Brown Bog (SAC 002346), Co. Longford

Executive Summary

This survey, carried out in late August and September 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 Brown 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 (ARB) covers 10.77 ha (21.16%) of the high bog area. The central ecotope is oval-shaped in the centre of the site and is characterised by interconnecting pools, lawns and low hummocks with a high *Sphagnum* cover, up to 90%. The central ecotope grades into the sub-central ecotope which surrounds the central. It has fewer pools, which are regular in shape, and in the inter-pool areas, *Sphagnum* cover is less at 50-75%, and *Narthecium ossifragum* flats and *Eriophorum vaginatum* characterise the vegetation.

The active flush area extends from the northern edge of the central ecotope northwards almost to the edge of the bog on a gentle slope. It has a notable tall lush growth of *Narthecium ossifragum* and *Eriophorum angustifolium*, and occasional birch trees. Towards the edge of the bog, it becomes drier with *Calluna vulgaris*, *Eriophorum vaginatum* and *Sphagnum* hummocks. *Pinus sylvestris* saplings and trees up to 5m high were localised around the flush and occasionally in the central ecotope.

Degraded Raised Bog covers 40.12ha (78.84%) of the high bog area. It is drier than the Active Raised Bog and supports a lower density of *Sphagnum* mosses (11-33%). It has a less developed micro-topography and pools are generally absent or very localised. *Pinus sylvestris* is expanding in the northern side of the bog particularly in the Degraded Raised Bog ecotopes, but also in the active flush area.

Depressions on peat substrates of the Rhynchosporion are found in both Active and Degraded Raised Bog. They tend to be best developed and most stable in the wettest areas of Active Raised Bog in the central and sub-central ecotopes.

No restoration works took place at the site between 2004 -2012.

The current conservation objective for Brown 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 36.41ha. 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 no change in the area of Active Raised Bog (10.77ha) at Brown Bog in the 2004 to 2012 period. Apparent changes in the ARB ecotope areas and shape in 2012 compared to 2004, was in fact due to more comprehensive mapping, hence the 2004 figures were amended.

There has not been recent peat cutting or new drainage on site. There is only one non-functional drain (81m long) at the south-eastern corner. There is on-going drainage off-site, to the west between the edge of the bog and adjoining agricultural fields. There is also a conifer plantation to the east of the bog and that is likely to be having some adverse impact on the high bog habitats.

Active Raised Bog has been given an overall **Unfavourable Bad–Stable** conservation status assessment. Habitat Area has not changed and quality is stable in the reporting period. However, current Area value is 70.42% below favourable reference values, whereas S&Fs is 0.9% below reference value. Future Prospects are considered Unfavourable Bad-Stable due to the lack of restoration measures and the presence of only minor impacting activities.

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

The **overall raised bog** at **Brown Bog SAC** has been given an **Unfavourable Bad-Stable** assessment.

A series of **recommendations** have been also given, these include: continuing the cessation of peat cutting; an assessment of the significance of the impacts associated with agricultural drainage to the west and forestry to the east of Brown Bog; restoration works on the cutover areas; further hydrological and topographical studies to ascertain the capacity of the high bog to support Active Raised Bog and thus estimate a more accurate favourable reference value and further botanical monitoring surveys. The increase in *Pinus sylvestris* and *Betula pubescens* on the high bog should be monitored.

Site identification

SAC Site Code	002346	**6" Sheet:**	LD 13
Grid Reference:	N 09 76	**1:50,000 Sheet:**	40
High Bog area (ha):	50.89 ha		
Dates of Visit:	29/08, 05/09 2012		
Townlands:	Tully, Fihoges, Catronlebagh, Mullolagher, Lissanurland and Brown Bog		

Site location

Brown Bog is located approximately 4km west of Longford town. It lies approximately 2km to the south-east of Fisherstown Bog (SAC 1818). The bog is accessed from the Longford to Cloondara road (N5). For the 2012 survey, the car was parked on the main N5 road in front of the factory located just south of the bog. Access to the bog was gained by walking from the N5 road, around the right hand side of the building and onto the bog 100m behind the factory.

Description of the survey

The survey was carried out on two days in late August and early September 2012 and involved a vegetation survey of the high bog at Brown 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 Brown 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. Three quadrats, which describe the micro-topographical features and

indicator species, recorded in the 2004 project (Fernandez *et al*. 2005) were re-surveyed. An additional quadrat was recorded also. The size of the quadrats was 4m x 4m.

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

Brown Bog is one of the three remaining northern midland raised bogs and was classified as a Basin Bog by Kelly *et al*. (1995). The margins are reasonably intact and a small flush occurs in the north of the site in which there appears to have been a peat flow (Cross, 1990). The bog is oval in shape.

Ecological Information

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

The following Raised Bog EU Annex I habitats, are found in Brown 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 Brown Bog is 10.77ha (21.16% of the high bog), which is a decrease of 0.10ha since 1994. Active Raised Bog includes central, sub-central ecotopes and active flushes. There was no change in the active raised bog area since 2004.

The central ecotope (**C1**) was all comprised of vegetation community complex **15.** It had frequent interconnecting pools (10-20%) containing a good *Sphagnum* cover (76-90%) and scattered *Eriophorum angustifolium*. The ground was quaking. The *Sphagnum* cover was dominated by *S. papillosum*, which occurred in lawns and around the edges of pools, and the pools usually had a good cover of *S. cuspidatum*. *Menyanthes trifoliata* and *Drosera anglica* (both<4%) also occurred in the pools. *Narthecium ossifragum* cover was locally high (33-50%). Towards the south and the east of the ecotope, the cover of *Narthecium ossifragum* and *Rhynchospora alba* increased as the central ecotope graded into sub-central. However, spreading lax hummocks of *Sphagnum austinii* and occasional hummocks of *S. fuscum* were also found towards the south of the central ecotope with hummocks of *S. capillifolium* as well as *S. magellanicum* common throughout.

The active flush (**FZ**) area extended from the edge of the central ecotope northwards almost to the edge of the bog on a gentle slope. Quaking mats of *Narthecium ossifragum* dominated large parts of the flush. *Dactylorhiza maculata* and *Platanthera bifolia* recorded in 2004 were not found. However, they are likely to be still there as conditions have not changed significantly.

There were also several semi-mature *Betula pubescens* trees present as well as younger trees, and occasionally *Vaccinium myrtillus*. Wetter areas included *Eriophorum angustifolium*. Localised hummocks of *Aulacomnium palustre* were associated with *Sphagnum papillosum* and *S. magellanicum* along the margins of the flush. Several pools contained *Utricularia sp.*

The sub-central ecotope (**Sc1**) surrounds the central ecotope (See Appendix IV, Map 1). It is comprised of two community complexes. Complex 6/9+P located in the southern area, is very soft to quaking with pools (4-10%) and good *sphagnum* cover (51-75%), and there are localised hummocks of *S. austinii* and *Huperzia sp*. Complex 9/7/10 located towards the northern end of the sub-central ecotope has no pools. It has a high cover of *Eriophorum vaginatum* (26-33%) with tall *Calluna* and beneath an extensive *Sphagnum* carpet of mainly *S. capillifolium* (26-33%) and *S. papillosum* (11-25%).

Degraded Raised Bog (7120)

The current area of Degraded Raised Bog at Brown Bog is 40.12ha (78.84% of the high bog).

Degraded Raised Bog includes the sub-marginal, marginal and face bank ecotopes.

Degraded Raised Bog at this site ranges from dry *Calluna*-dominated vegetation along the previously cut margins of the high bog (with little or no *Sphagnum* cover) to sub-marginal vegetation complexes close to the centre of the high bog, which have a moderate *Sphagnum* cover (26-33%). In sloping areas where there is a discernible flow of surface water, erosion channels

dominated by *Rhynchospora alba* are frequent. In the north-east of the site, there also appears to be a slow invasion of the high bog with *Betula pubescens* and *Pinus sylvestris* occurring. Otherwise the vegetation of the Degraded Raised Bog is typical of raised bog flora with *Calluna vulgaris*, *Eriophorum vaginatum* and *Narthecium ossifragum* dominating. The cover of *Cladonia portentosa* is also very high in places as the most of the high bog has not been burned in over 20 years.

The sub-marginal ecotope includes two community complexes; complex 9/7/3, which is located close to the centre of the bog, has good micro-topography and *Sphagnum* cover (>25%). Pools are mostly absent. *Carex panicea* is frequent. At the northern end of the site, complex 6/7/3 + Pines ***sylvestris*** is in an area near the active flush, where pine saplings and trees are colonising. *Narthecium ossifragum* is locally frequent in addition to *Carex panicea*.

Marginal ecotope is slightly drier than sub-marginal ecotope and mainly occurs as a narrow band near the margins of the high bog. The micro-topography consists of *Calluna vulgaris* hummocks, low *Sphagnum* hummocks, flats and very occasionally hollows and tear pools. The *Sphagnum* cover is even lower here than in the sub-marginal ecotope (<10%) and the vegetation is characterised by a higher cover of *Carex panicea, Narthecium ossifragum, Trichophorum germanicum* and *Calluna vulgaris.* Community complex 2/7 occurs near the edge of the high bog where there are some erosion channels and *Trichophorum germanicum* is frequent. Complex 3/6 is common. Localised wetter patches within the marginal ecotope include sub-marginal complex 9/7/3 vegetation.

The face bank ecotope is characterised by firm ground with some cracking, tall *Calluna vulgaris*, poor *Sphagnum* cover and a flat micro-topography. The main bryophyte is *Hypnum jutlandicum*.

Tree saplings of *Betula pubescens* and *Pinus sylvestris* are occasional.

Depressions on peat substrates of the Rhynchosporion (7150)

Areas of the Rhynchosporion vegetation were mostly confined to the central active portion of this small site where there are numerous pool and lawn areas, though there is also Rhynchosporion dominated vegetation in erosion channels in areas of Degraded Raised Bog. Rhynchosporion depressions are particularly frequent towards the north-east of the central ecotope where they co-dominate the vegetation along with flats of *Narthecium ossifragum* and *Sphagnum*.hollows.

Detailed vegetation description of the high bog

A detailed description of high bog vegetation recorded during the 2012 survey of Brown 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 Brown Bog, according to their occurrence on the high bog or adjacent to the high bog; area or length of impacting activities, 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
J02.07	Drainage	L	-1	n/av	Outside high bog West of site	**7110/7120/7150**
B01.02	Artificial planting on open ground (non-native trees)	L	-1	5ha	Outside high bog east of site	**7110/7120/7150**
I02	Problematic native species	L	-1	n/av	Inside High Bog Northern part	**7110/7120/7150**

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

n/av: not available

Peat cutting

Peat cutting no longer takes place at Brown Bog. Peat cutting has been abandoned for over 28 years. According to Kelly *et al*. (1995), Douglas and Grogan (1986) and Fernandez *et al.* (2005) all reported that there was no evidence of peat cutting. Although peat cutting did not take place in the reporting period, old face banks and cutover drainage associated with past cutting around the perimeter of the site are likely to continue to have some negative influence on high bog habitats.

Drainage

High bog drainage

There are no significant high bog drainage features on Brown Bog with only one non-functional drain (D1). This is a short drain found extending in a NNE/SSW direction in the SE of the high bog (See Table 6.2). It is in filled with vegetation including *Molinia caerulea*, *Narthecium ossifragum*, *Erica tetralix*, *Potentilla erecta*, *Sphagnum capillifolium* and robust *Calluna vulgaris* overhanging the drain. The drain was not recorded in 1994, but would have been present at that time. See Kelly *et al*. (1995) for a more detailed description of the drainage on the high bog. Table 6.2 shows no change on the status of high bog drains since 2004.

Table 6.2 High bog drainage summary

Status	2004 (km) 1	2012 (km)	Change
NB: functional	n/a	n/a	n/a
NB: reduced functional	n/a	n/a	n/a
NB: non- functional	0.081	0.081	0.000
B: functional	n/a	n/a	n/a
B: reduced functional	n/a	n/a	n/a
B: non- functional	n/a	n/a	n/a

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

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

Table 6.3 below provides a more detail description of the drainage present on the high bog at Brown 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)**	**2004/5 status**	**2012 status**	**Change**	**Comment**
D1	0.081	NB: non-functional	NB: non- functional	No	No change

Bog margin drainage

The cutover areas were not surveyed for drains during 2012.

Drainage on agricultural land immediately west of the high bog (E209360 N 275758) has been maintained (700m of field drains) as indicated the 2010 aerial photographs compared to the 2004 ortho images. It is likely to be having some negative impact on the high bog and thus is given a Low importance/impact on high bog habitats.

Fire history

No fire events have been reported on the high bog in the 2004-2012 reporting period. Apart from a small area on the southern edge of the bog that was burned in the early 1990s, most areas (up to 80%) of the high bog have escaped burning for a long time (>28 years). Indeed, Douglas and Grogan (1986) stated in the mid-1980s that the bog has not been burned for a considerable period of time.

Invasive species

No invasive species were recorded on site during the 2012 survey.

In the 1986 survey, Douglas and Grogan recorded that 'trees are absent from the flush apart from a small group of *Betula pubescens* (<2m high)'. Furthermore, in their species list the only Pine (*Pinus sp.)* recorded was a seedling. In the 2012 survey, Pine trees (up to 6m high) were locally frequent in the active flush area and localised in the sub-central and central ecotopes *Pinus sylvestris* was also frequently recorded across the Degraded Raised Bog.

Although no longer referred to as an invasive species, but as a problematic native species, *Pinus sylvestris* seems to be spreading on the bog. As it is increasing, it is considered to be may be causing localised drying out and thus is given a low importance/impact on the high bog habitats in Table 6.1 of the report. Although the actual direct impact from the species on the high bog habitats can be argued and thus would require further research, the spreading of *Pinus sylvestris* is likely to indicate further drying out processes on the high bog which encourage the dissemination and growth of the species.

Afforestation and forestry management

To the east of the high bog, there is a 5ha area of Sitka spruce (*Picea sitchensis*) conifer plantation on peat, which would have been part of Brown Bog in the past.

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

Other impacting activities

There is some dumping of machinery and other plastic and metal products on cut-over adjacent to the southern edge of the high bog from the factory located near the N5 road.

Conservation activities

There are no conservation activities on Brown Bog which would enhance the conservation status of the site such as the blocking of drains on former cutover areas (e.g. to the west of high bog where maintenance took place in the reporting period) or removal of the conifer plantation on peat east of the bog.

Conservation status assessment

The assessment of the conservation status of Annex I Active and Degraded Raised Bog 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

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 36.41ha (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 10.77ha is 70.42% below the FRV. A current Area value more than 15% below FRV falls into the **Unfavourable Bad** assessment category.

Although a long term (1994-2012) trend indicates a slight reduction in the area of Active Raised Bog at the site (-)0.10ha from 1994 - 2004 (see table 8.1), the more recent and short term trend analysis (8 years 2004-2012) indicates no change in the area of Active Raised Bog.

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

Structure & Functions

The FRV for S&Fs is for at least half of the active raised bog area to be made up of central and active flush, i.e. the higher quality wetter vegetation communities. This value is 5.39ha (half of 10.77ha, the current area of Active Raised Bog). The current value is 5.38ha which is 0.09% below the FRV. Therefore S&Fs are given a **Favourable** assessment.

The long term (1994-2012) trend indicates a decrease in the area of active flush. The short term since last reporting in 2004 indicates no change in the area of active flush. The overall trend (in terms of S&Fs) is **Stable**

Quadrats analysis (**Qc1, Qc2, Qm1** and **Qsc1**) indicates the following:

Qc1: The vegetation of this quadrat was complex **15** in both years. There is a difference in the micro-topography of this quadrat between 2004 and 2012. In 2004 there were 11-25% lawns cover, and 26-33% low hummocks and in 2012 no lawns and 34-50% low hummocks. The S*phagnum* cover reflects the difference in micro-topography, in 2004 *Sphagnum papillosum* 34-50% and *S.capillifolium* 4-10%, whereas in 2012 the higher *S. capillofolium* cover of 26-33% and lower *S. papillosum* of 11-25% is what you would expect of a more hummocky topography. Although S*phagnum* cover was slightly higher in 2012 (>91%) than in 2004 (76-90%), the differences are probably due to a slight difference in the location of the quadrat.

Qc2: The quadrats were given different community complex names in 2004 (complex 4/6/15) and in 2012 (complex 15) and this is reflected in the higher abundance of both *Rhynchospora alba* 11-25% and *Narthecium ossifragum* 34-50% in 2004 compared to <4% and 11-25% respectively in 2012. The difference is probably due to a slightly different quadrat location in the two years reflecting the mosaic of micro-topography rather than a real change in the vegetation.

Qsc1 This was a new sub-central quadrat, taken in the community complex 6/9+P in 2012 as there had been no quadrats taken in the sub-central ecotope in 2004.

Qsm1 – Qm1 This quadrat was in sub-marginal ecotope; complex 3/6/7 in 2004 and in 2012 this was deemed to be an area of marginal community complex 3/6 within a wider sub-marginal area. The change in classification was due to a few factors notably the higher total *Sphagnum* cover of 22-25% recorded in 2004 was only 4-10% in 2012, and lower *Trichophorum germanicum* 4-10% in 2004 compared to 11-25% in 2012. The latter values are more typical of marginal vegetation. It was noted that where this quadrat was recorded, although it was mostly sub-marginal complex 9/7/3 vegetation, there was a mosaic of some marginal areas within it.

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 Brown Bog are assessed as Favourable-Stable (see table 8.5).

Future Prospects

The habitat Area has not increased in the 2004-2012 reporting period and S&Fs remained Stable.

There are no significant impacting activities on the site. There is no active turf cutting and only one small non-functional drain. However outside the high bog area, adjacent land drainage (e.g. 700m of adjacent drains maintained (i.e. deepened and widened) to the west of the site) and forestry plantation to the east which are likely to be having an on-going adverse effect. The 2012 survey noted the spread of *Pinus sylvestris* and *Betula pubescens* which was also reported in the 2004 survey with trees up to 6m in places, but mostly 1-4m. Much fewer pine trees <2m high were recorded on the high bog in the 1994 survey. This is a sign that the bog may be getting drier as such species to continue to grow and expand.

Nevertheless, no decrease/increase in habitat Area neither decline/improvement or S&Fs are expected due to the lack of restoration measures and absence of major impacting activities.

Habitat **Area** is currently 70.42% below FRV (see table 8.4) and a Stable trend is foreseen due to the lack of restoration measures and absence of major 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-Stable**. Habitat's **S&Fs** are currently 0.09% below FRV (see table 8.4) and a Stable trend is also foreseen. Therefore S&Fs are expected to remain 0 to 5% below FRV in the following two reporting periods. Thus, **S&Fs Future Prospects** are assessed as **Favourable-Stable**. **The overall habitat's Future Prospects are Unfavourable Bad-Stable** (see table 8.5).

The overall conservation status of Active Raised Bog at Brown Bog is assessed as Unfavourable Bad-Stable (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	8.68	3.70	3.93	3.93	0.00	0.00
Sub-central	0.00	3.52	5.39	5.39	0.00	0.00
Active flush	2.19	2.54	1.45	1.45	0.00	0.00
Total	**10.87**	**9.76**	**10.77**	**10.77**	**0.00**	**0.00**

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

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

Table 8.2 Assessment of changes in individual Active Raised Bog areas

Area	Quadrats	Trend	Comment	Quadrats analysis
C1	Qc1,Qc2	Stable	Slightly smaller than mapped in 2004. However, this is the result of a more comprehensive surveying and accurate mapping in the 2012.	Both quadrats were slightly different in 2012 compared to 2004 in terms of micro-topography and species. It was probably due to a slightly different location of the quadrat
Sc1	Qsc1	Stable	Slightly larger than mapped in 2004. However, this is the result of a more comprehensive surveying and accurate mapping in the 2012.	2012 was the first year of this quadrat, so nothing to compare it with in 2004.
FZ	None	Stable	Slightly smaller than mapped in 2004However, this is the result of a more comprehensive surveying and accurate mapping in the 2012.	

Degraded Raised Bog (7120)

Area

The Degraded Raised Bog FRV for area is 14.48ha at Brown Bog. This value corresponds with the difference between the current high bog area (50.89ha) and the Active Raised Bog FRV (36.41ha) 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 177.07% bigger than FRV and therefore the habitat Area is given an **Unfavourable Bad** assessment (see table 8.4).

Table 8.3, shows no change on the area of sub-marginal ecotope in the reporting period. Again, the apparent increase in the area of marginal ecotope is due to more comprehensive mapping in 2012 and therefore, is not considered a real change in area. There was no change in the area of face bank. Therefore there has been no change in the area of degraded raised bog in the reporting period 2004-2012. As a result the habitat is given a **Stable** trend.

The Area of Degraded Raised Bog at Brown Bog is assessed as Unfavourable Bad-Stable (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 10.03ha (25% of 40.12ha, the current area of Degraded Raised Bog). The current marginal and face bank ecotopes area value (24.15ha) is 140.78% 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 marginal and face bank ecotopes. Thus, the DRB's S&Fs at Brown Bog are given a **Stable** trend.

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 Brown Bog are assessed as Unfavourable Bad-Stable (see table 8.5).

Future Prospects

Degraded Raised Bog Area and S&Fs have remained Stable during the reporting period. Impacting activities such as agricultural drainage located west of the bog and a forestry plantation to the east of the bog are likely to have some adverse effect on the bog habitats. Also, the 2012 survey noted the continuing spread of *Pinus sylvestris* across many sections of the high bog and particularly at the northern end. Nevertheless, no decrease/increase in habitat Area neither decline/improvement or S&Fs are expected due to the lack of restoration measures and absence of major impacting activities.

Habitat **Area** is currently 177.07% above FRV (see table 8.4) and a Stable trend is expected in the following two reporting periods (12 years). As a result habitat Area is expected to remain more than 15% above FRV. Thus, habitat's **Area Future Prospects** are assessed as **Unfavourable Bad-Stable**. Habitat's **S&Fs** are currently 140.78% above FRV (see table 8.4). A Stable trend is foreseen in the following two reporting periods and thus **S&Fs** are expected to remain more than 25% above FRV. As a result, habitat's **S&Fs Future Prospects** are assessed as **Unfavourable Bad-Stable**.

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

The overall conservation status of Degraded Raised Bog at Brown Bog is assessed as Unfavourable Bad-Stable (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	25.54	22.91	15.97	15.97	0.00	0.00
Marginal	14.47	12.85	18.80	18.80	0.00	0.00
Face bank	n/a	5.35	5.35	5.35	0.00	0.00
Total	**40.01**	**41.11**	**40.12**	**40.12**	**0.00**	**0.00**

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

Note: Table 8.3 includes 2004 figures and 2004 amended figures. The latter shows the ecotope area believed to be present in 2004 after surveying improvements in 2012. The comparison between 2004 (amended) and 2012 illustrates the actual changes in ecotope area in the 2004-2012 period. Any

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

Depressions on peat substrates of the Rhynchosporion (7150)

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

The physical structure and distribution of the habitat across large sections of the high bog makes the process of calculating its area unfeasible and as a consequence makes the process of calculating realistic FRVs unfeasible. Thus, the assessment of the habitat's Area conservation status is indirectly based on the assessment of Active Raised Bog habitat Area (a favourable assessment indicates that all sub-marginal ecotope has turned Active Raised Bog). The habitat Area is given an **Unfavourable Bad** assessment.

The Area trend assessment is based on the variation on Active Raised Bog and sub-marginal ecotope within Degraded Raised Bog in the reporting period. The area of Active Raised Bog and sub-marginal ecotope has not changed in the reporting period. As result habitat Area is given a **Stable** trend.

The habitat's Area Future Prospects status is equally based on the Active Raised Bog Area Future Prospects status assessment and the Area Future Prospects trend is based on the trend expected for Active Raised Bog and sub-marginal ecotope in the following two reporting periods. No major impacting activities occur at the site. Therefore, the habitat's Area Future Prospects are given an **Unfavourable Bad-Stable** 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 a **Favourable-Stable** assessment.

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

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

The conservation status of depressions on peat substrates of the Rhynchosporion at Brown Bog is assessed as Unfavourable Bad-Stable (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	36.41	10.77	70.42	5.39	5.38	0.09

[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	14.48	40.12	177.07	10.03	24.15	140.78

[5] 1994/5 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–Stable.**
- **Degraded Raised Bog is assessed as being Unfavourable Bad–Stable.**
- **Rhynchosporion depressions is assessed as being Unfavourable Bad–Stable.**

Table 8.5 Habitats conservation status assessments

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

Conclusions

Summary of impacting activities

- Peat cutting. There is no evidence of peat cutting in recent times on Brown Bog. Peat cutting has been abandoned for more than 25 years (Kelly *et al*. 1995). And Douglas and Grogan (1986) and Fernandez *et al*. (2005) made no reference to peat cutting during their site visits.
- High bog drainage. There is only one non-functional drain (81m long) at the south-eastern side of the bog.
- Cutover drainage (peripheral drainage). Actual cutover and adjacent land drains were not surveyed in 2012. The comparison of 2004 versus 2010 aerial images show some (700m) drainage maintenance (i.e. widening and deepening) of adjacent agriculture land drains to the west of the high bog.
- Fire History. There was no evidence of recent burning noted during this survey and, historically only a small area on the southern edge of the bog that was burned in the 1990's (Fernandez *et al*. 2005).

Changes in active peat forming areas

- Although the distribution and shape of the area of ARB mapped in 2012 was slightly different to that mapped in 2004, this was due to improved mapping accuracy as a result of more comprehensive surveying. Hence it is concluded that here were no changes in the ARB during the reporting period (2004-2012).

Other changes

- Impacting activities adjacent to Brown Bog. Drainage channels (700m), west of the high bog on adjoining agricultural land are still maintained. These are likely to be having some ongoing indirect drainage impact on the bog. The conifer plantation (5ha. approximately) located adjacent to the eastern side of the bog is also likely to be having an indirect impact which is difficult to quantify.
- The 2012 survey noted the spread of *Pinus sylvestris* and to a lesser extent *Betula pubescens* on many sections across the entire high bog and particularly at the northern end in the area of active flush and adjoining sub-marginal ecotope. The trees were up to 6m high, but most were < 2m high. Saplings <1m were occasional on the marginal ecotope across the site.

Quadrats analysis

- Quadrats **Qc1** and **Qc2**. There were slight differences in both quadrats in terms of micro-topography and vegetation which would suggest that the quadrat location may have been slightly different in both years. In **Qc2**, the community complex was re-named from complex 4/6/15 in 2004 to complex 15 in 2012 reflecting a difference in the main species occurring. **Qm1** was classified as **Qsm1** in 2004 with the community complex **3/6**. The vegetation of this quadrat was indicative that there is a mosaic of small areas of marginal vegetation within a larger sub-marginal ecotope. These differences are likely to be the result of re-interpretation of vegetation and inaccuracy in quadrat location rather than any actual change in vegetation.
- **Qsc1** This was a new sub-central quadrat, taken in 2012 as there had been no quadrats taken in the sub-central ecotope in 2004.

Restoration work

- No restoration works having been undertaken at the site.

Summary of conservation status

- **Active Raised Bog** has been given an **Unfavourable Bad–Stable** conservation status at Brown Bog. Habitat Area and S&Fs have not changed in the reporting period. Future Prospects are considered **Unfavourable Bad-Stable.** However there are on-going activities (drainage and forestry) off-site which are likely to have an adverse effect on the high bog. The spread of birch and pine trees on the site continues and this may indicate some drying out processes on the bog.
- **Degraded Raised Bog** has been given an **Unfavourable Bad-Stable** conservation status at Brown Bog. The habitat Area has not changed since 2004. Habitat's S&Fs have not changed either since 2004. Both Area and S&Fs are above FRVs, which is deemed negative for this habitat as regards conservation status. Future Prospects are considered Unfavourable Bad-Stable.
- **Depressions on peat substrates of the Rhynchosporion has been given an Unfavourable Bad-Stable** conservation status at Brown Bog. Habitat Area and quality (S&Fs) are considered to have not changed in the reporting period. Future Prospects are considered Unfavourable Bad-Stable.

The conservation status of the **overall raised bog** at **Brown Bog SAC** is assessed as being **Unfavourable Bad-Stable.**

Recommendations

- **Maintain the cessation of peat cutting**.
- **Assessment of the actual impact of adjacent land drainage** on the high bog and look into the possibility of blocking of this drainage system (particularly to the west of the site where maintenance took place in the reporting period).
- **Further hydrological and topographical studies** to ascertain the capacity of the high bog to support Active Raised Bog and thus estimate a more accurate favourable reference value.
- **Further botanical monitoring surveys** on the high bog. Including the monitoring of the spreading of *Pinus sylvestris* and *Betula pubescens*.
- **Restoration works are recommended** including the removal of the conifer plantation just to the east of Brown Bog and on the cutover areas.
- The dumped machinery and plant from the factory near the southern end of the site should be removed.

References

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Appendix I Detailed vegetation description of the high bog

Active Raised Bog (7110)

Central Ecotope Complex

COMPLEX 15

- **Location**: Center of bog within **C1**
- **Ground**: quaking
- **Physical indicators**: absent
- ***Calluna* height**: 10-20cm
- ***Cladonia* cover**: absent
- **Macro-topography**: gentle slope to north
- **Pools**: Interconnecting
- ***Sphagnum* cover**: 76-90%
- ***Narthecium* cover**: <4%
- **Micro- topography**: High and low hummocks/ pools/lawns
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (4-10%), *Erica tetralix* (4-10%), *Eriophorum vaginatum* (<4%), *E. angustifolium* (<4%), *Rhynchospora alba* (4-10%), *Drosera anglica* (<4%), *Menyanthes trifoliata* (<4%), *Carex panicea* (<4%), *Sphagnum capillifolium* (Hummocks (H); 11-25%), *S. austinii* (H; 4-10%), *S. fuscum* (H; <4%), *S. papillosum* (H & Pools (P); 25-33%), *S. magellanicum* (Lawns (L) & P; 4-10%), *S. cuspidatum* (P; 4-10%), *S. denticulatum* (P;<4%),*S. tenellum* (H; <4%).
- **Additional comments**: Pools often full of *S. cuspidatum. Narthecium* cover, locally high (33-50%), but *Sphagnum* cover is still 75%-90%. The central ecotope and active Flush were not very different towards the north end of the central ecotope. Some Flush species such as *Vaccinium oxycoccos* and *Aulacomnium palustre* did occur in the central area also.

Quadrats **Qc1** and **Qc2** were recorded within this complex.

Sub-Central Ecotope Complexes

COMPLEX 6/9+P

- **Location**: this complex dominates **Sc1**
- **Ground**: very soft/quaking
- **Physical indicators**: absent
- ***Calluna* height**: 10-20cm
- ***Cladonia* cover**: 5-10%
- **Macro-topography**: slight slope towards north
- **Pools**: 4-10%. Regular, infilling with *Sphagnum*
- ***Sphagnum* cover**: 51-75%
- ***Narthecium* cover**: 4-10%
- **Micro- topography**: Low hummocks/hollows/pools
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (34-50%), *Erica tetralix* (4-10%), *Eriophorum angustifolium* (<4% few), *E. vaginatum* (4-10%), *Narthecium ossifragum 4-10%, Rhynchospora alba* (<4%), *Drosera anglica* (<4%), *Menyanthes trifoliata* (<4%), *Carex panicea* (4-10%), *Sphagnum cuspidatum* (Hollows (Hl); 4-10%), *Sphagnum capillifolium* (H; 26-33%), *S. papillosum* (H; 26-33%), *S. denticulatum* (<4%), *S. fuscum* (H; <4%). *Leucobryum glaucum* (H;<4%).
- **Additional comments**: This complex is a mosaic of *Sphagnum* pools. The inter-pool areas have less *Sphagnum* and the vegetation is comprised mainly of *Sphagnum capillifolium,* with *Narthecium ossifragum,*, *Carex panicea* and, *Eriophorum angustifolium*. Towards the central ecotope there was more *Eriophorum vaginatum,* and *Rhynchospora alba* in depressions and less *Carex panicea*, and *Narthecium ossifragum*. There were localised hummocks of *Sphagnum austinii* and occasional *Huperzia sp*. Quadrat **Qsc1** is recorded in this complex. The sub-central ecotope was not always distinctly separate from active flush as shown by the occurrence of occasional complex **6/9+P** dots in the flush **X** area. The sub-central ecotope supports some flush type species towards its northern extent. Where *Eriophorum vaginatum* was frequent 11-25% and *Narthecium ossifragum* <4% the vegetation became complex 9/7+P towards the eastern side of the bog.

COMPLEX 9/7/10

- **Location**: north side of bog within flush **Z**
- **Ground**: soft
- **Physical indicators**: absent
- ***Calluna* height**: 20-40cm

- ***Cladonia* cover**<4%
- **Macro-topography**: gentle slope towards northern edge
- **Pools**: absent
- ***Sphagnum* cover**: 51-75%
- ***Narthecium* cover**: <4%
- **Micro- topography**: Low hummocks/hollows
- **Tussocks**: *Eriophorum vaginatum* 4-10%
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (50-75%), *Erica tetralix* (4-10%), *Eriophorum angustifolium* (<4% few), *E. vaginatum* (25-33%), *Narthecium ossifragum (<4%), Sphagnum capillifolium* (H; 26-33%), *S. papillosum* (H; 11-25%), *S. denticulatum* (P; <4%), *S .tenellum* (H; <4%).
- **Additional comments:** This complex is associated with the active flush and is mapped within the active flush on the ecotope map.

Active flushes

FLUSH Z

- **Location**: North side of site
- **Ground**: very soft to quaking
- **Physical indicators**:
- ***Calluna* height**: 20-30cms
- ***Cladonia* cover**: <4%
- **Macro-topography**: Sloping towards the north
- **Pools**: 4-10%
- ***Sphagnum* cover**: 26-33%
- ***Narthecium* cover**: 4-33%
- **Micro- topography**: Hummocks/hollows/lawns/pools
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (11-25%), *Eriophorum angustifolium* (11-25% 4-10%) *Eriophorum vaginatum* (4-10%), *Erica tetralix* (<4%), *Narthecium ossifragum* (4-33%)*Sphagnum papillosum* (4-10%), *S. magellanicum* (4-10%), *S. capillifolium (11-25%), S. cuspidatum* (4-10%), *Aulacomnium palustre* (<4%). *Betula pubescens* (<4%).

- **Additional comments:** Very wet quaking area at the northern side of the bog, the southern end of which seems to be an extension of the central ecotope. It has a notable lush tall growth of *Narthecium ossifragum* and *Eriophorum angustifolium*. Occasional birch trees. Further north it becomes drier with *Calluna*, *Eriophorum vaginatum* and *Sphagnum* hummocks and intermittent trees. In places the active flush **Z** is similar and difficult to distinguish from sub-central complex 6/9+P.

Degraded Raised Bog (7120)

Sub-Marginal Ecotope Complexes

COMPLEX 9/7/3

- **Location**: this complex is found south of **Sc1**
- **Ground**: soft
- **Physical indicators**: absent
- ***Calluna* height**: 20-30cm
- ***Cladonia* cover**: 26-33%
- **Macro-topography**: flat to gentle slope
- **Pools**: absent
- ***Sphagnum* cover**: 26-33%
- ***Narthecium* cover**: <4%
- **Micro- topography**: Low hummocks/hollows
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (11-25%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (11-25%), *E. angustifolium* (4-10%), *Carex panicea* (11-25%), *Narthecium ossifragum* (<4%), *Rhynchospora alba* (<4%), *Sphagnum cuspidatum (4-10%), S. capillifolium* (H; 4-10%), *S. papillosum* (H; 4-10%), *S. austinii* (H; <4%), *S. subnitens* (H; <4%), *S. fuscum* (H<4%), *Huperzia selago* (<4%).
- **Additional comments:** The boundary of this complex with the adjacent marginal complex **3/6** has changed since the 2004 survey with an increase in complex **3**/6 and a reduction in the sub-marginal complex 9/7/3. This is an interpretation change due to more comprehensive mapping, and hence considered not a real change. **Qm1** was recorded in this complex. Community complex 9/7/6 occurs in localised areas around the sub-marginal ecotope, where *Narthecium ossifragum* is 4-10% or greater, and *Carex panicea* is < 4%, notably in the north-west of the site. *Pinus sylvestris* is also localised.

COMPLEX 7/6/3 + PINES

- **Location**: East of flush **Z**
- **Ground**: firm
- **Physical indicators**: absent
- ***Calluna* height**: 30-40cm
- ***Cladonia* cover**: <4%
- **Macro-topography**: Gentle slope to edge
- **Pools**: absent
- ***Sphagnum* cover**: 11-25%
- ***Narthecium* cover**: 11-25%
- **Micro- topography**: Low hummocks/hollows/flats
- **Tussocks**: *Trichophorum germanicum* <4%
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (34-50%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (<4%), *Carex panicea* (4-10%), *Narthecium ossifragum* (11-25%), *Rhynchospora alba* (<4%), *Pinus sylvestris* (4-10%), *Sphagnum cuspidatum (<4%), S. capillifolium* (H; 11-25%), *S. papillosum* (H; 4-10%), *S. tenellum* (H; <4%), *Huperzia selago* (<4%).
- **Additional comments:** This complex is located east and north of the flush area with frequent *Pinus sylvestris* saplings and immature trees < 4m high. Towards the south it grades into complex 7/6/3, where the trees decrease and the *Sphagnum* cover increases with localised *Leucobryum glaucum* hummocks. This is also found to the east of flush **Z**. Complex 7/6/3 is also locally frequent at the southern side of the site. Where the heather is tall and >20% cover with *Eriophorum vaginatum* 11-25%, this becomes complex 9/7.

Marginal Ecotope Complexes

COMPLEX 2/7

- **Location**: along the southwester section of high bog near the margin
- **Ground**: firm
- **Physical indicators**: run-off channels frequent
- ***Calluna* height**: 20-40cm
- ***Cladonia* cover**: 34-50%
- **Macro-topography**: steep slope to bog margin
- **Pools**: absent

- ***Sphagnum* cover**: 4-10%
- ***Narthecium* cover**: 4-10%
- **Micro- topography**: *Calluna* hummocks between runoff channels
- **Tussocks**: *Trichophorum germanicum* 26-33%
- **Degradation or regeneration evidence**: no change
- **Species cover**: *Calluna vulgaris* (26-33%), *Erica tetralix* (11-25%), *Molinia caerulea* (<4%), *Pinus sylvestris* (<4%), *Narthecium ossifragum* (4-10%), *Trichophorum germanicum* (<1%), *Sphagnum capillifolium* (H; <4%), *S. tenellum* (H; <4%), *S. subnitens* (H; <4%), *S. papillosum* (H; <4%).
- **Additional comments**: A small area with *Leucobryum glaucum* and *Pleurozia purpurea* nearby
    - Variant: 2/7+Pines

COMPLEX 3/6

- **Location**: along the entire high bog edge
- **Ground**: firm to soft
- **Physical indicators**: bare peat <4%
- ***Calluna* height**: 11-20cm
- ***Cladonia* cover**: 11-25%
- **Macro-topography**: gentle slope to bog margin
- **Pools**: absent
- ***Sphagnum* cover**: 4-10%, (locally 11-25%)
- ***Narthecium* cover**: 26-33% and locally 34-50%
- **Micro- topography**: Hummocks/flats/hollows
- **Tussocks**: *Trichophorum germanicum* <4%
- **Species cover**: *Calluna vulgaris* (26-33%), *Carex panicea (11-25%), Rhynchospora alba (4-10%), Eriophorum angustifolium (<4%), Narthecium ossifragum 26-50%Sphagnum capillifolium* (H; <4%), *S. cuspidatum* (<4%), S. *tenellum* (H; <4%), *S. subnitens* (H; <4%), *S. papillosum* (H; <2%), *Leucobryum glaucum* (<4% few).
- **Additional comments**: Relic hummocks of *Sphagnum austinii* and *S. magellanicum.* There has been a boundary change here since the 2004 map, with an increase in marginal ecotope and reduction in sub-marginal. Likely that this is due to interpretation. There are small patches of sub-marginal, vegetation within this marginal complex. Where *Sphagnum* cover is 26-33%, it grades into complex 9/7/3.
    - Variant: 3/6+Pines

Face bank Complexes

COMPLEX 1

- **Location**: Southern margin behind the factory on the N5 road, near access point
- **Ground**: firm
- **Physical indicators**: Limited cracking. Face bank 1.5m high.
- ***Calluna* height**: >60cm
- ***Cladonia* cover**: 5-10%
- **Macro-topography**: steep slope
- **Pools**: absent
- ***Sphagnum* cover**: 4-10%
- ***Narthecium* cover**: absent
- **Micro- topography:** tall robust *Calluna vulgaris*/low hummocks
- **Tussocks:** *Calluna*
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (76-90%), *Trichophorum germanicum* (<4%), *Hypnum jutlandicum* (11-25%), *Aulacomnium palustre* (<4%), *Betula pubescens* (<4%).
- **Additional comments**: None.

Appendix II Photographical records

Photograph Number	Aspect	Type	Feature	Date
0294	NE	Overview	Qsm1	29/08/2012
0295	NE	Overview	Qc1	29/08/2012
0299	NE	Overview	Qsc1	05/09/2012
0300	NE	Overview	Qc2	29/08/2012

Appendix III Quadrats

Ecotope type	Central	Central	Central	Central
Complex Name	15	15	4/6/15	15
Quadrat Name	Qc1	Qc1	Qc2	Qc2
Easting	209700	209704.19	209700	209705.24
Northing	275775	275777.84	275890	275893.151
Date	01/09/04	29/08/2012	01/09/04	05/09/2012
Firmness	Quaking	Quaking	Very soft	Very soft
Burnt	No	No	No	No
Algae in hollows %	Absent	Absent	Absent	Absent
Algae in pools %	Absent	Absent	4-10	Absent
Bare peat %	Absent	Absent	Absent	Absent
High hummocks %	Na	1-3 (many indiv)	na	Absent
Low hummocks %	26-33	34-50	4-10	76-90
Hollows %	4-10	Absent	4-10	Absent
Lawns %	11-25	Absent	11-25	Absent
Pools %	11-25	11-25	11-25	Absent
Pool type	Regular & Tear	Regular	Regular & Tear	Absent
S.austinii hum type	Na	Absent	na	Active
S.austinii hum %	4-10	1-3 (many indiv)	4-11	1-3 (few indiv)
S.austinii height(cm)	Na	0-10	na	0-10
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	4-10	Absent	Absent	Absent
Trichophorum type	Na	Flats	Tussocks	Flats
Trichophorum %	Na	1-3 (many indiv)	26-33	1-3 (few indiv)
S.magellanicum %	Absent	Absent	Absent	Absent
S.cuspidatum %	4-10	4-10	4-10	1-3 (many indiv)
S.papillosum %	34-50	11-25	34-50	34-50
S.denticulatum %	4-10	Absent	Absent	Absent
S.capillifolium subsp. rubellum	4-10	26-33	4-10	34-50

Ecotope type	Central	Central	Central	Central
Complex Name	15	15	4/6/15	15
%				
S.tenellum %	Na	1-3 (many indiv)	na	1-3 (many indiv)
S.subnitens %	4-10	4-10	4-10	Absent
R.fusca %	Absent	Absent	Absent	Absent
R.alba %	4-10	1-3 (many indiv)	11-25	1-3 (many indiv)
N.ossifragum %	4-10	4-10	34-50	11-25
Sphag pools %	11-25	11-25	11-25	Absent
Dominant pool Sphag	S.cuspidatum	S.cuspidatum	S.cuspidatum	
Sphag lawns %	11-25	Absent	11-25	Absent
Sphag humm %	26-33	51-75	4-10	76-90
Sphag holl %	4-10	Absent	4-10	Absent
Total Sphag %	76-90	91-100	51-75	76-90
Hummocks indicators	Absent	S.austinii	S.austinii	Absent
Cladonia portent %	Absent	Absent	4-10	1-3 (several indiv)
Other Cladonia sp	Absent		Absent	
C. panicea %	Absent	Absent	Absent	Absent
Calluna cover %	11-25	26-33	11-25	34-50
Calluna height(cm)	41-50	Absent	11-20	11-20
Other NotableSpecies		Drossera anglica, Menyanthes trifoliate		Menyanthes trifoliate
Other comment				Sphag pools and lawns adjoining quad

Ecotope type	Sub-marginal	Marginal	Sub-central
Complex Name	6/3/7	3/6	6/9+p
Quadrat Name	Qsm1	Qm1	Qsc1
Easting	209778	209784.99	209555.68
Northing	275620	275621.57	275942.66
Date	01/09/04	29/08/2012	05/09/2012
Firmness	Soft	Soft	Very soft
Burnt	No	No	No
Algae in hollows %	Absent	Absent	Absent
Algae in pools %	Absent	Absent	Absent
Bare peat %	Absent	1-3 (few indiv)	1-3 (few indiv)
High hummocks %	na	Absent	4-10
Low hummocks %	11-25	11-25	34-50
Hollows %	4-10	26-33	4-10
Lawns %	Absent	Absent	Absent
Pools %	Absent	Absent	11-25

Ecotope type	Sub-marginal	Marginal	Sub-central
Complex Name	6/3/7	3/6	6/9+p
Pool type	Absent	Absent	Regular
S.austinii hum type	na	Active	Absent
S.austinii hum %	4-12	1-3 (several indiv)	Absent
S.austinii height(cm)	na	0-10	Absent
S.fuscum hum type	na	Absent	Absent
S.fuscum hum %	Absent	Absent	Absent
S.fuscum height(cm)	na	Absent	Absent
Leucobryum glaucum	4-10	Absent	Present
Trichophorum type	Tussocks	Tussocks	Flats
Trichophorum %	4-10	11-25	1-3 (few indiv)
S.magellanicum %	Absent	Absent	Absent
S.cuspidatum %	1-3 (many indiv)	Absent	4-10
S.papillosum %	4-10	1-3 (many indiv)	11-25
S.denticulatum %	Absent	Absent	Absent
S.capillifolium subsp. rubellum %	4-10	1-3 (several indiv)	26-33
S.tenellum %	na	1-3 (several indiv)	1-3 (several indiv)
S.subnitens %	4-10	1-3 (few indiv)	Absent
R.fusca %	Absent	Absent	Absent
R.alba %	na	1-3 (few indiv)	1-3 (several indiv)
N.ossifragum %	4-10	4-10	4-10
Sphag pools %	Absent	Absent	11-25
Dominant pool Sphag	S.cuspidatum		S.cuspidatum
Sphag lawns %	Absent	Absent	Absent
Sphag humm %	11-25	4-10	34-50
Sphag holl %	4-10	Absent	Absent
Total Sphag %	11-25	4-10	51-75
Hummocks indicators	Absent	S.austinii	Absent
Cladonia portent %	11-25	26-33	1-3 (several indiv)
Other Cladonia sp	Absent	no	
C. panicea %	11-25	26-33	Absent
Calluna cover %	11-25	26-33	Absent
Calluna height(cm)	21-40	31-40	21-40
Other NotableSpecies			Drossera anglica, Menyanthes trifoliate
Other comment		this quadrat was Qsm1 in 2004	Sph magellanicum adjoining quad. and Carex pan.New quadrat recorded in 2012

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

209000 209900

276200 275600

FZ

Qsc1

Qc2

C1

Qc1

Sc1

Qm1

Raised Bog Monitoring & Assessment Survey 2013

Map 1: Ecotopes Map and Quadrats

Ecology and Environmental Consultants Ireland Ltd.

Brown Bog SAC (002346)
Co. Longford

1:5,000

N

0 62.5 125 250 375 500 Meters

Legend

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

209000 209900

276200 275600

Raised Bog Monitoring & Assessment Survey 2013

Map 2: Vegetation community complexes

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Ecology and Environmental Consultants Ireland Ltd.

Brown Bog SAC (002346)
Co. Longford

1:5,000

N

0 70 140 280 420 560 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

209000.000000 209900.000000

276200.000000 275600.000000

376 3 133
Including 1 2 28 water

165

I H O G E S
A R P
96 3 7

B.M.161·9

Brianstown School

160

B.M.156·4

C A R T R O N L E B A G H
A R P
201 1 6

158

B R O W N B O G
A R P
31 2 15

d1

209000.000000 209900.000000

Raised Bog Monitoring & Assessment Survey 2013

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

Ecology and Environmental Consultants Ireland Ltd.

Brown Bog SAC (002346)
Co. Longford

1:5,000

N

0 62.5 125 250 375 500 Meters

Legend

High Bog drainage

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

SAC