Mongan Bog (SAC 000580), Co. Offaly

Executive Summary

This survey, carried out in September 2011, aimed to assess the conservation status of habitats listed on Annex I of the European Habitats Directive (92/43EEC) on the high bog at Mongan 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 48.31ha (38.84%) of the high bog area. Mongan features a large central ecotope area dominating the original high bog dome. Although complex 14 (highest quality/wettest vegetation type) is found, complex 15 dominates the central ecotope and has of a very good micro-topography consisting of *Sphagnum* hummocks, lawns, pools and hollows. *Sphagnum* cover reaches 90% in certain locations. The habitat has western raised bog type features such as *Racomitrium lanuginosum* and *Pleurozia purpurea*. Active Raised Bog also includes sub-central ecotope; some sections have developed to the east of the high bog in the 2004-11 reporting period due to re-wetting associated with the blocking of drainage (drains bA).

Degraded Raised Bog covers 76.06ha (61.16%) of the high bog area. It is drier than Active Raised Bog and supports a lower density of *Sphagnum* mosses. It has a less developed micro-topography while permanent pools and *Sphagnum* lawns are generally absent. Some improvements in habitat quality (i.e. development of sub-marginal ecotope) have been noted within the blocked drain complex bC to bF to the west of the high bog.

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.

Restoration works took place at the site in the 1984-1986 period and included the blocking of high bog drains. This has triggered the development of new Active Raised Bog (sub-central ecotope) and the expansion of sub-marginal in several locations.

The current conservation objective for Mongan 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 60.9ha. 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 increase in the area of Active Raised Bog (0.10ha) at Mongan in the 2004 to 2011 period. This is the result of the development of sub-central ecotope at two locations (**Sc2** and **Sc3**) associated with restoration works.

Cutover drainage and some functional and reduced functional high bog drains are the highest impacting activities at the site. A recent (2010) fire event damaged 40% of the high bog. Peat cutting on the high bog was phased out in the reporting period. This activity took place on the cutover at one location. However, this did not occur in 2011.

Active Raised Bog has been given an overall **Unfavourable Bad-Improving** conservation status assessment. Habitat Area has slightly increased and the quality has been maintained in the reporting period. However, the Area is below the favourable reference value. Future Prospects are considered Unfavourable Inadequate-Improving as a result of the positive effects of restoration works and despite some impacting activities.

Degraded Raised Bog has been given an overall **Unfavourable Bad-Improving** assessment as there has been some restoration to Active Raised Bog. Sub-marginal ecotope (wettest within the Degraded Raised Bog) has expanded.

Rhynchosporion depressions has been given an overall **Unfavourable Bad-Improving** conservation status assessment as there has been some restoration to Active Raised Bog and expansion of sub-marginal ecotope.

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

A series of **recommendations** have been also given, these include: further restoration works including blocking of any remaining high bog functional and reduced functional drains, and possibly the cutover drains; further hydrological and topographical studies to ascertain more accurate FRVs; further botanical surveys on the high bog to assess the efficiency of restoration works and an impact assessment of maintenance works on adjacent land drainage with a view to the potential of blocking these drains.

Site identification

SAC Site Code	000580	**6" Sheet:**	OY: 5&6
Grid Reference:	E 203300 / N 230800	**1:50,000 Sheet:**	47
High Bog area (ha)[1]:	124.37ha		
Dates of Visit:	01 to 02/09/11		
Townlands:	Clonfinlough, Clonscra and Tullaghbeg and Clonmacnoise.		

Site location

Mongan Bog is located in the western part of Co. Offaly, 2km east of the Clonmacnoise National Monument and the River Shannon on the central plain of the Irish midlands. Part of the site is owned by An Taisce. The road between Ballynahown and Clonmacnoise runs by the southern side of the site and The Pilgrim's road runs along the esker to the north. A Bord na Mona railway runs along the east and north-eastern edge. This site is accessed from the Ballynahown to Clonmacnoise or Shannonbridge road. There is room to park along a siding of a BnM railway track to the right of this road.

Description of the survey

The survey was carried out in September 2011 and involved a vegetation survey of the high bog at Mongan 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

1 This figure is slightly smaller than the one given in 2004, as a result of improvement on mapping accuracy; based on 2010 aerial photography.

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 Mongan 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.

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

The site has an approximately elliptical shape. It reaches its maximum length in an ENE-WSW direction while it is thinnest in a north-south direction. Although it is considered to be a Midland raised bog it has elements of the more western or transitional raised bogs. This bog has been classified as a Basin bog type since it is surrounded on all sides by low relief bedrock ridges. (Kelly *et al*., 1995)

Ecological information

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

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

- Active Raised Bog (EU code 7110),
- Degraded Raised Bog (EU code 7120) and

- Depressions on peat substrates of the Rhynchosporion (EU code 7150).

Active Raised Bog (7110)

The current area of Active Raised Bog at Mongan Bog is 48.31ha (38.84% of the high bog), which is a decrease of 2.59ha since 1994.

Active Raised Bog includes central and sub-central ecotope.

Central ecotope was found in Mongan occupying a large section of the original dome (see Appendix IV, Map 1). The highest quality Active Raised Bog sections consist of central ecotope (vegetation community complex 14) which covers a small area in the highest section of the dome. This complex has a good micro-topography consisting of high and low hummocks, large *Sphagnum* lawns and pools and hollows. *Sphagnum* covers up to 90% of the ground and consists of S. *papillosum, S. subnitens, S. capillifolium* and *S. austinii* forming hummocks, and *S. cuspidatum* and *S. denticulatum* in pools. Other species present include *Menyanthes trifoliata, Leucobryum glaucum* and *Drosera anglica.*

Complex 15 occupies the largest area within central ecotope at the centre of the site. There is also a good micro-topography consisting of hummocks, regular pools and tear pools. The hummocks consist of *Sphagnum subnitens, S. papillosum, S. austinii* and *S. fuscum*. *Racomitrium lanuginosum* hummocks are occasionally found with some supporting *Calluna vulgaris* and *Leucobryum glaucum.* Interconnected pools and tear pools at the margins of the complex are colonised by *S. cuspidatum*, *S. papillosum* and also *S. magellanicum*. The pools cover 40% of the complex surface and their *Sphagnum* cover accounts for 30% of the complex's *Sphagnum*. The overall *Sphagnum* cover is up to 50%. The western indicator *Pleurozia purpurea* is also found very occasionally. Although *algae* is found in the pools at the margins of the complex it is absent in the centre. Large *Sphagnum cuspidatum* pools and *Sphagnum papillosum* lawns which contain *Rhynchospora alba* and *Drosera anglica* are found towards the north-west and at centre of the complex.

Sub-central ecotope is also found and features a less developed micro-topography and lower *Sphagnum* cover. Two new sub-central ecotope areas have developed within the blocked drain network to the east of the site (Sc2 and Sc3) in the reporting period. The micro-topography consists of hummocks, lawns, pools and hollows. Abundant *Eriophorum angustifolium, Sphagnum papillosum* and *S. magellanicum* characterise the vegetation (complex 10/9a). The area to the north of the large central ecotope dominated dome also features sub-central ecotope: complex 3/10 which has western raised bog features (low *Sphagnum* cover, *Racomitrium lanuginosum*) and complex 9/7+P, where pools cover up to 15% of the ground.

Degraded Raised Bog (7120)

The current area of Degraded Raised Bog at Mongan Bog is 76.06ha (61.16% of the high bog).

Degraded Raised Bog includes the sub-marginal, marginal and face bank ecotope. 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 features the most developed micro-topography within Degraded Raised Bog. Complex 6/3 characterised by the abundance of *Narthecium ossifragum* and *Carex panicea* is the most widespread sub-marginal ecotope community complex. Micro-topography consists of low hummocks, *N. ossifragum* / *C. panicea* flats and hollows. *Sphagnum* cover reaches 25%. Wettest samples of sub-marginal vegetation consist of complex 4/9, which has abundant *Rhynchospora alba* and *Eriophorum angustifolium*. Complex 9/7 which has a relatively high *Sphagnum* cover (up to 50% in places) is found to the west of the high bog within a blocked drains area where re-wetting is taking place.

Marginal ecotope is slightly drier than sub-marginal ecotope and mainly occurs as a narrow band near the margins of the high bog. Micro-topography consists of low *Sphagnum* hummocks, flats, tear pools and very occasionally hollows. The *Sphagnum* cover is even lower here than in the sub-marginal ecotope (<10%) and the vegetation is characterised by a higher cover of *N. ossifragum*, *C. panicea* and *C. vulgaris*.

Face bank ecotope is characterised by firm ground, tall *C. vulgaris*, poor *Sphagnum* cover and flat micro-topography.

Depressions on peat substrates of the Rhynchosporion (7150)

Rhynchosporion vegetation is widespread on Mongan. 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 along pool edges and on lawns underlain by deep, wet and quaking peat. 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 pools, hollows and erosion channels.

Detailed vegetation description of the high bog

A detailed description of high bog vegetation recorded during the 2011 survey of Mongan 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 Mongan 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; see section 7):

Table 6.1 Impacting activities

Code	Activity	Ranking	Influence	Area (ha) /Length(km) affected	Location	Habitat affected
C01.03	Peat extraction	L	-1	<0.10ha;1 turf plot	Adjacent to HB	**7110/7120/7150**
J02.07	Drainage	M	-1	9.305km [1]	On HB	**7110/7120/7150**
J02.07	Drainage	M	-1	n/av	Adjacent to HB	**7110/7120/7150**
J01	Fire	L	-1	50ha	On HB	**7110/7120/7150**
4.2	Restoring/Improving the hydrological regime	H	+1	8.894km²	On HB	**7110/7120/7150**

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

[1] This figure only includes functional and reduced-functional drains (some of them blocked).

[2] This figure includes blocked drains on high bog.

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

Peat cutting

Only one turf plot was reported as being actively cut by Fernandez *et al*. (2005). This cutting is no longer taking place and the NPWS are currently in negotiation with the owner of the plot (Bugler pers. comm., 2011). A new peat cutting plot was started on the cutover in 2010 in the south-western section of the bog. However, it was not cut in 2011 and is also currently under negotiation (Bugler pers. comm., 2011). Information from the NPWS indicates that no cutting took place in the 2012-13 period. Old face banks and high bog and cutover drainage associated with past cutting continue to cause negative impacts on the high bog habitats.

Peat cutting is considered to have had low importance/impact on high bog habitats in the reporting period.

Drainage

High bog drainage

There have been no major changes in the status of the high bog drains. Infilling has continued to take place and has resulted in the expansion of ARB in places such as in the area close to the blocked drain complex bA. Water flowing from adjacent high bog towards this complex was noted during 2011 visit. Drain complexes bB to bG are also infilling but regeneration of peat forming vegetation is much slower than within bA.

Overall, the majority of drains in the high bog remain reduced functional (9.305km). Only drain bH (0.127km) remain functional. Some of the reduced functional drains are also impacting on the high bog habitats and will continue to do so until they become completely in-filled and therefore non-functional.

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

Table 6.2 High bog drainage summary

Status	2004 (km) [1]	2011 (km)	Change
NB: functional	0.127	0.127	0.00
NB: reduced functional	0.411	0.411	0.00
NB: non- functional	0.854	0.854	0.00
B: functional	n/a	n/a	n/a

B: reduced functional	8.894	8.894	0.00
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 Mongan including any change in their functionality in the 2004 – 2011 reporting period (see Map 3).

Table 6.3 High bog drainage detail

Drain Name	Length (km)	2004 status	2011 status	Change	Comment
bA	3.631	B: reduced functional	B: reduced functional	No	Infilling taking place and expansion of sub-central ecotope within this drain complex
bB	0.702	B: reduced functional	B: reduced functional	No	Infilling taking place
bC	0.717	B: reduced functional	B: reduced functional	No	As above
bD	0.786	B: reduced functional	B: reduced functional	No	As above
bE	0.792	B: reduced functional	B: reduced functional	No	As above
bF	0.792	B: reduced functional	B: reduced functional	No	As above
bG	0.794	B: reduced functional	B: reduced functional	No	As above
bH	0.127	NB: functional	NB: functional	No	
bI	0.198	NB: non-functional	NB: non-functional	No	
bJ	0.514	NB: non-functional	NB: non-functional	No	

bK	0.303	B: reduced functional	B: reduced functional	No	This drain was not mapped in 2004; Infilling taking place
bL	0.377	B: reduced functional	B: reduced functional	No	As above
bM	0.116	NB: reduced functional	NB: reduced functional	No	These drains were wrongly classified as non-functional in 2004; Infilling taking place
bN	0.076	NB: reduced functional	NB: reduced functional	No	Infilling taking place
bO	0.099	NB: reduced functional	NB: reduced functional	No	These drains were wrongly classified as non-functional in 2004; Infilling taking place
bP	0.092	NB: reduced functional	NB: reduced functional	No	This drain was wrongly classified as non-functional in 2004; Infilling taking place
bQ	0.035	NB: reduced functional	NB: reduced functional	No	As above
bR	0.025	NB: reduced functional	NB: reduced functional	No	As above
bS	0.066	NB: non-functional	NB: non-functional	No	
bT	0.044	NB: reduced functional	NB: reduced functional	No	This drain was wrongly classified as non-functional in 2004; Infilling taking place

Bog margin drainage

The cutover areas were not surveyed for drains during 2011.

Cutover drains are located along the northwest and west of high bog, as well as to the south.

According to NPWS regional staff, a drain parallel to the Bord na Móna railway line to the southeast has been recently deepened (2011) (Bugler, N., pers. comm., 2011). Although the impact on the high bog habitats has not been estimated sub-marginal vegetation now stretches towards this location (GR 203855 / 230611). This is likely to indicate some water flowing towards this direction.

In addition, overflow from previously dammed drains to the east was creating problems along the Bord na Móna machine pass and as a result, water has been let off by deepening the drains beside the railway line (Bugler pers. comm., 2011). The impact of this activity has not been estimated.

Some drain maintenance and deepening of drains on the cutover grasslands to the southwest and west were also reported by regional NPWS staff (Bugler pers. comm., 2011) in the reporting period (2004-2011)

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

Fire history

A recent burn (2010) damaged 40% of the high bog area (50ha). This fire event must have been light as not much evidence of burning was noted in 2011. Another smaller fire event also took place in August 2004, but this event only affected the western cutover (Bugler pers. comm., 2011).

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

Other impacting activities

No other significant impacting activities were noted or recorded in 2011 as impacting the high bog habitats in the 2004-2011 reporting period.

Conservation activities

A Restoration Project was undertaken in the 1984-1986 period, which included the blocking of the majority of high bog drains. Evidence of improvement (i.e. infilling, wet areas and areas rich in *Sphagnum*), were already noted by Fernandez *et al*. (2005) in blocked drains sections. This trend has continued as confirmed by the 2011 survey. Active Raised Bog has expanded (e.g. Sc2 and Sc3) within drain complex bA to the east. Sub-marginal ecotope has expanded within bA, but also within drains bC, bD, bF and bG to the west. Therefore, the blocking of drains at this site can be taken as a very positive action.

The NPWS has engaged in negotiation with landowners in relation to the cessation of peat cutting at the site. NPWS acquired a plot of ground where peat cutting traditionally occurred in the northeast/east of the bog under the old Voluntary Purchase Scheme during the reporting period (2004-2011).

High bog drainage blocking is reported as a positive management action under Restoring/Improving the hydrological regime (4.2) within table 6.1.

Conservation status assessment

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

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

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

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

Active Raised Bog (7110)

Area

Table 8.1 indicates that there has been a slight increase (0.10ha) in the area of Active Raised Bog in the 2004-2011 reporting period. This is the result of the development of new sub-central ecotope sections (**Sc2** and **Sc3**) within the blocked drain complex bA to the east of the high bog as a result of re-wetting processes after the blocking of drains (see Map 1).

Central ecotope area is considered not to have changed in the reporting period and any discrepancy between the 2004 and the 2011 figures is due a more comprehensive surveying and accurate mapping in 2011. A new area of central ecotope (**C2**) has been reported in 2011. This area is located in a depression and was likely to be missed in the 2004 survey.

The more comprehensive survey undergone in 2011 has shown that some of the areas previously mapped as central currently correspond with sub-central ecotope (see map 1 sections **Sc4** to **Sc7**). However, this change is unlikely to be due to habitat loss or changes in habitat quality, but simply a reflection of a more intensive survey.

The 2011 survey also noted isolated patches of sub-central ecotope across the eastern section of high bog where drains bA were blocked (see Map 2). These patches are too small to be mapped as a polygon and only dots were depicted.

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). In the particular case of Mongan Bog the area of sub-marginal ecotope in 1994 was reported as 0ha. However, it is estimated that there were approximately 10ha of sub-marginal already in 1994 (Ryan. pers. comm., 2011). This assumption is based on the fact that restoration works (i.e. blocking of drains) were done in the 1984 – 1986 period, and therefore some improvement would have already occurred by 1994 in order to reach the 20.64ha estimated to be present in 2004. Therefore, Active Raised Bog Area FRV is 60.9ha (based on 1994/5 Kelly (1995) figures amended by Fernandez *et al.* (2005) and 10ha of estimated sub-marginal (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 (48.31ha) is 20.67% below the FRV. A current Area value more than 15% below FRV falls into the **Unfavourable Bad** assessment category. Active Raised Bog would not achieve a favourable assessment until its Area reaches the FRV.

A long term (1994/5-2011) trend indicates a reduction in the area of Active Raised Bog at the site (2.59ha) (see table 8.1). A more recent and short term trend analysis (7 years; 2004-2011) gives a more optimistic result with a slight increase (0.10ha) in its area. Therefore, the habitat Area is given an **Increasing** trend assessment.

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

Structure & Functions

The FRV for S&Fs is for at least half of the active raised bog area to be made up of central and active flush, i.e. the higher quality wetter vegetation communities. This value is 24.16ha (half of 48.31ha, the current area of Active Raised Bog). The current value is 42.71ha, which is 76.78% above the FRV. Therefore S&Fs are given a **Favourable** assessment.

A long term (1994/5-2011) trend indicates a decrease in the area of central ecotope at the site (6.99ha) (see table 8.1). A more recent and short term trend analysis (7 years; 2004-2011) shows no change. Therefore, the S&Fs are given a **Stabl**e trend assessment.

Quadrats analysis (**Qc1, Qc3, Qc4, Qsc1, Qsm1** and **Qsm2**) indicates the following:

Qc1: slight variation of quadrat data: a slight increase in *Sphagnum cuspidatum, Rhynchospora alba* and *Cladonia portentosa* cover; a slight decrease in hollows and pools cover as well as in *Sphagnum austinii* and *Calluna vulgaris* cover; *S. papillosum* and *S. denticulatum* are now absent; algae pools and *Carex panicea* are now present.

Qsc1: this quadrat was previously classified as central ecotope (Qc2; complex 15+Cl). However no major changes have been noted: a reduction in algae and low hummocks cover; *Sphagnum austinii, S. magellanicum, S. cuspidatum* are now absent (*S. austinii* found adjacent to current quadrat; *S. cuspidatum* may have been misidentified in 2004 and may corresponded with *S. denticulatum*); *S. fuscum, S. subnitens* and *Carex panicea* are now present; an increase in *S. denticulatum* and *Cladonia portentosa* cover; a decrease in *S. capillifolium* cover; *Sphagnum* lawns are now absent but the overall *Sphagnum* cover is slightly higher. Therefore, no major changes have taken place and former Qc2 was already sub-central ecotope in 2004.

Qc3: slight variation of quadrat data: a slight decrease in low hummocks, hollows and pools as well as in *Sphagnum austinii* and *S. denticulatum* cover; a slight increase in *S. papillosum* cover.

Qc4: slight variation of quadrat data: algae pools absent; a slight increase in low hummocks, *Sphagnum papillosum, S. capillifolium* and *Rhynchospora alba* cover; a decrease in pools cover (this may be due to misclassification); a slight decrease in *S. austinii, S. fuscum* and *Cladonia portentosa* cover; *Sphagnum* hollows are now absent.

Some of these changes noted within the above quadrats may be also the result of lack of precision in relocating of the quadrat (up to 2m) between both year surveys, rather than actual changes.

Typical good quality indicators and typical plant species are still found in sub-central and central ecotopes throughout the entire bog. No major changes of their occurrence within quadrats (**Qc1, Qsc1** (former Qc2), **Qc3** and **Qc4)** have taken place (see Appendix III).

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

Future Prospects

Restoration works undertaken at the site have had positive effects on the habitat as the expansion of sub-central ecotope indicates. However, perhaps not at the speed expected as blocking of drains took place in the 1984-1986 and it has been only in the 2004-2011 period when new areas of Active Raised Bog were recorded.

The 2011 survey noted some sort of water flow pattern towards the area where Bord na Móna drainage maintenance has taken place, indicated by the expansion of sub-marginal ecotope towards this section (see section 6.2.2). The impact of cutover drainage and drainage maintenance (i.e. deepening) should be monitored. Furthermore, these impacting activities are likely to hinder the further recovery of Active Raised Bog and therefore prevent it from reaching the FRVs.

Habitat **Area** is currently 20.67% below FRV (see table 8.4) and although an Increasing trend is expected the habitat Area is expected to be between 5 and 15% below FRV in two reporting periods (12 years). Thus, habitat's **Area Future Prospects** are assessed as **Unfavourable Inadequate-Increasing**. Habitat's **S&Fs** are currently 76.78% above FRV (see table 8.4). A Stable trend is expected and thus habitat's **S&Fs Future Prospects** are assessed as **Favourable-Stable**. **The overall habitat's Future Prospects are Unfavourable Inadequate-Improving** (see table 8.5) as a result of the positive effects of restoration works, despite some impacting activities (both high bog and cutover drainage) still having a negative influence on the high bog habitats (see table 6.1). Blocking of remaining reduced-functional and functional drains both on the high bog and cutover is recommended.

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

Table 8.1 Changes in Active Raised Bog area

Active Ecotopes	**1994/5** [1]	**2004** [2]	**2004 (amended)**	**2011**	**Change (2004-2011)**	
	Area (ha)	**Area (ha)**	**Area (ha)**	**Area (ha)**	**Area (ha)**	**%**
Central	49.7	53.38	42.71	42.71	0.00	0.00
Sub-central	1.2	0.61	5.50	5.60	(+)0.10	(+)1.82
Total	**50.9**	**53.99**	**48.21**	**48.31**	**(+)0.10**	**(+)0.21**

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

[2] 2004 figures have been slightly modified based on a more accurately mapped high bog boundary undertaken as part of this project. This has mostly affected face bank ecotope 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 2011. The comparison between 2004 (amended) and 2011 illustrates the actual changes in ecotope area in the 2004-2011 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 2011 (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, Qc3, Qc4	Decreased	The area of Active Raised Bog has decreased. However, this is the result of a more comprehensive surveying and mapping in 2011. In addition, some sections previously classified as central ecotope are now allocated to sub-central ecotope (Sc4 to Sc7). This change is the result of vegetation re-interpretation and more comprehensive surveying in 2011.	**Qc1:** slight increase in *Sphagnum cuspidatum*, *Rhynchospora alba*, *Cladonia portentosa* cover; slight decrease in hollows and pools cover, *Sphagnum austinii*, *Calluna vulgaris* cover; *S. papillosum* and *S. denticulatum* absent; algae pools and *Carex panicea* now present. **Qc3:** slight decrease in low hummocks, hollows pools *Sphagnum austinii*, *S. denticulatum* cover; slight increase in *S. papillosum* cover. **Qc4:** slight increase in low hummocks, *Sphagnum papillosum*, *S. capillifolium*, *Rhynchospora alba* cover; decrease in pools cover (this may be due to misclassification); slight decrease in *S. austinii*, *S. fuscum*, *Cladonia portentosa* cover; *Sphagnum* hollows now absent.
C2	None	Unknown	This specific area was not surveyed in 2004. Thus any ecotope map changes here are due to more accurate mapping in the 2011 survey.	

Sc1	None	Decreased	Slightly smaller than mapped in 2004. However, this is the result of a more comprehensive surveying and accurate mapping in the 2011.	
Sc2	None	Newly developed	Re-wetting is likely to be taking place in this location as a result of the blocking of drainage (bA).	
Sc3	None	Newly developed	Re-wetting is likely to be taking place in this location as a result of the blocking of drainage (bA).	
Sc4	None	Decreased	The area of Active Raised Bog has decreased. However, this is the result of a more comprehensive surveying and mapping in 2011. In addition, this section previously classified as central ecotope are now allocated to sub-central ecotope. This change is the result of vegetation re-interpretation and more comprehensive surveying in 2011.	
Sc5	None	Decreased	As per previous comment	
Sc6	None	Decreased	As per previous comment	
Sc7	Qsc1	Decreased	As per previous comment	Qsc1 – Previously classified as central ecotope (Qc2): reduction in algae, low hummocks cover; *Sphagnum austinii, S. magellanicum, S. cuspidatum* now absent (*S. austinii* found adjacent to current quadrat; *S. cuspidatum* misidentified in 2004 and corresponded with *S. denticulatum*); *S. fuscum, S. subnitens, Carex panicea* now present; increase in *S. denticulatum, Cladonia portentosa* cover; decrease in *S. capillifolium* cover; *Sphagnum* lawns absent but overall *Sphagnum* cover slightly higher.

Degraded Raised Bog (7120)

Area

The Degraded Raised Bog FRV for Area is 63.47ha at Mongan Bog. This value corresponds with the difference between the current high bog area (124.37ha) and Active Raised Bog FRV (65.9ha) 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 19.84% bigger than FRV and therefore the habitat Area is given an **Unfavourable Bad** assessment (see table 8.4).

Table 8.3 indicates that there has been a decrease (0.10ha) in the area of Degraded Raised Bog. Therefore the habitat is given a **Decreasing** trend.

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

Structure & Functions

The FRV for S&Fs is for a maximum 25% of the Degraded Raised Bog area to be made up of marginal and face bank, i.e. the lower quality and drier vegetation communities. This value is 19.02ha (25% of 76.06ha, the current area of Degraded Raised Bog). The current marginal and face bank ecotopes area value (51.42ha) is 170.42% 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.

As table 8.4 indicates, the area of marginal ecotope has decreased by 4ha as a result of an increase in sub-marginal ecotope. Sub-marginal ecotope has expanded along the blocked drains area to the east and west of the high bog. S&Fs trend is assessed based on actual changes within marginal and face banks ecotope (e.g. decreases due to rewetting processes or increases as a result of further drying out). Thus, the DRB's S&Fs at Mongan are given an **Improving** trend.

Quadrats analysis (**Qsm1** and **Qsm2**) indicates the following:

Qsm1: slight variation of quadrat data: algae pools are now absent; a slight increase in bare peat, low hummocks and *Sphagnum* lawns cover; a slight decrease in pools, *Trichophorum germanicum* and *Sphagnum papillosum* cover; *Sphagnum austinii* is now absent; *S. subnitens* is now present; a slight increase in *Sphagnum* cover. This area maybe getting slightly wetter after the blocking of drains.

Qsm2: this quadrat was previously classified as marginal ecotope (Qm1; complex 3). 2004 quadrat data missing, but the area the quadrat is in has now been classified as sub-marginal ecotope and thus is likely to have improved.

Some of these changes noted within the above quadrats may also be the result of lack of precision in relocating of the quadrat (up to 2m) between both year surveys, rather than actual changes.

Qsm1 and **Qsm2** (former Qm1) likely to be getting wetter (see Appendix III).

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

Future Prospects

Impacting activities such as both high bog and cutover drainage continue to negatively impact the habitat. However, overall restoration works are having a positive effect on the habitat and this has improved the quality in the reporting period. These positive results are expected to continue in the following two reporting periods (12 years).

Habitat **Area** is currently 19.84% above FRV (see table 8.4) and a Decreasing trend is expected in the following two reporting periods. Habitat Area is expected to remain more than 15% above FRV despite the foreseen decrease in habitat associated with restoration works. Thus, habitat's **Area Future Prospects** are assessed as **Unfavourable Bad-Decreasing**. Habitat's **S&Fs** are currently 170.42% above FRV (see table 8.4). Although an Improving trend associated with restoration works 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**.

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

Table 8.3 Changes in Degraded Raised Bog area

Inactive Ecotopes	**1994/5** [1]	**2004** [2]	**2004 (amended)**	**2011**	**Change (2004-2011)**	
	Area (ha)	**Area (ha)**	**Area (ha)**	**Area (ha)**	**Area (ha)**	**%**
Sub-marginal	0.00	10.97	20.64	24.64	(+)4.00	(+)19.38
Marginal	74.1	54.34	50.46	46.36	(-)4.10	(-)8.13
Face bank	0.00	5.06	5.06	5.06	0.00	0.00
Total	**74.10**	**70.37**	**76.16**	**76.06**	**(-)0.10**	**(-)0.13**

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

[2] 2004 figures have been slightly modified based on a more accurately mapped high bog boundary undertaken as part of this project. This has mostly affected face bank ecotope figures.

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 2011. The comparison between 2004 (amended) and 2011 illustrates the actual changes in ecotope area in the 2004-2011 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 2011.

The overall conservation status of Degraded Raised Bog at Mongan Bog is assessed as Unfavourable Bad-Improving (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 both sub -central and sub-marginal ecotope have increased in the reporting period. 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. Restoration works are likely to continue to positively affect the habitat in the future despite the occurrence of certain activities (e.g. high bog and cutover drainage) still negatively impacting the associated

habitats (i.e. Active and Degraded Raised Bog). Therefore, the habitat's Area Future Prospects are given an **Unfavourable Inadequate-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 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 Inadequate-Improving.

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

Table 8.4 Habitats favourable reference values

Habitat	Area Assessment			Structure & Functions Assessment		
	FRV Target (ha) [1]	2011 value (ha) [2]	% below target	FRV 2011 Target (ha) [3]	2011 value (ha) [4]	% above target
7110	60.9	48.31	20.67	24.16	42.71	76.78

[1] 1992 central, sub-central, active flush, bog woodland and sub-marginal ecotope area.

[2] 2011 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] 2011 central ecotope and active flush area.

	FRV Target (ha) [5]	2011 value (ha) [6]	% above target	FRV 2011 Target (ha) [7]	2011 value (ha) [8]	% above target
7120	63.47	76.06	19.84	19.02	51.42	170.42

[5] 1992 high bog area minus 7110 area FRV.

[6] 2011 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–Improving**. Note: The habitat was given a favourable assessment in 2004. The methodology used in 2004 was based on the comparison of 1994/5 and 2004 values rather than on setting FRVs. Habitat Area value was also below FRV in 2004 and therefore using the 2011 assessment criteria the assessment would also have been Unfavourable Bad in 2004.
- **Degraded Raised Bog is assessed as being Unfavourable Bad–Improving.**
- **Rhynchosporion depressions is assessed as being Unfavourable Bad–Improving.**

Table 8.5 Habitats conservation status assessments

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

Conclusions

Summary of impacting activities

There have been no major changes in the intensity or influence of impacting activities:

- Peat cutting is no longer present at the site. This activity was only recorded at one plot to the east of the high bog in 2005 and has been phased out in the new reporting period 2004-11. Cutting took place in the new reporting period on the south west cutover. This activity did not take place in 2011. Despite, the cessation of cutting at the site, old open face banks may still continue to drain the high bog.
- Only a few drains on the high bog remain functional (0.127km). Most of high bog drains were blocked and are considered reduced-functional. Infilling has continued within them in the reporting period.
- Cutover drainage (peripheral drainage) associated with former peat cutting along the west, northwest and south cutovers continue to impact high bog habitats. In addition maintenance work was undertaken in a drain parallel to the Bord na Móna railway line to the southeast. Some water flow towards this direction was noted in 2011 indicating the potential negative impact of this activity. Further drainage maintenance work has been reported by NPWS regional staff.

- A recent (2010) fire event damaged 40% of the high bog. Some other lighter fires were noted in the reporting period.

Changes in active peat forming areas

- Two new peat forming areas (**Sc2** and **Sc3**) have developed in the reporting period as a result of re-wetting associated with the blocking of drains.
- A new small central ecotope patch has been also recorded (**C2**) (see table 8.2). This new central ecotope area is the result of a more comprehensive survey inn 2011 rather than actual changes in Active Raised Bog.

Other changes

- Sub-marginal ecotope has expanded within blocked drains sections.

Quadrats analysis

- Although former central ecotope quadrat **Qc2** has been reclassified as sub-central ecotope in 2011 (Qsc1). This is considered to be the result of habitat reinterpretation as 2004 description already corresponds with sub-central ecotope. Slight changes within Active Raised Bog quadrats have been noted. These are mostly considered to correspond with discrepancies in the location of quadrats and observer variation (see Appendix III).
- Degraded Raised Bog quadrats have slightly improved in quality and thus former marginal quadrat Qm1 is now considered to correspond with sub-marginal ecotope (**Qsm2**). Similarly quadrat Qsm1 is slightly wetter. Although some of the differences between 2004 and 2011 quadrat description may be the result of discrepancies in the location of quadrats and observer variation, re-wetting of the high bog has taken place after blocking of drains and improvements have occurred particularly within and adjacent to blocked drains.
- Although high accuracy GPS equipment was used during the 2004 and 2011 surveys, the devises still only allow up to 0.5m accuracy. The lack of precision in relocating of the quadrat may justify certain differences in the vegetation described. Permanent markers were inserted into quadrats recorded in 2011.

Restoration works

- Restoration works undertaken in the 1984-1986 period, which involved the blocking of high bog, has continued to have a positive effect on the high bog vegetation. Infilling processes continue in the blocked drains and have triggered the formation of a new peat forming area

to the east of the high bog **Sc2** and **Sc3** (within drains bA) and the development of sub-marginal ecotope to the east (drain complex bA) and west (drains bC to bF).

Summary of conservation status

- **Active Raised Bog** has been given an overall **Unfavourable Bad-Improving** conservation status at Mongan Bog. Habitat Area has slightly increased and quality (S&Fs) maintained in the reporting period. However, the Area is below the FRVs. Future Prospects are considered Unfavourable Inadequate-Improving as a result of the positive effects of restoration works, despite some impacting activities. The habitat was given a Favourable assessment in 2004. However, using the 2011 assessment methodology (based on setting FRVs), the assessment would also have been Unfavourable Bad in 2004.
- **Degraded Raised Bog** has been given an overall **Unfavourable Bad-Improving** conservation status at Mongan Bog. Habitat Area has slightly decreased due to an increase of Active raised Bog and quality (S&Fs) has improved in the reporting period as the increase in sub-marginal ecotope indicates. Habitat Area and S&F s are above the FRV. Future Prospects are considered Unfavourable Bad-Improving as a result of the positive effects of restoration works.
- **Depressions on peat substrates of the Rhynchosporion** has been given an overall **Unfavourable Bad-Improving** conservation status at Mongan Bog. Habitat Area is considered to have increased and quality (S&Fs) remained Stable in the reporting period. Future Prospects are considered Unfavourable Inadequate-Improving.

The conservation status of the **overall raised bog** at **Mongan Bog** is assessed as being **Unfavourable Bad-Improving**.

Recommendations

- **Further restoration works** including the blocking of any remaining high bog functional and reduced functional drain, and possibly the cutover drains.
- **Further hydrological and topographical studies** to ascertain the capacity of the high bog to support Active Raised Bog and thus estimate a more accurate favourable reference value.
- **Further botanical monitoring surveys** both on the high bog and cutover in order to assess the effectiveness of restoration works.
- **An Impact assessment** of maintenance works on adjacent land drainage with a view to the potential of blocking these drains.

References

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Appendix I Detailed vegetation description of the high bog

Active Raised Bog (7110)

Central Ecotope Complexes

COMPLEX 14

- **Location**: this complex was found at the centre of **C1**
- **Ground**: quaking
- **Physical indicators**: some sections have been recently (2010) burnt
- ***Calluna* height**: <30cm
- ***Cladonia* cover**: variable (<40%)
- **Macro-topography**: flat (top of dome)
- **Pools**: interconnected pools (up to 30%)
- ***Sphagnum* cover**: 76-90%
- ***Narthecium* cover**: 1-4%
- **Micro- topography**: high hummocks/low hummocks/*Sphagnum* lawns/ pools/hollows
- **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* (11-25%), *Narthecium ossifragum* (1-4%), *Carex panicea* (<4%), *Andromeda polifolia* (<1%), *Vaccinium oxycoccos* (<1%), *Drosera rotundifolia* (<1%), *D. anglica* (<1%), *Menyanthes trifoliate* (<1%), *Leucobryum glaucum* (<1%), *Sphagnum capillifolium* (H; 4-10%), *S. papillosum* (H & L; 11-25%), *S. subnitens* (H; 4-10%), *S. fuscum* (H; 1-4%), *S. austinii* (H; 1-4%), *S. cuspidatum* (P; 11-25%), *S. denticulatum* (P; 4-10%).
- **Additional comments**: this area was not surveyed in the past

COMPLEX 15

- **Location**: this complex was found at the centre of the bog and dominates **C1**
- **Ground**: quaking
- **Physical indicators**: some sections have been recently (2010) burnt
- ***Calluna* height**: <40cm
- ***Cladonia* cover**: 11-25%
- **Macro-topography**: flat

- **Pools**: interconnected pools 10-15%
- ***Sphagnum* cover**: 34-50%
- ***Narthecium* cover**: 4-10%
- **Micro- topography**: *Calluna vulgaris* hummocks/high hummocks/low hummocks/*Sphagnum* lawns/ pools, *Narthecium ossifragum-Carex panicea* flats may be also found in between pools
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (11-25%), *Erica tetralix* (4-10%), *Eriophorum vaginatum* (<4%), *E. angustifolium* (<4%), *Narthecium ossifragum* (4-10%), *Carex panicea* (<4%), *Rhynchospora alba* (<4%), *Andromeda polifolia* (<1%), *Vaccinium oxycoccos* (<1%), *Drosera rotundifolia* (<1%), *D. anglica* (<1%), *Menyanthes trifoliate* (<1%), *Utricularia minor* (<1%), *Racomitrium lanuginosum* (<1%), *Aulacomnium palustre* (<1%), *Dicranum scoparium* (<1%), *Sphagnum capillifolium* (H; 4-10%), *S. papillosum* (H & L; 11-25%), *S. tenellum* (H; <4%), *S. subnitens* (H; <4%), *S. fuscum* (H; <1%), *S. austinii* (H; <1%), *S. cuspidatum* (P; 11-25%), *S. denticulatum* (P; 11-25%).
- **Additional comments**: quality of this complex decreases at the edges, where this complex grades into sub-central or sub-marginal ecotopes.

  This complex is again found in the southern section of the high bog (GR 203202/230374) at **C2**. This area was not comprehensively surveyed in 2004 and was likely to have been missed. A *Myrica gale* patch is found adjacent to this central ecotope sample. Complex 15 at this location features interconnected pools with *S. cuspidatum* and *Drosera anglica*, and is surrounded by *S. papillosum S. capillifolium, S. fuscum* and *S. austinii* hummocks. Other species recorded include *Rhynchospora alba* and *Menyanthes trifoliate*. The area is slightly depressed. *Lycopodium selago* was recorded to the south of this central ecotope.

Quadrats **Qc1, Qc3** and **Qc4** were recorded within this complex at **C1**.

Sub-Central Ecotope Complexes

COMPLEX 10/9A

- **Location**: this complex dominates **Sc2,Sc3** and**Sc4**
- **Ground**: quaking
- **Physical indicators**: absent
- ***Calluna* height**: <30cm
- ***Cladonia* cover**: absent
- **Macro-topography**: depression

- **Pools**: interconnected pools <5%
- ***Sphagnum* cover**: 60%
- ***Narthecium* cover**: 1-4%
- **Micro- topography**: tall hummocks/lawns/pools/hollows
- **Tussocks**: absent
- **Degradation or regeneration evidence**: this area is regenerating after the blocking of drainage
- **Species cover**: *Calluna vulgaris* (11-25%), *Erica tetralix* (4-10%), *Eriophorum angustifolium* (11-25%), *E. vaginatum* (4-10%), *Narthecium ossifragum* (1-4%), *Rhynchospora alba* (<4%), *Andromeda polifolia* (<1%), *Drosera rotundifolia* (<1%), *D. anglica* (<1%), *Menyanthes trifoliate* (<1%), *Sphagnum capillifolium* (H; 4-10%), *S. papillosum* (H & L; 11-25%), *S. magellanicum* (H & L; 11-25%), *S. denticulatum* (P; 4-10%).
- **Additional comments:** this area has developed adjacent to blocked drains bA on the east of the high bog. Smaller samples of this complex area found in this section of the bog amongst these drains. But these other patches are too small to be mapped as individual polygons (only dots recorded).

COMPLEX 3/10

- **Location**: This complex characterises **Sc5** and **Sc7**, and is also found within western section of **Sc6**
- **Ground**: very soft to quaking near pools
- **Physical indicators**: absent
- ***Calluna* height**: <20cm
- ***Cladonia* cover**: variable (up to 10%)
- **Macro-topography**: gentle slope
- **Pools**: tear pools 10-15%
- ***Sphagnum* cover**: 30%
- ***Narthecium* cover**: 11-25%
- **Micro- topography**: low hummocks/ *Narthecium ossifragum-Carex panicea* flats/tear pools/hollows
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (11-25%), *Erica tetralix* (4-10%), *Eriophorum angustifolium* (<4%), *E. vaginatum* (<4%), *Carex panicea* (26-33%), *Narthecium ossifragum* (11-25%), *Rhynchospora alba* (4-10%), *Andromeda polifolia* (<1%), *Drosera rotundifolia* (<1%), *D. anglica* (<1%), *Menyanthes*

trifoliate (<1%), *Sphagnum capillifolium* (H; 4-10%), *S. papillosum* (H; 11-25%), *S. tenellum* (H; <4%), *S. subnitens* (H; <4%), *S. fuscum* (H; <1%), *S. austinii* (H; <1%), *S. magellanicum* (TP;4-10%), *S. cuspidatum* (TP; 4-10%), *S. denticulatum* (TP; 4-10%).

- **Additional comments:** this complex has western raised bog features (low *Sphagnum* cover and *Racomitrium lanuginosum*).

Quadrats **Qsc1** (previously named Qc2 (2004)) was recorded within this complex at **Sc7**.

COMPLEX 9/7+P

- **Location**: this complex was found along the northwest high bog within **Sc6**
- **Ground**: very soft to quaking near pools
- **Physical indicators**: tear pools
- ***Calluna* height**: <40cm
- ***Cladonia* cover**: 11-25%
- **Macro-topography**: gentle slope
- **Pools**: tear pools 11-15%
- ***Sphagnum* cover**: 40%
- ***Narthecium* cover**: 4-10%
- **Micro- topography**: high hummocks/ /tear pools/hollows
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (33-50%), *Erica tetralix* (4-10%), *Eriophorum vaginatum* (4-10%), *E. angustifolium* (<4%), *Rhynchospora alba* (<4%), *Andromeda polifolia* (<1%), *Drosera rotundifolia* (<1%), *Sphagnum capillifolium* (H; 4-10%), *S. austinii* (H; <4%), *S. magellanicum* (L;11-25%), *S. cuspidatum* (TP; 4-10%).
- **Additional comments:** where pools are tear pools complex is called 9/7+TP and in those locations where *Narthecium* becomes abundant 9/7/6+TP.

Degraded Raised Bog (7120)

Sub-Marginal Ecotope Complexes

COMPLEX 4/9

- **Location**: southwest section of high bog
- **Ground**: soft

- **Physical indicators**: some sections have been recently (2010) burnt
- ***Calluna* height**: <20cm
- ***Cladonia* cover**: variable (up to 20% in places) depending in whether areas has been recently burnt or not.
- **Macro-topography**: gentle slope
- **Pools**: absent
- ***Sphagnum* cover**: 11-25%
- ***Narthecium* cover**: 4-10%
- **Micro- topography**: low hummocks/hollows
- **Tussocks**: *Eriophorum vaginatum* (<4%)
- **Degradation or regeneration evidence**: unknown
- **Species cover**: *Calluna vulgaris* (4-10%), *Erica tetralix* (<4%), *Eriophorum angustifolium* (4-10%), *E. vaginatum* (<4%), *Narthecium ossifragum* (4-10%), *Rhynchospora alba* (26-33%), *Carex panicea* (4-10%), *Andromeda polifolia* (<1%), *Drosera rotundifolia* (<1%), *D. intermedia* (<1%), *Sphagnum capillifolium* (H; 4-10%), *S. papillosum* (H; 11-25%), *S. tenellum* (H; <4%), *S. subnitens* (H; <4%), *S. fuscum* (H; <1%), *S. austinii* (H; <1%), *S. cuspidatum* (Hl; <4%), *S. denticulatum* (Hl; <4%).
- **Additional comments:** this complex stretches towards the bog edge, which is likely to indicate some water runoff. This area was not comprehensibly surveyed in 2004.

COMPLEX 9/7

- **Location**: to the west of high bog within drain complex bD to bG
- **Ground**: soft
- **Physical indicators**: absent
- ***Calluna* height**: <30cm
- ***Cladonia* cover**: variable (up to 10% in places) depending in whether areas have been recently burnt or not.
- **Macro-topography**: gentle slope to flat
- **Pools**: absent
- ***Sphagnum* cover**: very variable 20 to 50%, but higher in areas adjacent to drains, very localized.
- ***Narthecium* cover**: 4-10%
- **Micro- topography**: low hummocks/hollows
- **Tussocks**: *Eriophorum vaginatum* (4-10%)
- **Degradation or regeneration evidence**: sections adjacent to drains bD likely to be regenerating

- **Species cover**: *Calluna vulgaris* (4-10%), *Erica tetralix* (4-10%), *Eriophorum vaginatum* (11-25%), *E. angustifolium* (<4%), *Narthecium ossifragum* (4-10%), *Rhynchospora alba* (<4%), *Carex panicea* (<4%), *Andromeda polifolia* (<1%), *Drosera rotundifolia* (<1%), *Sphagnum capillifolium* (H; 35-50%), *S. papillosum* (H; 4-10%), *S. tenellum* (H; <4%), *S. cuspidatum* (Hl; <4%)
- **Additional comments:** *Molinia caerulea* becomes frequent in areas near the bog edge (GR 202914/230372). Where *Narthecium ossifragum* or *Carex panicea* become abundant the complex is named 9/7/6 or 9/7/3. Areas burnt feature higher *N. ossifragum*, *C. panicea* cover, lower *Sphagnum* cover and algae hollows are more frequent.

COMPLEX 6/3

- **Location**: this is the most widespread sub-marginal ecotope complex within the site, thus it is found across entire high bog, but northern sub-marginal section
- **Ground**: soft
- **Physical indicators**: some sections have been recently (2010) burnt
- ***Calluna* height**: <20cm
- ***Cladonia* cover**: variable (up to 20% in places) depending in whether areas has been recently burnt or not.
- **Macro-topography**: gentle slope
- **Pools**: only present where complex is named 6/3+P
- ***Sphagnum* cover**: 11-25%
- ***Narthecium* cover**: 25-33%
- **Micro- topography**: low hummocks/*Narthecium ossifragum*-*Carex panicea* flats/hollows
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (4-10%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (<4%), *E. angustifolium* (<4%), *Narthecium ossifragum* (25-33%), *Carex panicea* (11-25%), *Rhynchospora alba* (<4%), *Trichophorum germanicum* (<1%), *Andromeda polifolia* (<1%), *Drosera rotundifolia* (<1%), *D. anglica* (<1%), *Menyanthes trifoliate* (<1%), *Sphagnum capillifolium* (H; 4-10%), *S. papillosum* (H & Hl; 4-10%), *S. tenellum* (H; <4%), *S. subnitens* (H; <4%), *S. fuscum* (H; <1%), *S. austinii* (H; <1%), *S. cuspidatum* (Hl; <4%), *S. denticulatum* (Hl; <4%)
- **Additional comments:** this complex is named 6/3+TP or 6/3+P where these features become frequent. These pools are colonised by either *S. cuspidatum* or algae. *Menyanthes trifoliate* is also recorded.

Quadrat **Qsm2** (previously named Qm1 (2004)) was recorded within this complex to the south of C1.

Quadrat **Qsm1** was recorded within this **complex 6/3+P** to the west of high bog (between drain complex bD to bG).

Marginal Ecotope Complexes

COMPLEX 3/6

- **Location**: this is the only marginal ecotope complex described for the site and it is found along the high bog margin
- **Ground**: firm
- **Physical indicators**: some sections have been recently (2010) burnt, algae hollows and algae pools present in some locations
- ***Calluna* height**: <30cm
- ***Cladonia* cover**: variable (up to 20% in places) depending in whether areas has been recently burnt or not.
- **Macro-topography**: gentle to steep slope
- **Pools**: tear pools where complex is named 3/6 +TP
- ***Sphagnum* cover**: up to 10%
- ***Narthecium* cover**: 11-25%
- **Micro- topography**: low hummocks/*Narthecium ossifragum-Carex panicea* flats/tear pools/hollows
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (4-10%), *Erica tetralix* (4-10%), *Eriophorum vaginatum* (<4%), *E. angustifolium* (<4%), *Carex panicea* (26-33%), *Narthecium ossifragum* (11-25%), *Rhynchospora alba* (4-10%), *Trichophorum germanicum* (<1%), *Andromeda polifolia* (<1%), *Drosera rotundifolia* (<1%), *Sphagnum capillifolium* (H; <4%), *S. tenellum* (H; <4%), *S. subnitens* (H; <4%), *S. fuscum* (H; <1%), *S. magellanicum* (H,<4%), *S. papillosum* (TP; <4%), *S. cuspidatum* (TP; <4%), *S. denticulatum* (TP; <4%), *Leucobryum glaucum* (<1%).
- **Additional comments**: areas recently burnt feature higher *Narthecium ossifragum, Carex panicea* cover and shorter *Calluna vulgaris*.

The complex is named 3/6+TP where tear pool features are present. Tear pools contain *S .cuspidatum*. This complex features tall *Calluna vulgaris* (up to 40 cm) hummocks to the SE of the bog (GR 203913/230702)

Complex 3/6+P is found within drain complex bA. Here, pools feature *S. denticulatum* and R. *alba*, bare peat is found in the more degraded sections. Although some sections have sub-marginal ecotope quality as a result of re-wetting associate d with the blocking of drains, overall is considered marginal ecotope. Tall and robust *C. vulgaris* hummocks also found in this location.

This complex features higher locally *Sphagnum* cover (11-25%) along the eastern section of the high bog (GR 203690/230482). *S. subnitens, S. capillifolium* and *S. fuscum* are found within some sort of run off channels towards the bog edge.

This complex was not burnt along the southeaster section of high bog (GR 203272/230337). *Cladonia portento*sa reaches 25% cover at this location, *C. vulgaris* is much taller than areas burnt (30cm) and *E. angustifolium* is more common (4-10%) and ground slightly softer. *C. panicea* and *N. ossifragum* are still the most dominant species.

This complex also covers large section to the west of the high bog (GR 202734/230682). This area was not burnt and *Cladonia portentosa* cover is high (34 to 50%). *C. panicea* dominates the bog surface along with *N. ossifragum*; *C. vulgaris* is more robust than in burnt areas. *E. angustifolium* becomes frequent (4-10%) and *Sphagnum* cover is relatively high (up to 25%).

Face bank Complexes

COMPLEX 1

- **Location**: this complex was found along the bog margin
- **Ground**: firm
- **Physical indicators**: bare peat variable
- ***Calluna* height**: <50cm
- ***Cladonia* cover**: variable up to 60%
- **Macro-topography**: steep slope
- **Pools**: absent
- ***Sphagnum* cover**: generally absent but <5% in places
- ***Narthecium* cover**: absent
- **Micro- topography:** absent
- **Tussocks:** absent

- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (76-90%), *Erica tetralix* (4-10%), *Eriophorum vaginatum* (<4%), *E. angustifolium* (<4%), *Molinia caerulea* (<4%), *Trichophorum germanicum* (<1%), *Myrica gale* (<4%), *Hypnum jutlandicum* (<4%), *Hylocomium splendens* (<1%).
- **Additional comments**: this complex was not thoroughly surveyed and it was mapped mainly based on the 2010 aerial photographs and previous 2004 survey map.

Depressions on peat substrates of the Rhynchosporion (750)

The habitat occurs at Mongan Bog in both Active and Degraded Raised Bog, but it is only occasional found on degraded habitat. Only *Rhynchospora alba* was recorded within the 2011 survey at this site.

R. alba is found in all ecotopes except the face bank in Mongan Bog, such as: central ecotope (complex 14; 15); sub-central ecotope (10/9a; 3/10; 9/7+P); sub-marginal ecotope (4/9; 9/7; 6/3) and marginal ecotope (3/6).

The species becomes very frequent within complex 4/9 (sub-marginal); complex that covers a small area in the southern high bog section.

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 steep slope sections at the edge of the bog where bare peat and erosion channels are found.

Appendix II Photographical records

Photograph Number	Aspect	Type	Feature	Date
102-0410	NE	Overview	Qsm2	01/09/2011
102-0411	SE	Overview	Qc3	01/09/2011
102-0412	NW	Overview	Qsc1	01/09/2011
102-0413	NE	Overview	Qc1	01/09/2011
102-0416	SW	Overview	Qsm1	02/09/2011
102-0417	NW	Overview	Qc2	02/09/2011

Appendix III Quadrats

Ecotope type	Central	Central	Central	Sub-central
Complex Name	**15**	**15**	**15 + cl**	**3/10**
Quadrat Name	Qc1	Qc1	Qc2	Qsc1
Easting	203988	203987	203810	203811
Northing	230992	230993	231054	231052
Firmness	Quaking	Quaking	Very soft	Very soft
Burnt	No	No	No	No
Algae in hollows %	Absent	Absent	Absent	Absent
Algae in pools %	Absent	1-3 (several indiv)	4-10	Absent
Bare peat %	Absent	Absent	Absent	Absent
High hummocks %	Na	11-25	na	Absent
Low hummocks %	11-25	11-25	4-10	11-25
Hollows %	4-10	1-3 (many indiv)	na	4-10
Lawns %	4-10	4-10	4-10	Absent
Pools %	34-50	11-25	11-25	11-25
Pool type	Tear	Tear	Tear	Tear
S.austinii hum type	Na	Active	na	Absent
S.austinii hum %	4-10	1-3 (many indiv)	4-10	Absent
S.austinii height(cm)	Na	11-20	na	Absent
S.fuscum hum type	Absent	Absent	Absent	Relic
S.fuscum hum %	Absent	Absent	Absent	1-3 (many indiv)
S.fuscum height(cm)	Absent	Absent	Absent	0-10
Leucobryum glaucum	Absent	Absent	Absent	Absent
Trichophorum type	Absent	Absent	Absent	Absent
Trichophorum %	Absent	Absent	Absent	Absent
S.magellanicum %	11-25	11-25	4-10	Absent
S.cuspidatum %	4-10	11-25	4-10	Absent
S.papillosum %	4-10	Absent	4-10	4-10
S.denticulatum %	4-10	Absent	4-10	11-25

S.capillifolium%	4-10	4-10	4-10	1-3 (many indiv)
S.tenellum %	Na	1-3 (several indiv)	na	1-3 (many indiv)
S.subnitens %	Absent	Absent	Absent	1-3 (many indiv)
R.fusca %	Absent	Absent	Absent	Absent
R.alba %	4-10	1-3 (many indiv)	4-10	4-10
N.ossifragum %	4-10	4-10	11-25	11-25
Sphag pools %	34-50	11-25	11-25	11-25
Dominant pool Sphag	S. cuspidatum	S. cuspidatum	S. denticulatum	S. denticulatum
Sphag lawns %	4-10	4-10	4-10	Absent
Sphag humm %	11-25	11-25	4-10	4-10
Sphag holl %	4-10	Absent	na	Absent
Total Sphag %	51-75	51-75	11-25	26-33
Hummocks indicators	S. austinii	S. austinii	S. austinii	S.fuscum
Cladonia portent %	4-10	1-3 (many indiv)	34-50	4-10
Other Cladonia sp	Absent		Absent	C. uncialis
C. panicea %	Absent	1-3 (many indiv)	Absent	26-33
Calluna cover %	11-25	4-10	11-25	11-25
Calluna height(cm)	Na	21-40	na	21-40
Other NotableSpecies	Racomitrium lanuginosum	Racomitrium, Drosera anglica, Menyanthes, Andromeda, E. Angustifolium		Drosera anglica. E. vaginatum. E. angustifolium.
Other comment	Stable			Flats 34-50%.S.auric misidentified as S. cusp in 20004.S.imb & S. cusp just outside quadrat; Previously(Qc2)
Date	**17/08/2004**	**01/09/2011**	**17/08/2004**	**01/09/2011**

Ecotope type	**Central**	**Central**	**Central**	**Central**
Complex Name	**15**	**15**	**15**	**15**
Quadrat Name	Qc3	Qc3	Qc4	Qc4
Easting	203343	203345	203539	203538

Northing	231005	231004	230612	230612
Firmness	Quaking	Quaking	Quaking	Quaking
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	11-25	na	26-33
Low hummocks %	11-25	4-10	4-10	11-25
Hollows %	4-10	1-3 (many indiv)	4-10	Absent
Lawns %	11-25	11-25	4-10	4-10
Pools %	34-50	4-10	51-75	11-25
Pool type	Interconnecting	Interconnecting	Interconnecting	Interconnecting
S.austinii hum type	Na	Relic	na	Active
S.austinii hum %	4-10	1-3 (many indiv)	4-10	1-3 (many indiv)
S.austinii height(cm)	Na	21-40	na	0-10
S.fuscum hum type	Absent	Absent	na	Active
S.fuscum hum %	Absent	Absent	4-10	1-3 (many indiv)
S.fuscum height(cm)	Absent	Absent	na	0-10
Leucobryum glaucum	Absent	Absent	Absent	Absent
Trichophorum type	Absent	Absent	Absent	Absent
Trichophorum %	Absent	Absent	Absent	Absent
S.magellanicum %	4-10	Absent	4-10	Absent
S.cuspidatum %	4-10	4-10	11-25	11-25
S.papillosum %	11-25	26-33	4-10	11-25
S.denticulatum %	4-10	1-3 (many indiv)	4-10	Absent
S.capillifolium%	4-10	4-10	4-10	11-25
S.tenellum %	Na	1-3 (many indiv)	na	1-3 (many indiv)
S.subnitens %	Absent	Absent	Absent	Absent
R.fusca %	Absent	Absent	Absent	Absent
R.alba %	4-10	1-3 (many indiv)	4-10	11-25
N.ossifragum %	4-10	1-3 (many indiv)	4-10	4-10
Sphag pools %	34-50	4-10	51-75	11-25
Dominant pool Sphag	S. cuspidatum	S. cuspidatum	S. cuspidatum	S. cuspidatum

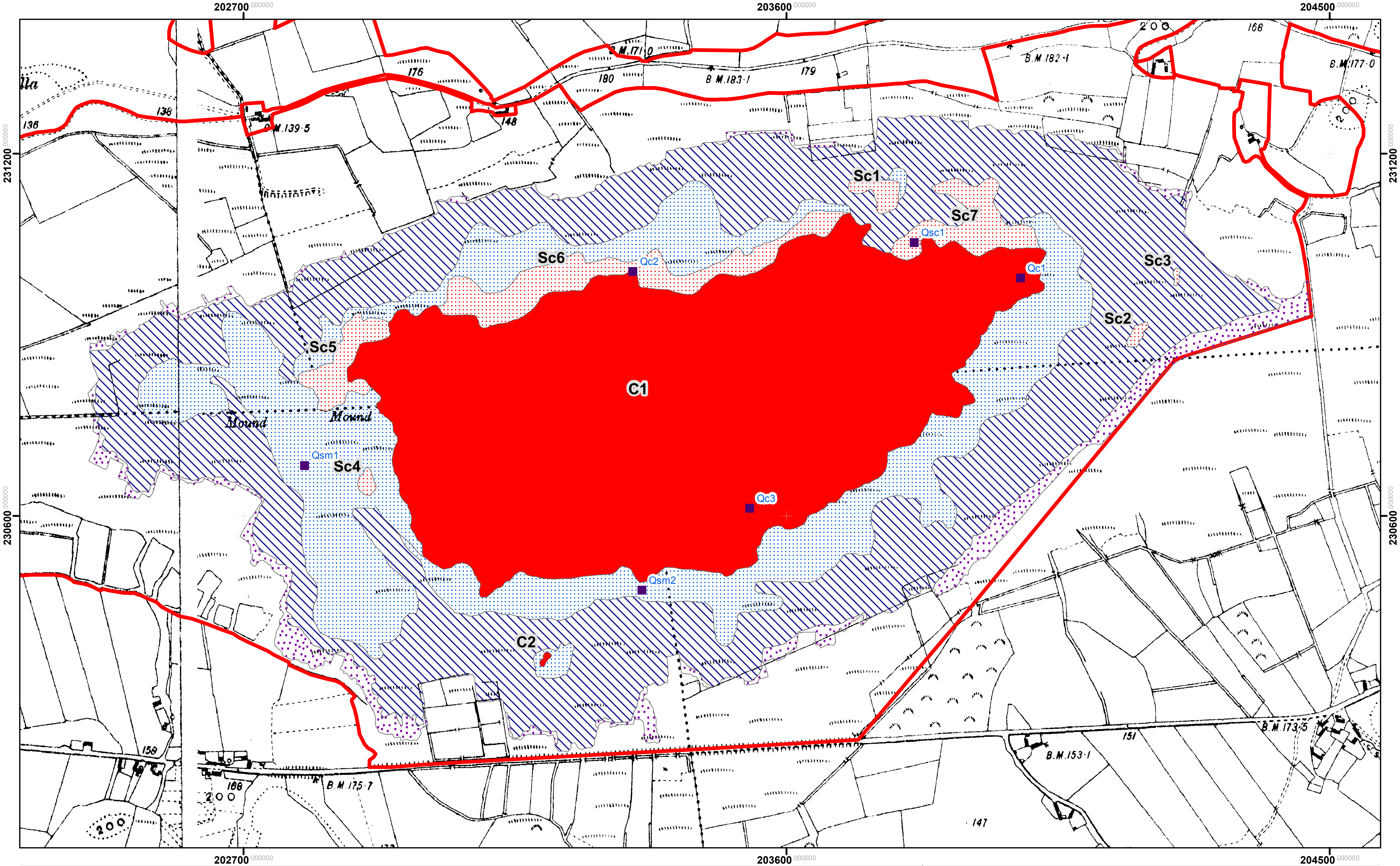
Sphag lawns %	11-25	11-25	4-10	4-10
Sphag humm %	11-25	11-25	4-10	11-25
Sphag holl %	4-10	Absent	4-10	Absent
Total Sphag %	51-75	51-75	51-75	51-75
Hummocks indicators	S. austinii	S. austinii	S. fuscum & austinii	S. austinii & S. fuscum
Cladonia portent %	4-10	4-10	4-10	1-3 (many indiv)
Other Cladonia sp	Absent		Absent	
C. panicea %	Absent	Absent	Absent	Absent
Calluna cover %	11-25	11-25	11-25	11-25
Calluna height(cm)	Na	41-50	na	21-40
Other NotableSpecies		Drosera anglica/intermedia. Andromeda polifolia; Menyanthes trifoliata		Menyanthes trifoliata and Drosera anglica
Other comment	Stable		Stable	
Date	**17/08/2004**	**02/09/2011**	**17/08/2004**	**01/09/2011**

Ecotope type	**Sub-marginal**	**Sub-marginal**	**Marginal**	**Sub-marginal**
Complex Name	**6/3 + p**	**6/3+P**	**3**	**6/3**
Quadrat Name	Qsm1	Qsm1	Qm1	Qsm2
Easting	202793	202801	203361	203360
Northing	230687	230683	230477	230476
Firmness	Firm-soft	Soft	Firm	Soft
Burnt	No	Severe	na	Severe
Algae in hollows %	4-10	4-10	na	Absent
Algae in pools %	4-10	Absent	na	Absent
Bare peat %	Absent	4-10	na	4-10
High hummocks %	Na	Absent	na	Absent
Low hummocks %	4-10	11-25	na	34-50
Hollows %	Na	11-25	na	34-50
Lawns %	Absent	4-10	na	Absent

Pools %	11-25	4-10	na	Absent
Pool type	Tear	Absent	na	Absent
S.austinii hum type	Na	Absent	na	Absent
S.austinii hum %	4-10	Absent	na	Absent
S.austinii height(cm)	Na	Absent	na	Absent
S.fuscum hum type	Absent	Absent	na	Absent
S.fuscum hum %	Absent	Absent	na	Absent
S.fuscum height(cm)	Absent	Absent	na	Absent
Leucobryum glaucum	Absent	Absent	na	Absent
Trichophorum type	Flats	Absent	na	Absent
Trichophorum %	4-10	1-3 (few indiv)	na	Absent
S.magellanicum %	4-10	4-10	na	Absent
S.cuspidatum %	4-10	4-10	na	Absent
S.papillosum %	4-10	1-3 (many indiv)	na	11-25
S.denticulatum %	4-10	Absent	na	Absent
S.capillifolium%	4-10	4-10	na	4-10
S.tenellum %	Na	1-3 (many indiv)	na	1-3 (many indiv)
S.subnitens %	Absent	1-3 (many indiv)	na	4-10
R.fusca %	Absent	Absent	na	Absent
R.alba %	4-10	1-3 (many indiv)	na	1-3 (several indiv)
N.ossifragum %	4-10	4-10	na	11-25
Sphag pools %	11-25	4-10	na	Absent
Dominant pool Sphag	S. cuspidatum	S. cuspidatum	na	
Sphag lawns %	Absent	4-10	na	Absent
Sphag humm %	4-10	4-10	na	11-25
Sphag holl %	Na	Absent	na	4-10
Total Sphag %	11-25	26-33	na	26-33
Hummocks indicators	S. austinii	Absent	na	Absent
Cladonia portent %	4-10	Absent	na	1-3 (many indiv)
Other Cladonia sp	Absent		na	C. uncialis
C. panicea %	11-25	11-25	na	11-25
Calluna cover %	11-25	11-25	na	4-10
Calluna height(cm)	Na	11-20	41-50	0-10

Other NotableSpecies		Dicranum scoparium		Andromeda
Other comment	Wetter	Pool has formed where peat was excavated for dam.		Calluna % includes Erica.Previously(Qm1)
Date	**17/08/2004**	**02/09/2011**	**17/08/2004**	**01/09/2011**

Appendix IV Survey maps



Raised Bog Monitoring Survey 2011

Map 1: Ecotopes Map and Quadrats

Ordnance Survey Ireland Licence No EN 0059208

Ecologic Environmental & Ecological Consultants Ltd.

Mongan Bog SAC (000580)
Co. Offaly

1:6,000

N

0 75 150 300 450 600 Meters

Legend

Ecotype type

- Central
- Sub-central
- Bog Woodland
- Active Flush
- Open water
- Sub-marginal
- Inactive Flush
- Marginal
- Face bank
- Quadrat
- SAC

Raised Bog Monitoring Survey 2011

Map 2: Vegetation community complexes

Ecologic Environmental & Ecological Consultants Ltd.

Mongan Bog SAC (000580)
Co. Offaly

1:6,000

0 75 150 300 450 600 Meters

N

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

202700 000000 | 203600 000000 | 204500 000000

231200 000000 | 230600 000000

bA bB bC bD bE bF bG bH bI bJ bK bL bM bN bO bP bQ bR bS bT

Mound Mound

B.M.139·5 B.M.171·0 B.M.183·1 B.M.182·1 B.M.177·0 B.M.175·7 B.M.153·1 B.M.173·5

136 148 176 180 179 168 159 151 147

Raised Bog Monitoring Survey 2011

Map 3: Impacts (High Bog drainage; Turf cutting)

Ecologic Environmental & Ecological Consultants Ltd.

Mongan Bog SAC (000580)
Co. Offaly

1:6,000

N

0 75 150 300 450 600 Meters

Legend

High Bog drainage

- Blocked:non-functional
- Blocked:reduced functional
- Not blocked:functional
- Not blocked:non-functional
- Not blocked:reduced functional
- Ecotopes
- SAC