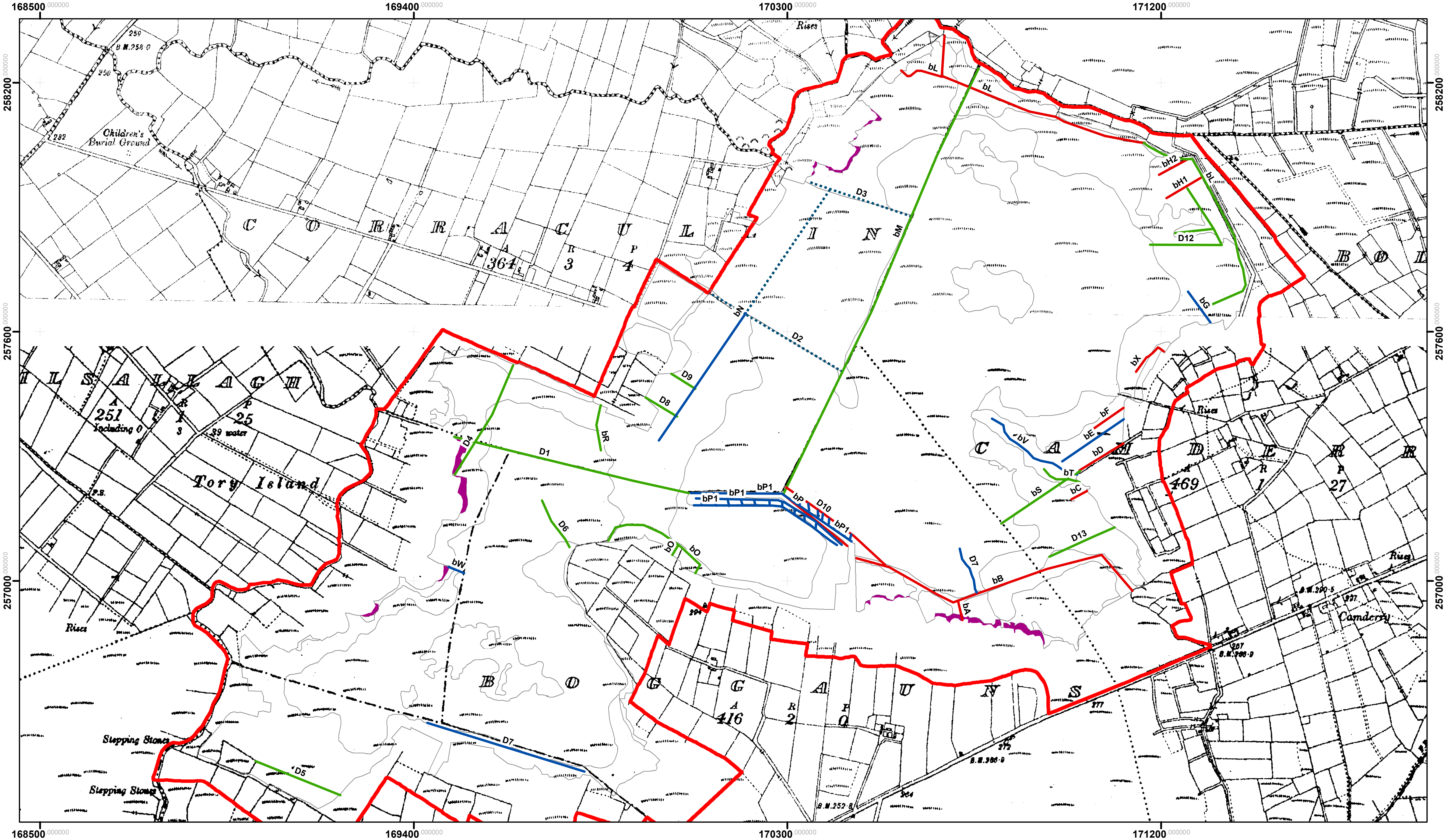
Legend

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)

Ordnance Survey Ireland Licence No EN 0059208

Ecology and Environmental Consultants Ireland Ltd.

Camderry SAC (002347)
Co. Galway

1:8,500

0 115 230 460 690 920 Meters

N

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