Ferbane Bog (SAC 000575), Co. Offaly

Executive Summary

This survey, carried out in 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 Ferbane 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 32.63 ha (27.20%) of the high bog area. High quality Active Raised Bog consists of central ecotope (1.99ha) featuring interconnecting *Sphagnum* pools and lawns dominated by *S. cuspidatum* and *S. papillosum*. *Sphagnum* cover reaches 100% in certain locations. Sub-central ecotope is more abundant (30.64ha) and is more variable in quality with the *Sphagnum* cover ranging from 34 to 75%. Pools are also less common with *Sphagnum* hummocks including *S. austinii*, but more frequently *S. capillifolium*, composing a large part of the *Sphagnum* layer.

Degraded Raised Bog covers 87.33 ha (72.80%) of the high bog area. It is drier than Active Raised Bog and supports a lower density of *Sphagnum* mosses. It has a less developed micro-topography while permanent pools and *Sphagnum* lawns are generally absent. The high cover of *Cladonia portentosa* across much of the site suggests that this bog hasn't been burnt for quite some time.

Depressions on peat substrates of the Rhynchosporion are found in both Active and Degraded Raised Bog, but tend to be best developed and most stable in the wettest areas of Active Raised Bog. On Ferbane Bog it was found to be most common within the sub-central complex 4/10.

The current conservation objective for Ferbane 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 81.73ha. 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 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 decrease in the area (4.30ha) of Active Raised Bog at Ferbane Bog in the 2005 to 2012 period. This loss of sub-central habitat has taken place mostly in the south, south-west and north of the Active Raised Bog and is likely to be associated with high bog drains that are still drying out the site. The abundance of pines, particularly in the south, east and north of the site also indicate that this site is drying out.

Drainage on the high bog is the biggest threat to Active Raised Bog on the site with 7.8km of drains recorded as functional and an additional 3.1km classed as reduced functional. Although peat cutting was not recorded on Ferbane Bog from 2005-2010 or in 2012, it was recorded at one plot in 2010/2011. Furthermore, open face banks, particularly in the west and north-west of the site may still continue to drain the high bog. No fire events have affected the bog in the reporting period and no restoration works have taken place at Ferbane Bog.

Active Raised Bog has been given an overall **Unfavourable Bad–Declining** conservation status assessment. Habitat Area has decreased and the quality remained stable in the reporting period. Furthermore, the current Area value as well as the S&Fs are below reference values. Future Prospects are considered Unfavourable Bad-Declining as drainage continues to threaten the habitat.

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

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

A series of **recommendations** have been also given, these include: the cessation of peat cutting; restoration works on the high bog in the form of drain blocking; further hydrological and topographical studies to ascertain more accurate FRVs; further botanical monitoring surveys to

assess the efficiency of restoration works and to assess the rate of spread of *Pinus sylvestris* on the high bog.

Site identification

SAC Site Code	000575	**6" Sheet:**	OY 14
Grid Reference:	E211000 / N225900	**1:50,000 Sheet:**	47
High Bog area (ha):	119.96ha		
Dates of Visit:	11 to 12/09/12		
Townlands:	Ferbane, Ballyvora, Creggan and Endrim.		

Site location

Ferbane Bog is located immediately northwest of Ferbane town in north-western Co. Offaly. The main Athlone/Ferbane/Birr road is located to the east and the Ferbane/Belmont road is located to the south. Ferbane Bog is located 3 km east of Moyclare Bog (SAC 581) and south-east of the extensively drained Clonlyon Glebe Bog (NHA 893).

Access to the north of the bog is from the Athlone/Ferbane road along an un-surfaced track to the northeast of the site. The north of the bog can be reached with difficulty after passing over cutover bog a wide facebank drain and thick scrub. Access to the bog can also be reached from the south-east of the site, parking a car in a housing estate and entering through an ESB gate and through some scrub before reaching the high bog.

Description of the survey

The survey was carried out in September 2012 and involved a vegetation survey of the high bog at Ferbane Bog and the recording of impacting activities affecting high bog vegetation. A similar survey was carried out in 2005 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 Ferbane Bog was re-surveyed. Sections mapped as sub-marginal, sub-central and central ecotope in 2005 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 2005 project (Fernandez *et al*. 2005) were re-surveyed (see Appendix III). The size of quadrats was 4m x 4m for Active Raised Bog.

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

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

Description of the high bog

The bog is shaped like an irregular rectangle with the longest axis orientated north-south. This bog has been classified as a Basin Bog type since it is surrounded on all sides by low relief bedrock ridges according to Kelly *et al*., (1995). This bog is also classified as a Midlands type raised bog (Cross, 1990).

Ecological Information

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

The following Raised Bog EU Annex I habitats, are found in Ferbane 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 Ferbane Bog is 32.63ha (27.20% of the high bog), which is a decrease of 9.10ha since 1995.

Active Raised Bog includes sub-central ecotope and central ecotope.

Central ecotope (1.99ha) was found at two locations (**C1** to **C2**) (see Appendix IV, Map 1), both in depressions in the WNW of the high bog. Two community complexes were recorded; complex 14 and 10/15. Complex 14 characterised the centre of **C1** and consisted of low hummocks, lawns and pools. This area was extremely wet with inter-connecting pools covering 51 to 75% that could almost be considered as one very large pool. The *Sphagnum* cover ranged from 76 to 90% composed mostly of *S. cuspidatum* and *S. papillosum* in pools and lawns, respectively. The micro-topography was poorly developed with few (and very low) hummocks present dominated by *S. capillifolium* and *S. papillosum*. *Calluna vulgaris* and *Eriophorum vaginatum* were frequent on hummocks while *Rhynchospora alba* was frequent on lawns and *Eriophorum angustifolium* frequent in pools. *Sphagnum magellanicum* was also an integral part of the *Sphagnum* lawns. Additional species that were frequent at a low cover throughout include *Vaccinium oxycoccos, Drosera anglica, Cladonia portentosa* and *Narthecium ossifragum.* Complex 10/15 characterised **C2** and the edges of **C1** and consisted of low hummocks, lawns and pools. Inter-connecting pools were 26 to 33% and the *Sphagnum* cover ranged from 51 to 90%. *Calluna vulgaris* was frequent throughout and tussocks of *Eriophorum vaginatum* were abundant; *Sphagnum capillifolium* was dominant in the hummock layer with pools dominated by *S. cuspidatum* and *S. magellanicum* and lawns dominated by *S. papillosum S. magellanicum*. *Rhynchospora alba* was frequent on lawns and *Eriophorum angustifolium* and *Drosera anglica* frequent in pools.

Sub-central ecotope (30.64ha) was found in a large area (**Sc1**) of the centre of the high bog, extending effectively in a NW/SE direction (see Appendix IV, Map 1). Five community complex types were recorded. The most frequent complex was 9/7/10. This complex was found to be variable in quality as it graded into and formed a mosaic with sub-marginal community complexes in places, but elsewhere graded into the better quality sub-central complex 9/7 + P. Overall, *Calluna vulgaris* and *Eriophorum vaginatum* dominated the vegetation with the *Sphagnum* layer dominated by hummocks of *Sphagnum capillifolium* and *S. papillosum*. *S. magellanicum*, *S. tenellum*, *S. fuscum*, *S. austinii* and *S. cuspidatum* were also recorded as well as *Dicranum scoparium*, *Vaccinium oxycoccos*, *Hypnum jutlandicum* and *Leucobryum glaucum*. The best quality sub-central complexes were 9/7 + P and 4/10. Active hummocks of *Sphagnum austinii* were common in both of these complexes and both also supported species such as *Dicranum scoparium*, *Pleurozium schreberi* and *Aulacomnium*

palustre. *Calluna vulgaris* was abundant throughout both complexes, tussocks of *Eriophorum vaginatum* were frequent and *Narthecium ossifragum* occasional. Complex 9/7 + P was found in the south-east of **Sc1** and had a pool cover generally of 4-10% that was higher in places and a *Sphagnum* cover that ranged from 34 to 75%. *Sphagnum capillifolium* and *S. papillosum* were dominant in the hummock layer with pools dominated by *S. cuspidatum* and the very occasional lawns by *S. magellanicum*. The pools, however, were variable in quality with some supporting only a patchy cover of *S. cuspidatum* and a relatively high cover of *Rhynchospora alba*. The pools also supported *Eriophorum angustifolium*, *Menyanthes trifoliata* and *Drosera anglica*. Complex 4/10 was found mainly in the mid-northern section of **Sc1**. Although no pools were present, there were 'pool-like' depressions dominated by *Rhynchospora alba*, which supported *Menyanthes trifoliata*, *Drosera anglica* and *Sphagnum cuspidatum*. Tall hummocks which supported *Leucobryum glaucum*, *Polytrichum strictum*, *Empetrum nigrum* and *Vaccinium oxycoccos* were also present. The *Sphagnum* cover ranged from 51 to 75% dominated by low hummocks and lawns of *Sphagnum magellanicum* as well as hummocks of *S. capillifolium* and *S. papillosum*. Complex 9a/10 was found in a very small area in the north-east of **Sc1** and was dominated by *Eriophorum angustifolium*, *Rhynchospora alba*, *Sphagnum. papillosum* and *S. magellanicum*. Complex 3/10 was the most inferior quality sub-central complex recorded at Ferbane Bog and thus had some attributes of sub-marginal complexes and graded into and formed mosaics with them. This complex was found mainly in the north-west of **Sc1** *Sphagnum* cover ranged from 26 to 50% composed mostly of hummocks of *S. papillosum*, *S. capillifolium* and *S. tenellum*. *Calluna vulgaris*, *Carex panicea* and *Narthecium ossifragum* dominated the vegetation.

Degraded Raised Bog (7120)

The current area of Degraded Raised Bog at Ferbane Bog is 87.33ha (72.80% 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 (55.82ha) featured the most developed micro-topography within Degraded Raised Bog. However, pools were absent. Three community complexes (with additional variants) were recorded within the sub-marginal ecotope: 9/7, 9/7/3 and 6/3. Complex 9/7 was the best quality sub-marginal complex and thus had some sub-central characteristics. Only small amounts of this complex were recorded at Ferbane Bog, mostly immediately north of, but also south of Sc1. *Calluna vulgaris* and *Eriophorum vaginatum* dominated the vegetation and the *Sphagnum* cover, which ranged from 26 to 50%, was composed almost entirely of hummocks of *S. capillifolium* and *S. papillosum*. Some scattered *Pinus* trees were also recorded, most of which were <3.0m in

height. Complex 9/7/3 was far more common on the site covering large areas particularly in the north-west and the south-west of the high bog. The *Sphagnum* cover, which ranged from 11 to 33%, again was composed almost entirely of hummocks of *S. capillifolium* and *S. papillosum*. *Calluna vulgaris* dominated the vegetation along with *Carex panicea*, *Eriophorum vaginatum* and *Narthecium ossifragum*. Complex **6/3** was the most inferior quality sub-marginal and recorded mostly in the south-east of the site. The *Sphagnum* cover ranged mostly from 11 to 25%, composed almost entirely of hummocks of *S. capillifolium* and *S. papillosum*. *Calluna vulgaris* dominated the vegetation along with *Carex panicea* and *Narthecium ossifragum*.

Marginal ecotope (23.04ha) is slightly drier than sub-marginal ecotope and was mainly recorded as a narrow band near the margin of the high bog although there was a wider band in the north-east. Four marginal complexes were recorded on Ferbane Bog; complex 6/7 in the east of the site, 3/6 in the north-east, 3/7 in the north-west and 7/2 in the west and south. The micro-topography consisted 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*. *Pinus* is also present in many of the complexes in marginal ecotope particularly in the east, south and north of the site with some trees of up to 8m in height recorded.

Face bank ecotope (8.47ha) is characterised by firm ground, tall *Calluna vulgaris*, poor *Sphagnum* cover and a flat micro-topography. This ecotope was recorded in a very narrow band along most of the high bog margin with a wider area recorded in the west-north-west of the site associated with drainage complex bP.

Depressions on peat substrates of the Rhynchosporion (7150)

Rhynchosporion vegetation is widespread on Ferbane Bog. It is found in both Active and Degraded Raised Bog, but tends to be best developed and most stable in the wettest areas of Active Raised Bog. In these areas, the Rhynchosporion vegetation occurs within *Sphagnum* hollows and along *Sphagnum* pool edges and on lawns. On Ferbane Bog it was found to be most common within the sub-central complex 4/10 as well as the central complexes 14 and 10/15 and the sub-central complex 9/7 + P. Typical plant species include *Rhynchospora alba*, *Sphagnum cuspidatum, S. magellanicum, S. papillosum*, *Drosera anglica* and *Eriophorum angustifolium*.

Rhynchospora alba was also found within Degraded Raised Bog, but was not as common and was always associated with wet features such as hollows and run off channels.

Detailed vegetation description of the high bog

A detailed description of high bog vegetation recorded during the 2012 survey of Ferbane 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 Ferbane Bog, according to their occurrence on the high bog or adjacent to the high bog; area or length affected, and whether they influence negatively (i.e. drainage, peat extraction) or positively (i.e. restoration works):

Table 6.1 Impacting activities

Code	Activity	Ranking	Influence	Area (ha) /Length(km)	Location	Habitat affected
C01.03	Peat extraction	L	-1	n/av	Inside High Bog: 1 active turf plot recorded in 2010/2011	**7110/7150**
C01.03	Peat extraction	M	-1	n/av	Inside High Bog: 1 active turf plot recorded in 2010/2011	**7120**
J02.07	Drainage	H	-1	10.889km [1]	Inside High Bog	**7110/7120/7150**
J02.07	Drainage	H	-1	n/av	Outside High Bog	**7110/7120/7150**
I01	Invasive alien species	L	-1	<0.1ha [3]	Inside High Bog	**7120/7150**
I02	Problematic native species	L	-1	<0.5ha [4]	Inside High Bog	**7110**
I02	Problematic native species	M	-1	<0.5ha [4]	Inside High Bog	**7120/7150**

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

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

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

[3] This figure is estimated and represents the extent of invasive species across entire high bog

[4] This figure is estimated and represents the extent of trees across entire high bog

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

Peat cutting

Peat cutting was recorded at one turf plot to the north-west of the high bog at Ferbane Bog by Fernandez *et al*. (2005) in 2003. This activity does not appear to have taken place at the site during the 2005-2010 period, and thus no high bog was calculated as being lost to cutting in the reporting period. However, information from the NPWS indicates that although no cutting took place at the site in 2012, one turf plot was cut in 2010/2011. Information from the NPWS indicates that not cutting took place in 2012-13. The loss of high bog from peat cutting, however, is calculated using GIS techniques on aerial photography from 2004/05 and 2010 and since there is no aerial photography available post 2010, the area lost in 2011 cannot be estimated.

In addition to the recent cutting activity of 2010/2011, old face banks and high bog and cutover drainage associated with past cutting continue causing negative impacts on the high bog habitats. Thus peat cutting is considered to have a medium importance/impact on Degraded Raised Bog and a low importance/impact on Active Raised Bog and Rhynchosporion depressions.

The continuation of these peat cutting will prevent the recovery of the high bog, and the recovery of Active Raised Bog towards FRVs as restoration works cannot be employed until such activities stop. It should also be borne in mind that peat cutting has already had a serious negative impact over a long period at this site, indicated by the fact that ARB covers only a very small area (32.63ha or 27.20% of the high bog) and is 60.08% below the FRV target.

Drainage

High bog drainage

Table 6.2 shows no change on the status of high bog drains (or increase in functional drainage or decrease on functional drainage as a result of blocking of drains). The majority of drains in the high bog remain functional (7.780km), or reduced functional (3.109km). During the 2012 survey water flow was recorded in some of the drains within drainage complex bM as well as in drain bH. Furthermore, the amount of facebank ecotope in the area of drainage complex bP shows that these drains are having a significant impact on the high bog vegetation.

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

No blockage of drains has occurred to date.

Table 6.2 High bog drainage summary

Status	2005 (km) [1]	2012 (km)	Change
NB: functional	7.780	7.780	0.000
NB: reduced functional	3.109	3.109	0.000
NB: non- functional	5.051	5.051	0.000
B: functional	0.000	0.000	0.000
B: reduced functional	0.000	0.000	0.000
B: non- functional	0.000	0.000	0.000

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

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

Table 6.3 below provides a more detail description of the drainage present on the high bog at Ferbane Bog including any change in their functionality in the 2004/5 – 2012 reporting period (see Map 3).

Table 6.3 High bog drainage detail

Drain Name	Length (km)	2004/5 status	2012 status	Change	Comment
bB	0.833	NB: non-functional	NB: non- functional	No	
bB1	0.308	NB: non-functional	NB: non- functional	No	
bC	0.339	NB: functional	NB: functional	No	Southern section wrongly classified as reduced functional in 2005
bC	0.456	NB: non-functional	NB: non- functional	No	
bD	0.347	NB: functional	NB: functional	No	Northern section of bD
bD	0.566	NB: non-functional	NB: non- functional	No	Southern section of bD
bF1	0.493	NB: non-functional	NB: non- functional	No	
bG1	0.284	NB: reduced functional	NB: reduced functional	No	Northern section of bG1 wrongly classified as reduced functional in 2005
bG2	0.165	NB: non-functional	NB: non- functional	No	
bG2	0.191	NB: reduced functional	NB: reduced functional	No	Northern section of bG2
bG3	0.263	NB: reduced functional	NB: reduced functional	No	BG3 consists of two drains (southern section of larger drain non-functional)

bG4	0.063	NB: reduced functional	NB: reduced functional	No	
bH	0.141	NB: functional	NB: functional	No	Eastern section of bH; water flowing recorded during visit
bH	0.288	NB: reduced functional	NB: reduced functional	No	
bH1	0.325	NB: non-functional	NB: non- functional	No	
bH2	0.097	NB: non-functional	NB: non- functional	No	BH2 consists of two drains
bH3	0.278	NB: non-functional	NB: non- functional	No	
bH4	0.047	NB: reduced functional	NB: reduced functional	No	Drain already present in 2005 but not mapped
bJ	0.494	NB: functional	NB: functional	No	
bJ1	0.392	NB: non-functional	NB: non- functional	No	
bK	0.214	NB: functional	NB: functional	No	Eastern section of bK
bK	0.118	NB: reduced functional	NB: reduced functional	No	
bM	0.725	NB: functional	NB: functional	No	Western and eastern sections of bM; water flowing recorded during visit within both sections
bM	0.291	NB: reduced functional	NB: reduced functional	No	Middle section of bM
bM1	3.101	NB: functional	NB: functional	No	Drain complex
bM2	0.718	NB: functional	NB: functional	No	These drains within drain complex bM2 were wrongly classified as reduced functional in 2005
bM2	0.872	NB: non-functional	NB: non- functional	No	
bM2	0.615	NB: reduced functional	NB: reduced functional	No	Section of these drains already present in 2005 but not mapped
bN1	0.249	NB: reduced functional	NB: reduced functional	No	
bN2	0.114	NB: functional	NB: functional	No	Western section of bN2
bN2	0.571	NB: reduced functional	NB: reduced functional	No	
bO	0.152	NB: functional	NB: functional	No	Wrongly mapped as reduced functional in 2005. Described in 2005 as functional (1.0m

					deep with flow to the NNE)
bO	0.129	NB: reduced functional	NB: reduced functional	No	
bP	1.249	NB: functional	NB: functional	No	Many drains within this drain complex already present in 2005 but not mapped
bR	0.186	NB: functional	NB: functional	No	One drain within this drain complex already present in 2005 but not mapped
bS	0.266	NB: non-functional	NB: non- functional	No	

Bog margin drainage

The cutover areas were not surveyed for drains during 2012.

Drains associated with past peat cutting are present along the much of the cutover. These drains continue to drain the high bog and impacting on high bog habitats.

Bog margin drainage is considered to have a high importance/impact on high bog habitats and is likely to be indirectly connected with further subsidence along the northwest section of high bog (**C1**).

Fire history

No fire events have been reported on the high bog in the 2005-2012 reporting period. Neither were there any fire events reported by Fernandez *et al*. (2005) from 1995-2005. Furthermore, although Kelly *et al*. (1995) noted evidence of a fire in the south-east of the site, they also noted that "quite a large area of the bog had lichen cover (>75%) dominated by *Cladonia portentosa* suggesting that the site had not been burnt for some time". Thus it is apparent that there have been no major fire events on the high bog at Ferbane Bog for quite some time.

Invasive species

Several mature *Rhododendron ponticum* bushes were recorded on the north-eastern margin of the high bog by Kelly *et al*., (1995) and Fernandez *et al*. (2005). These do not appear to be spreading significantly.

Campylopus introflexus has also been recorded on the high bog, always associated with more disturbed areas such as within the area of drainage complex bM in the south of the site.

Invasive species are considered to have a low importance/impact on Degraded Raised Bog and Rhynchosporion depressions and no impact on Active Raised Bog.

Problematic native species

Pinus sylvestris trees occur quite frequently, particularly in the northern, southern and eastern margins of the high bog where they are quite dense in places. The presence of pines in these areas was already noted by Kelly *et al*., (1995) and although *Pinus* seedlings and young saplings were recorded during the current survey, they are not frequent. However, *Pinus* did seem to be colonising via drains in the marginal ecotope in the eastern part of the site. Thus although *Pinus* may be spreading on the high bog the rate of spread has not significantly increased since 2005 and no new areas of the high bog have been invaded.

Problematic native species are considered to have medium importance/impact on Degraded Raised Bog and Rhynchosporion depressions and a low importance impact on Active Raised Bog.

Afforestation and forestry management

No forestry plantations are present on or adjacent to the high bog. However, *Betula pubescens* scrub, and *Betula* and *Pinus sylvestris* woodland have developed on cut-away peat to the north and east of the site. *Sphagnum squarrosum* was recorded in a drain at the woodland/high bog edge in the south-east of the site.

Other impacting activities

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

Conservation activities

Although no physical management actions such as the blocking of drains have been carried out to improve the conservation status of the high bog habitats, the NPWS has engaged in negotiation with landowners in relation to the cessation of peat cutting at the site. This has contributed to a reduction in peat cutting.

Conservation status assessment

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

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

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

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

Active Raised Bog (7110)

Area

Table 8.1 indicates that there has been a decrease (4.30ha) in the extent of Active Raised Bog habitat on Ferbane Bog.

The area of central ecotope extent is considered not to have changed in the reporting period and the discrepancy between the 2005 and the 2012 figures is due a more comprehensive surveying and accurate mapping in 2012, as well as the re-interpretation of the vegetation complex 10/9. This complex was described as a sub-central complex in 2005, but the description given at the time ("*Sphagnum* 60-70% composed mostly of lawns of *S. magellanicum*") corresponds to central ecotope (complex 10/15) under current criteria.

The area of sub-central ecotope is considered to have declined by 4.30ha with minor changes along most of the boundary of **Sc1**. Much of these differences can be attributed to being the result of more comprehensive surveying and increased mapping accuracy in 2012. However, there are significant changes to the **Sc1** boundary, resulting in a loss of sub-central ecotope, along its south (loss of

2.30ha), south-west (3.12ha) and northern (3.37ha) boundaries. These areas, totalling 8.79ha, correspond largely with areas mapped as complex 3/10 in 2005. This complex is considered a 'borderline' sub-central complex that contains some sub-marginal characteristics. Thus, since the difference between sub-central and sub-marginal ecotope in these areas is so subtle, it is likely that at least part of the loss of sub-central ecotope can be attributed to vegetation re-interpretation. It is therefore considered that only half (4.4ha) of the loss of sub-central ecotope is real with the other half being attributed to vegetation re-interpretation.

The four small polygons of sub-central mapped outside (to the south-west, south and east) of **Sc1** in 2005 are no longer present. However, all of these were recorded as complex 3/10. Furthermore, two of these polygons had only one sub-central point (the others had only two points) recorded within them and thus should probably not have been mapped as sub-central in 2005. Thus, overall there is insufficient evidence to record the loss of these four small sub-central polygons as a real loss and hence they are attributed to vegetation re-interpretation.

On the other hand there has been a very slight potential increase (0.1ha) in sub-central ecotope in the west of the site, immediately west of **C1**. This may indicate that there has been further subsidence in this area. Although the origin of this subsidence is uncertain, they are likely to be the result of impacts from regional drainage on the cutover to the northwest of the site. Drainage on the adjacent cutover or adjacent agriculture land can be causing subsidence further into the high bog if this drainage takes place near or within gravel substrates. Drainage within this substrate type near the high bog can cause regional changes in water pressure under the bog which lead to the compaction of the bottom of the bog and then further subsidence, which can be even greatest where the peat is deeper. Although subsidence may benefit the expansion of ARB locally, it will also cause further drying out in other sections of the high bog and thus the overall result is negative.

To summarise there has been an overall loss of sub-central ecotope of 4.30ha and this is related to drying out processes that are likely to be caused by the continued presence of functional and reduced functional drains across the high bog (drainage complex bM is located in the south and south-west of the high bog close to where much of the loss of ARB has been recorded). Evidence of this drying out is also supported by the slow spread (often along the drains) of *Pinus* on the high bog. Indeed, it should also be realised that the presence of the *Pinus* is likely to augment these drying out processes.

The favourable reference value (FRV) for Area is considered to be the sum of Active Raised Bog (central and sub-central ecotopes) plus sub-marginal ecotope when the Habitats Directive came into force in 1994 (see table 8.4). Therefore, Active Raised Bog Area FRV is 81.73ha (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 (32.63ha) is 60.08% below the FRV. A current Area value more than 15% below FRV falls into the **Unfavourable Bad** assessment category.

A long term (1995-2012) trend indicates a reduction in the area of Active Raised Bog at the site (9.10ha) (see table 8.1). A more recent and short term trend analysis (7 years; 2005-2012) also indicates a decrease in the area (4.30ha) of Active Raised Bog. Therefore, the habitat Area is given a **Decreasing** trend assessment.

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

Structure & Functions

The FRV for S&Fs is for at least half of the active raised bog area to be made up of central and active flush, i.e. the higher quality wetter vegetation communities. This value is 16.32ha (half of 32.63ha, the current area of Active Raised Bog). The current value is 1.99ha which is 87.81% below the FRV. Therefore S&Fs are given an **Unfavourable Bad** assessment.

Although the long term (1994/5-2012) trend indicates a decrease in the extent of central ecotope, the short term (7 years; 2005-2012) trend indicates that its extent has been stable and therefore the S&Fs are given a **Stable** trend.

Quadrats analysis (**Qc1, Qsc1, Qsc2** and **Qsc3**) indicates the following:

Qc1: There was a slight variation in the quadrat data compared to 2005: This quadrat was previously classified complex 10/15 but was recorded as complex 14 in 2012, this is due to re-interpretation of the data and not due to vegetation change; the total *Sphagnum* cover (76-90%) has not changed from 2005-2012 and overall the quadrats appear very similar. There has been a decrease in the cover of *S. cuspidatum* (from 34-50% in 2005 to 26-33% in 2012) and *S. magellanicum* (from 11-25% in 2005 to 4-10% in 2012), and an increase in the cover of *S. papillosum* (from 11-25% in 2005 to 34-50% in 2012). This may indicate that the area is getting slightly drier. However, these changes may also merely be the result of a discrepancy in the quadrat location (up to 2m) between both year surveys, rather than an actual change. The absence of *S. austinii* in 2012 (it was recorded <4% cover in 2005) may also be due to this possibility. A decrease in the cover of *Rhynchospora alba* was also recorded (11-25% in 2005 to 4-10% in 2012).

Qsc1: There was a moderate variation in the quadrat data compared to 2005: This quadrat was previously classified as complex 3/10 + Cl but was recorded as complex 9/7/10 in 2012, this is due to a discrepancy in quadrat positioning (up to 2m) and not due to vegetation change; Although the total *Sphagnum* cover has increased from 34-50% in 2005 to 51-75% in 2012, its composition remains broadly similar; *S. capillifolium* (11-25% in both years), *S. papillosum*, (11-25% in 2005; 4-10% in 2012), *S. magellanicum* (11-25% in both years) and *S. austinii* (<4% in 2005; 4-10% in 2012); *S. cuspidatum* and *S. fuscum* were both recorded at <4% cover in 2005 and as absent in 2012 while *S. tenellum* was recorded as absent in 2005 and as <4% in 2012. There was a recorded decrease in the cover of *Carex panicea* (11-25% in 2005 to <4% in 2012) and *Cladonia portentosa* (26-33% in 2005 to <4% in 2012) and a recorded increase in the cover of *Calluna vulgaris* (from 11-25% to 51-75%). However, the area around the quadrat was examined and it was considered that these changes (the decrease in the cover of *Carex panicea* and *Cladonia portentosa* and the increase in the cover of *Calluna vulgaris*) were due to differences in quadrat positioning between 2005 and 2012 and not due to changes in the vegetation.

Qsc2: There was a slight variation in the quadrat data compared to 2005 (classified as complex 4/10 in both years): Although the total *Sphagnum* cover has increased from 51-75% in 2005 to 76-90% in 2012, its composition remains broadly similar; *S. capillifolium* (4-10% in both years), *S. papillosum*, (11-25% in both years), *S. magellanicum* (26-33% in 2005; 34-50% in 2012), *S. cuspidatum*, (<4% in both years), and *S. austinii* (<4% in 2005; 4-10% in 2012); *S. fuscum* was recorded at <4% cover in 2005 and as absent in 2012 while *S. tenellum* was recorded as absent in 2005 and as <4% in 2012. An increase in the cover of *Rhynchospora alba* and *Calluna vulgaris* (11-25% in 2005 to 26-33% in 2012) was also recorded. These changes may merely be the result of a discrepancy in the quadrat location (up to 2m) between both year surveys, rather than an actual change.

Qsc3: There was a moderate variation in the quadrat data compared to 2005: This quadrat was previously classified as complex 10/3 but was recorded as complex 9/7 + P in 2012, this is due to a discrepancy in quadrat positioning (up to 2m) and not due to vegetation change; The total *Sphagnum* cover (76-90%) has not changed from 2005 to 2012, and its composition remains broadly similar; *S. capillifolium* (11-25% in both years), *S. papillosum*, (26-33% in both years), *S. magellanicum* (11-25% in 2005; <4% in 2012), *S. cuspidatum* (<4% in 2005; 11-25% in 2012) and *S. austinii* (<4% in 2005; 4-10% in 2012); *S. tenellum* was recorded as absent in 2005 and as 4-10% in 2012. The change in the abundances of *S. magellanicum* and *S. cuspidatum* along with the fact that the pool cover was recorded as 4-10% in 2005 and 26-33% in 2012 suggests that the area is getting wetter. However, the area around the quadrat was examined and it was considered that these changes (were due to differences in quadrat positioning between 2005 and 2012 and not due to changes in the vegetation.

There was also a recorded decrease in the cover of *Carex panicea* (4-10% in 2005 to "absent" in 2012) and *Cladonia portentosa* (26-33% in 2005 to 11-25% in 2012) and a recorded increase in the cover of *Calluna vulgaris* (from 11-25% to 26-33%) and *Narthecium ossifragum* (from <4% to 4-10).

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

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

Future Prospects

There has been a steady decrease in the area of Active Raised Bog on the site from 1994 (when ARB was estimated at 41.73ha), to 2005 (36.93ha estimated) to 2012 (32.63ha). This loss of ARB has largely been from the south-west and the north of the site. Meanwhile, the wettest part of the bog (the central ecotope in lying in a depression in the west-north-west) appears to be stable and the ARB extending to the south-east also appears stable. This suggests that there may be water flow towards these two areas. Impacting activities most notably high bog drainage continue to negatively impact on the habitat, as the decline in habitat area indicates.

The loss of ARB from the south-west of the site may be explained by the existence of drainage complex bM in this area. Water flow was recorded in the central drain within this drainage complex during the 2012 survey and in 1994, Kelly *et al*. (1995) reported that the drain had been recently re-excavated, and that there was "considerable flow" to the south-east in the eastern section of this drain and "considerable flow" to the west-south-west in its western section. The drain has been described as being 0.5m wide and 0.75-1.0m deep. Furthermore, there are ca. 20 drains mapped as drainage complex bM1 running south from the mid to western end of this drain towards the high bog margin. Water flow to the south has been recorded. Thus, these drains are also causing drying out of the bog as evidenced by the wide band of marginal ecotope that is associated with these drains. To prevent further losses of ARB in these areas, it is essential that the drains within drainage complex bM are blocked.

The loss of ARB from the north of the site may also be explained by the existence of functional and reduced functional drains on the high bog. In this case, drains bC and bD have been reported as being 1.5m at their northern extent, and once again the wide band of marginal ecotope in this area is likely to be associated with these drains indicating that they are contributing to the drying out of the high bog in the area.

As can be seen from the above examples, drains on the high bog at Ferbane Bog are having a negative impact on the high bog vegetation and ideally all functional and reduced functional drains on the high bog would be blocked. Apart from drains bM, bC and bD discussed above, other drains worthy of special attention are: drainage complex bP, which occurs in the north-west of the site and has resulted in a wide band of facebank vegetation developing in this area; drainage complex bR in the north of the site, which has also caused a wide band of facebank vegetation to develop; drains bH, bJ and bK in the east of the site where "significant flow" was reported by Kelly *et al*. (1995) and drain bO in the west of the site, which lies within 80m of central ecotope.

The 2012 survey noted the slow spread of *Pinus sylvestris* particularly along drains in the southern, eastern and northern margins. The abundance of pines is likely to be an indication of further drying out of the high bog. However, the spread of pines is not a major problem in Active Raised Bog, where there occurrence largely confined to Degraded Raised Bog.

Habitat **Area** is currently 60.08% below FRV (see table 8.4) and a decreasing trend is expected in the following two reporting periods (12 years). The habitat Area is expected to be more than 15% below FRV. Thus, habitat's **Area Future Prospects** are assessed as **Unfavourable Bad-Decreasing**. Habitat's **S&Fs** are currently 87.81% below FRV (see table 8.4) and a Declining trend is also expected. Therefore the habitat's S&Fs are expected to be more than 25% below FRV in the following two reporting periods. **S&Fs Future Prospects** are assessed as **Unfavourable Bad-Declining**.

The overall habitat's Future Prospects are Unfavourable Bad-Declining (see table 8.5)**.** The blocking of the reduced-functional and functional drains on the high bog is necessary.

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

Table 8.1 Changes in Active Raised Bog area

Active Ecotopes	1994[1]	2005	2005 (amended)	2012	Change (2005-2012)	
	Area (ha)	Area (ha)	Area (ha)	Area (ha)	Area (ha)	%
Central	3.61	1.33	1.99	1.99	0.00	0.00
Sub-central	38.12	43.92	34.94	30.64	(-)4.30	(-)12.31
Total	**41.73**	**45.25**	**36.93**	**32.63**	**(-)4.30**	**(-)11.64**

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

Note: Table 8.1 includes 2004/5 figures and 2004/5 amended figures. The latter shows the ecotope area believed to be present in 2004/5 after surveying improvements in 2012. The comparison between 2004/5 (amended) and 2012 illustrates the actual changes in ecotope area in the 2004/5-2012 period. Any change in ecotope area between the 2004/5 and the 2004/5 (amended) values is due to improvement in mapping accuracy and/or the result of a more comprehensive survey in 2012 (see table 8.2 for further detail).

Table 8.2 Assessment of changes in individual Active Raised Bog areas

Area	Quadrats	Trend	Comment	Quadrats analysis
C1	Qc1	Stable	Slight changes in boundary (slightly larger). This change is the result of more comprehensive surveying in 2012, which resulted in more accurate mapping.	Previously classified as community complex 10/15, but classified as 14 in 2012. The total *Sphagnum* cover has remained stable (76-90%). Changes due to re-interpretation of vegetation and quadrat location.
C2	None	Unknown	This specific area was not surveyed in 2005. This is likely to be the result of more comprehensive surveying in 2012 which resulted in more accurate mapping.	
Sc1	Qsc1, Qsc2, Qsc3	Decreasing	Smaller than mapped in 2005. Actual losses associated with drying out processes. But also changes due to re-interpretation of vegetation.	Qsc1: Previously classified as community complex 3/10 + Cl, but classified as 9/7/10 in 2012. The total *Sphagnum* cover has increased from 34-50% to 51-75%, but the *Sphagnum* composition has remained broadly the same. A decrease recorded in the cover of *Carex panicea* and *Cladonia portentosa* and an increase in *Calluna vulgaris*. Changes due to re-interpretation of vegetation and quadrat location. Qsc2: Complex 4/10: The total *Sphagnum* cover has increased from 51-75% to 76-90%, but the *Sphagnum* composition has remained broadly the same. Changes due to re-interpretation of vegetation and quadrat location. Qsc3: Previously classified as community complex 10/3, but classified as 9/7 + P in 2012. : The total *Sphagnum* cover has remained stable at 76-90% and the *Sphagnum* composition has remained broadly the same although there was an increase in the cover of *S. cuspidatum* and an associated increase in the pool cover. Changes due to re-interpretation of vegetation and quadrat location.

Degraded Raised Bog (7120)

Area

The Degraded Raised Bog FRV for Area is 38.23ha at Ferbane Bog. This value corresponds with the difference between the current high bog area (119.96ha) and the Active Raised Bog FRV (81.73ha) 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 128.43% bigger than FRV and therefore the habitat Area is given an **Unfavourable Bad** assessment (see table 8.4).

Table 8.3, shows a 4.3ha increase in the area of Degraded Raised Bog in the reporting period. However, this increase has occurred at the expense of Active Raised Bog FRV and thus is taken as a negative.

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

Structure & Functions

The FRV for S&Fs is for a maximum 25% of the Degraded Raised Bog area to be made up of marginal and face bank, i.e. the lower quality and drier vegetation communities. This value is 21.83ha (25% of 87.33ha, the current area of Degraded Raised Bog). The current marginal and face bank ecotopes area value (31.51ha) is 44.33% 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.

The un-adjusted area figures for 2005 in table 8.3 show that there was an 8.49ha decrease in marginal 2005 to 2012. However, it is believed that this decrease is as a result of more comprehensive surveying in 2012, which led to some areas that had previously been classified as marginal ecotope being mapped as sub-marginal ecotope in 2012. This has been taken into account in the 2005 (amended) figures in table 8.3. 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 Ferbane 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 Ferbane Bog are assessed as Unfavourable Bad-Stable (see table 8.5).

Future Prospects

No peat cutting took place from 2005 to 2010 and 2012 to 2013 on Ferbane Bog. However, one turf plot was recorded as being actively cut in 2010/11 by the NPWS. Drainage on the high bog continues to damage the habitat and hinder its recovery to FRVs, as well as minimising the chances to convert face bank and marginal ecotope into sub-marginal and/or Active Raised bog.

Nonetheless, despite the fact that no restoration works have taken place on the site, the area of marginal and face bank ecotope has not increased during the reporting period. However, neither has their area decreased and it cannot be expected to do so until restoration works in the form of drain blocking are carried out on the site.

The 2012 survey noted the slow spread of *Pinus sylvestris* along drains particularly towards the northern, eastern and southern. The spread of pines is likely to be an indication of further drying out of the high bog. This together with the fact that further losses in Active Raided Bog are expected associated with further drying out processes caused by drainage, indicates that an increase in the extent and decline in quality of Degraded Raised Bog can be expected in the future. Habitat **Area** is currently 128.43% above FRV (see table 8.4) and an Increasing 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-Increasing**. Habitat's **S&Fs** are currently 44.33% above FRV (see table 8.4). A Declining trend is foreseen in the following two reporting periods, **S&Fs** are expected to remain more than 25% above FRV. Thus, habitat's **S&Fs Future Prospects** are assessed as **Unfavourable Bad-Declining**.

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

Table 8.3 Changes in Degraded Raised Bog area

Inactive Ecotopes	**1994/5[1]**	**2004/5**	**2004/5 (amended)**	**2012**	**Change (2004/5-2012)**	
	Area (ha)	**Area (ha)**	**Area (ha)**	**Area (ha)**	**Area (ha)**	**%**
Sub-marginal	40.00	34.71	51.52	55.82	(+)4.30	(+)8.35
Marginal	38.83	31.53	23.04	23.04	0.00	0.00
Face bank	n/a	8.48	8.47	8.47	0.00	0.00
Total	**78.83**	**74.72**	**83.03**	**87.33**	**(+)4.30**	**(+)5.18**

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

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

Depressions on peat substrates of the Rhynchosporion (7150)

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

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

The Area trend assessment is based on the variation on Active Raised Bog and sub-marginal ecotope within Degraded Raised Bog in the reporting period. The area of Active Raised Bog has slightly decreased in the reporting period. However, the loss of Active Raised Bog was associated with the loss of the sub-central complex 3/10, in which *Rhynchospora alba* was recorded as being largely absent from in 2005. Therefore, the Area and S&Fs of depressions on peat substrates of the Rhynchosporion is likely to be stable or perhaps to have decreased/declined slightly. Nevertheless the combined extent of Active Raised Bog and sub-marginal ecotope has re remained unchanged. 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. Impacting activities such as drainage are threatening Active and Degraded Raised Bog. Logically this has to

have a long term negative effect on Rhynchosporion depressions. Therefore, the habitat's Area Future Prospects are given an **Unfavourable Bad-Decreasing** assessment.

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

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

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

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

Table 8.4 Habitats favourable reference values

Habitat	Area Assessment			Structure & Functions Assessment		
	FRV Target (ha) [1]	2012 value (ha) [2]	% below target	FRV 2012 Target (ha) [3]	2012 value (ha) [4]	% below target
7110	81.73	32.63	60.08	16.32	1.99	87.81

[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	38.23	87.33	128.43	21.83	31.51	44.33

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

[6] 2012 Degraded Raised Bog area.

[7] 25% of the current Degraded Raised Bog habitat area. The target is that the extent of marginal and face bank ecotopes should not be larger than 25% of the current Degraded Raised Bog habitat area.

[8] Current marginal and face bank ecotopes area.

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

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

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

Table 8.5 Habitats conservation status assessments

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

Conclusions

Summary of impacting activities

- Although peat cutting was not recorded on Ferbane Bog from 2005-2010 or in 2012, it was recorded at one plot in 2010/2011. Furthermore, open face banks, particularly in the west and north-west of the site may still continue to drain the high bog.
- 7.8km of drains on the high bog remain functional and a further 3.1km are classed as reduced functional with the most extensive drainage network found in the south and south-west of the high bog with running water noted in some of these drains during the 2012 visit.
- No fire events have damaged the high bog in the reporting period. The last recorded fire was recorded as occurring prior to the 1994 site visit by Kelly *et al*. (1995) as damaging a small area of the south-east of the bog.
- Although the spread of *Pinus sylvestris* is slow, it's abundance on the high bog indicates that the site is drying out.

Changes in active peat forming areas

- There has been a 4.3ha loss in Active Raised Bog, with a 4.4ha loss of sub-central ecotope in the south, south-west and north of **Sc1**. The loss of ARB is likely to have been caused by the continued presence of functional and reduced functional drains across the high bog (drainage complex bM is located in the south and south-west of the high bog close to where much of the loss of ARB has been recorded). On the other hand, there has been a very small (0.1ha) potential increase in sub-central ecotope in the west of the site, which is likely to

have been caused by subsidence. Although the origin of this subsidence is uncertain, they are likely to be the result of impacts from regional drainage on the cutover to the northwest of the site. Drainage on the adjacent cutover or adjacent agriculture land can be causing subsidence further into the high bog if this drainage takes place near or within gravel substrates. Drainage within this substrate type near the high bog can cause regional changes in water pressure under the bog which lead to the compaction of the bottom of the bog and then further subsidence, which can be even greatest where the peat is deeper. Although subsidence may benefit the expansion of ARB locally, it will also cause further drying out in other sections of the high bog and thus the overall result is negative.

Other changes

- The 2012 survey noted the slow spread (often along drains) of *Pinus sylvestris* particularly in the north, south and east of the high bog. However, although *Pinus* seedlings and young saplings were recorded during the current survey, they are not frequent. The spread of pines is likely to be an indication of further drying out of the high bog.

Quadrats analysis

- Quadrat **Qc1**, quadrat was previously classified complex 10/15 but was recorded as complex 14 in 2012, this is due to re-interpretation of the data and not due to vegetation change. No major changes noted.
- **Qsc1**: quadrat was previously classified as complex 3/10 + Cl but was recorded as complex 9/7/10 in 2012. However, no major changes in the *Sphagnum* composition were noted and the decrease recorded in the cover of *Carex panicea* and *Cladonia portentosa* and the increase in the cover of *Calluna vulgaris* was considered to be due to differences in quadrat positioning between 2005 and 2012 and not due to changes in the vegetation.
- **Qsc2**. No major changes noted.
- **Qsc3**: quadrat was previously classified as complex 10/3 but was recorded as complex 9/7 + P in 2012. However, no major changes in the *Sphagnum* composition were noted and the increase recorded in the cover of *S. cuspidatum* and the increase in the cover of pools was considered to be due to differences in quadrat positioning between 2005 and 2012 and not due to changes in the vegetation.

Restoration works

- No restoration works have been undertaken at the site.

Summary of conservation status

- **Active Raised Bog** has been given an **Unfavourable Bad–Declining** conservation status at Ferbane Bog. Habitat Area has slightly decreased while the quality has remained Stable in the reporting period. However both values are below the FRVs. This decrease is associated with high bog drainage. Future Prospects are considered Unfavourable Bad-Declining as impacting activities (drainage and cutting) continue to threaten the habitat.
- **Degraded Raised Bog** has been given an **Unfavourable Bad-Declining** conservation status at Ferbane Bog. Habitat Area has slightly increased due to a decrease in Active Raised Bog. Habitat's S&Fs have remained stable. Habitat Area and S&Fs are below the FRV. Future Prospects are considered Unfavourable Bad – Declining.
- **Depressions on peat substrates of the Rhynchosporion** has been given an **Unfavourable Bad-Declining** conservation status at Ferbane Bog. Habitat Area and quality (S&Fs) are considered to have not changed in the reporting period. However, Future Prospects are considered Unfavourable Bad-Declining as a result of threatening impacting activities.

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

Recommendations

- **Cessation of peat cutting.**
- **Restoration works** including the blocking of high bog reduced-functional and functional drains.
- **Further hydrological and topographical studies** to ascertain the capacity of the high bog to support Active Raised Bog and thus estimate a more accurate favourable reference value.
- **Further botanical monitoring surveys** on the high bog to assess the efficiency of restoration works and to assess the rate of spread of *Pinus sylvestris* on the high bog.

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Appendix I Detailed vegetation description of the high bog

Active Raised Bog (7110)

Central Ecotope Complex

COMPLEX 14

- **Location**: this complex characterizes the centre of **C1**
- **Ground**: quaking
- **Physical indicators**: absent
- ***Calluna* height**: 21-30cm
- ***Cladonia* cover**: <4%
- **Macro-topography**: depression
- **Pools**: 51-75% (34-50% in places)
- ***Sphagnum* cover**: 76-90%
- ***Narthecium* cover**: <4%
- **Micro- topography**: Low hummocks, lawns and pools
- **Tussocks**: *Eriophorum vaginatum* (4-10%)
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (4-10%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (4-10%), *E. angustifolium* (4-10%), *Narthecium ossifragum* (<4%), *Rhynchospora alba* (4-10%), *Drosera anglica* (<4%), *Vaccinium oxycoccos* (<4%), *Sphagnum capillifolium* (H; <4%), *S. papillosum* (L & P; 34-50%), *S. magellanicum* (L & P; 4-10%), *S. cuspidatum* (P; 11-25%).
- **Additional comments**: Although there is a very high *Sphagnum* cover and the area is extremely wet with interconnecting pools that could almost be considered as one very large pool, this is probably not the finest example of this complex as the micro-topography is poorly developed with very few hummocks present and no tall hummocks.

Quadrat **Qc1** was recorded within this complex.

COMPLEX 10/15

- **Location**: this complex characterizes **C1** and the edges of **C2**
- **Ground**: quaking

- **Physical indicators**: absent
- ***Calluna* height**: 21-30cm
- ***Cladonia* cover**: <4%
- **Macro-topography**: depression
- **Pools**: 26-33%
- ***Sphagnum* cover**: 51-75% (76-90% in places)
- ***Narthecium* cover**: <4%
- **Micro- topography**: Low hummocks/hollows, lawns and pools
- **Tussocks**: *Eriophorum vaginatum* (11-25%)
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (11-25%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (11-25%), *E. angustifolium* (4-10%), *Narthecium ossifragum* (<4%), *Rhynchospora alba* (4-10%), *Drosera anglica* (<4%), *Sphagnum capillifolium* (H; 4-10%), *S. papillosum* (L & P; 11-25%), *S. magellanicum* (L & P; 26-33%), *S. cuspidatum* (P; 4-10%).
- **Additional comments**: The area where this complex was recorded was called complex 10/9 (sub-central) in 2005. However, the description of the area then appears to be similar to now and thus this difference is considered to be due to interpretation differences.

Sub-Central Ecotope Complexes

COMPLEX 9/7 + P

- **Location**: this complex dominates southeast section of **Sc1**
- **Ground**: very soft
- **Physical indicators**: absent
- ***Calluna* height**: 11-20cm
- ***Cladonia* cover**: 11-25%
- **Macro-topography**: flat
- **Pools**: 4-10% (higher in places)
- ***Sphagnum* cover**: 34-50% (51-75% in places)
- ***Narthecium* cover**: 4-10%
- **Micro- topography**: Low hummocks/hollows & Pools
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent

- **Species cover**: *Calluna vulgaris* (26-33%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (4-10%), *E. angustifolium* (<4%), *Rhynchospora alba* (4-10%), *Carex panicea* (<4%), *Dicranum scoparium* (<4%), *Aulacomnium palustre* (<4%), *Pleurozium schreberi*, *Hylocomium splendens*, *Menyanthes trifoliata* (<4%), *Drosera anglica* (<4%), *Sphagnum capillifolium* (H; 11-25%), *S. papillosum* (H; 11-25%), *S. magellanicum* (H & L; 4-10%), *S. tenellum* (H; <4%), *S. austinii* (H; <4%), *S. cuspidatum* (P/Hl; 4-10%), *Odontoschisma sphagni* (<4%).
- **Additional comments:** In some areas the pool cover is up to 26-33% but in places the pools appear to be suffering from desiccation and have only a patchy cover of *Sphagnum cuspidatum*. Active hummocks of *S. austinii* are common (4-10% cover in places) within this complex often occurring at the edges of pools. The high cover of *Rhynchospora alba* in some of the pools may indicate that they are drying out.

Quadrat **Qsc3** was recorded within this complex.

COMPLEX 4/10

- **Location**: this complex dominates northern and southern sections of **Sc1**
- **Ground**: soft to very soft
- **Physical indicators**: absent
- ***Calluna* height**: 21-30cm
- ***Cladonia* cover**: 4-10%
- **Macro-topography**: flat
- **Pools**: absent
- ***Sphagnum* cover**: 51-75%
- ***Narthecium* cover**: 4-10%
- **Micro- topography**: Low hummocks/hollows & depressions
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (26-33%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (11-25%), *E. angustifolium* (<4%), *Rhynchospora alba* (11-25%), *Trichophorum germanicum* (<4%), *Dicranum scoparium* (<4%), *Aulacomnium palustre* (<4%), *Polytrichum strictum* (<4%), *Pleurozium schreberi* (<4%), *Menyanthes trifoliata* (<4%), *Drosera anglica* (<4%), *Sphagnum capillifolium* (H; 4-10%), *S. papillosum* (H; 11-25%), *S. magellanicum* (H & L; 34-50%), *S. tenellum* (H; <4%), *S. austinii* (H; 4-10%), *S. cuspidatum* (Hl; <4%), *Odontoschisma sphagni* (<4%).
- **Additional comments:** Although there are no pools present, there are 'pool-like' depressions present dominated by *Rhynchospora alba*, which support *Menyanthes trifoliata*, *Drosera anglica*

and *Sphagnum cuspidatum*. Active hummocks of *S. austinii* are also common (4-10% cover in places) within this complex. There are also some large hummocks present within this complex, which support *Leucobryum glaucum*, *Empetrum nigrum* and *Vaccinium oxycoccos*.

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

COMPLEX 9A/10

- **Location**: northeast of **Sc1**
- **Ground**: soft to very soft
- **Physical indicators**: absent
- ***Calluna* height**: 21-30cm
- ***Cladonia* cover**: <4%
- **Macro-topography**: gentle slope
- **Pools**: absent
- ***Sphagnum* cover**: 51-75%
- ***Narthecium* cover**: 4-10% (<4% in places)
- **Micro- topography**: Low hummocks/hollows & depressions
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (11-25%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (<4%), *E. angustifolium* (34-50%), *Rhynchospora alba* (11-25%), *Trichophorum germanicum* (<4%), *Sphagnum capillifolium* (H; 4-10%), *S. papillosum* (H; 26-33%), *S. magellanicum* (H & L; 11-25%), *S. cuspidatum* (Hl; <4%).
- **Additional comments:** This complex is found in a small wet area in the east of the site between drains bC, bD, bH and bH1.

COMPLEX 9/7/10

- **Location**: this is the most widespread SC community complex within **Sc1**
- **Ground**: soft
- **Physical indicators**: absent
- ***Calluna* height**: 21-30cm
- ***Cladonia* cover**: 4-10%
- **Macro-topography**: gentle slope towards high bog margin
- **Pools**: absent
- ***Sphagnum* cover**: 34-50% (51-75% in places)

- ***Narthecium* cover**: 4-10%
- **Micro- topography**: High & low hummocks/hollows
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (34-50%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (11-25%), *E. angustifolium* (<4%), *Rhynchospora alba* (<4%), *Dicranum scoparium* (<4%), *Vaccinium oxycoccos* (<4%), *Hypnum jutlandicum* (<4%), *Leucobryum glaucum* (<4%), *Sphagnum capillifolium* (H; 11-25%), *S. papillosum* (H; 26-33%), *S. magellanicum* (H & L; <4%), *S. tenellum* (H; <4%), *S. fuscum* (H; <4%), *S. austinii* (H; <4%), *S. cuspidatum* (Hl; <4%).
- **Additional comments:** In some areas where the complex grades into the sub-central complex 9/7 + P there are 'pool-like' depressions present. These have little or no water, but have a good cover of *Sphagnum magellanicum* and a patchy cover of *S. cuspidatum*. These depressions also support *Menyanthes trifoliata* and a higher cover of *Rhynchospora alba* (4-10%).

  In the north-west of Sc1, the cover of *Cladonia portentosa* is 34-50% and the cover of *Carex panicea* is 11-25%.

  This complex also grades into (and forms mosaics with) the sub-marginal complex 9/7/3, with active hummocks of *Sphagnum austinii* being more common in 9/7/10.

Quadrat **Qsc1** was recorded within this complex.

COMPLEX 3/10

- **Location**: this complex is found to the northwest and southeast of **Sc1**
- **Ground**: soft (firm to soft in places)
- **Physical indicators**: absent
- ***Calluna* height**: 21-30cm
- ***Cladonia* cover**: 11-25%
- **Macro-topography**: gentle slope towards high bog margin
- **Pools**: absent
- ***Sphagnum* cover**: 34-50% (26-33% in places)
- ***Narthecium* cover**: 4-10% (11-25% in places)
- **Micro- topography**: High & low hummocks/hollows
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (34-50%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (4-10%), *E. angustifolium* (<4%), *Carex panicea* (11-25%), *Sphagnum capillifolium* (H; 4-10%), *S. papillosum* (H;

11-25%), *S. magellanicum* (H & L; <4%), *S. tenellum* (H; 4-10%), *S. austinii* (H; <4%), *S. cuspidatum* (Hl; <4%).

- **Additional comments:** this is a 'borderline' sub-central complex which has some attributes of sub-marginal ecotope and the differences between it and the sub-marginal complex 9/7/3 are subtle.

Active flushes

- No active flushes recorded at Ferbane Bog.

Degraded Raised Bog (7120)

Sub-Marginal Ecotope Complexes

COMPLEX 9/7

- **Location**: located to the north and south of **Sc1**
- **Ground**: soft
- **Physical indicators**: absent
- ***Calluna* height**: 31-40cm
- ***Cladonia* cover**: 4-10%
- **Macro-topography**: gentle slope
- **Pools**: absent
- ***Sphagnum* cover**: 34-50% (26-33% in places)
- ***Narthecium* cover**: <4%
- **Micro- topography**: High and low hummocks/hollows
- **Tussocks**: *Eriophorum vaginatum* (34-50%)
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (34-50%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (34-50%), *E. angustifolium* (<4%), *Narthecium ossifragum* (<4%), *Carex panicea* (<4%), *Vaccinium oxycoccos* (<4%), *Sphagnum capillifolium* (H; 11-25%), *S. papillosum* (H; 11-25%), *S. tenellum* (H; <4), *S. cuspidatum* (Hl; <4%).
- **Additional comments:** There are some scattered *Pinus* trees present in this area, most of which are <3.0m in height.

COMPLEX 9/7/3

- **Location**: this complex mainly dominates the NW and the SW section of the high bog
- **Ground**: firm (to soft in places)
- **Physical indicators**: absent
- ***Calluna* height**: 31-40cm
- ***Cladonia* cover**: 34-50%
- **Macro-topography**: flat
- **Pools**: absent
- ***Sphagnum* cover**: 11-25% (26-33% in places)
- ***Narthecium* cover**: 4-10%
- **Micro- topography**: Low hummocks/hollows and flats
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (34-50%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (4-10%), *E. angustifolium* (<4%), *Narthecium ossifragum* (4-10%), *Carex panicea* (11-25%), *Rhynchospora alba* (<4%), *Trichophorum germanicum* (<4%), *Vaccinium oxycoccos* (<4%), *Leucobryum glaucum* (<4%), *Sphagnum capillifolium* (H; 4-10%), *S. papillosum* (H; 4-10%), *S. tenellum* (H; <4%), *S. subnitens* (H; <4%), *S. cuspidatum* (Hl; <4%).
- **Additional comments:** The cover of *Narthecium ossifragum* is higher (11-25%) in places and thus the complex becomes complex 9/7/6.

  Although not mapped, small patches of this complex occur immediately east of **C1**. Here the ground is relatively firm underfoot and the cover of *Carex panicea* and *Cladonia portentosa* is high so that it could be called **9/7/3+Cladonia**. The cover of *Sphagnum* in this area is ca. 20-25%.

  Some of the area within the complex of active drains in south west (bm complex) is sub-marginal 9/7/3 – unlike 2005 map which has marginal ecotope mapped here. The habitat around the drains is probably generally drier than the area to north of drains (also 9/7/3), but is still characterised by *Eriophorum vaginatum, Carex panicea, Calluna vulgaris* and *Sphagnum* (which has a cover of c. 20%). South of the marginal/sub-marginal boundary in this area there is an extensive cover of *Pinus* – some up to c. 8m in height.

COMPLEX 6/3

- **Location**: this complex is found to the west of **C1** and southeast of **Sc1**
- **Ground**: firm to soft
- **Physical indicators**: absent
- ***Calluna* height**: 21-30cm

- ***Cladonia* cover**: 11-25%
- **Macro-topography**: gentle slope
- **Pools**: absent
- ***Sphagnum* cover**: 11-25% (26-33% in places)
- ***Narthecium* cover**: 11-25%
- **Micro- topography**: Low hummocks/hollows and flats
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (34-50%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (4-10%), *E. angustifolium* (<4%), *Narthecium ossifragum* (11-25%), *Carex panicea* (11-25%), *Rhynchospora alba* (<4%), *Trichophorum germanicum* (<4%), *Sphagnum capillifolium* (H; 4-10%), *S. papillosum* (H; 11-25%), *S. tenellum* (H; <4%), *S. austinii* (H; <4%).
- **Additional comments:** In the south of the site there are areas where the cover of *Eriophorum vaginatum* increases so that the complex could be called 6/3/9. However, it is not consistently high so the complex is also termed 6/3 here.

Marginal Ecotope Complexes

COMPLEX 6/7

- **Location**: east of the site
- **Ground**: firm
- **Physical indicators**: no bare peat or burning in the description area, but some bare peat and erosion channels elsewhere in the complex
- ***Calluna* height**: 41-50cm
- ***Cladonia* cover**: <4%
- **Macro-topography**: gentle to steep slope
- **Pools**: absent
- ***Sphagnum* cover**: 4-10%
- ***Narthecium* cover**: 34-50%
- **Micro- topography**: high and low hummocks and flats
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent

- **Species cover**: *Calluna vulgaris* (34-50%), *Erica tetralix* (4-10%), *Eriophorum vaginatum* (<4%), *E. angustifolium* (<4%), *Narthecium ossifragum* (34-50%), *Pinus* (4-10%), *Sphagnum capillifolium* (H; 4-10%), *S. tenellum* (H; <4%).
- **Additional comments**: none.

COMPLEX 3/7

- **Location**: northwest of the site (west of drain bB)
- **Ground**: firm
- **Physical indicators**: absent
- ***Calluna* height**: 41-50cm
- ***Cladonia* cover**: 26-33%
- **Macro-topography**: gentle slope to margin
- **Pools**: absent
- ***Sphagnum* cover**: 4-10%
- ***Narthecium* cover**: <4%
- **Micro- topography**: low hummocks and flats
- **Tussocks**: *Eriophorum vaginatum* (4-10%)
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (34-50%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (4-10%), *E. angustifolium* (<4%), *Narthecium ossifragum* (<4%), *Sphagnum capillifolium* (H; <4%), *S. papillosum* (H; <4%), *S. magellanicum* (H; <4%), *S. austinii* (H; <4%).
- **Additional comments**: none.

COMPLEX 3/6

- **Location**: northeast of the site
- **Ground**: firm
- **Physical indicators**: no bare peat or burning in the description area, but some bare peat and erosion channels elsewhere in the complex
- ***Calluna* height**: 41-50cm
- ***Cladonia* cover**: 11-25%
- **Macro-topography**: gentle slope
- **Pools**: Tear Pools (<4%) particularly in the NE of the site
- ***Sphagnum* cover**: <4%
- ***Narthecium* cover**: 11-25%

- **Micro- topography**: high and low hummocks and flats
- **Tussocks**: *Trichophorum germanicum* (1-4%); *Eriophorum vaginatum* (1-4%).
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (34-50%), *Erica tetralix* (4-10%), *Eriophorum vaginatum* (<4%), *E. angustifolium* (<4%), *Narthecium ossifragum* (11-25%), *Carex panicea* (11-25%), *Sphagnum capillifolium* (H; <4%), *S. tenellum* (H; <4%).
- **Additional comments**: *Pinus* is invading the east side of the site from the adjacent wood/plantation – particularly spreading along drains.

COMPLEX 7/2

- **Location**: this complex is found along the western and southern boundary of the site
- **Ground**: firm
- **Physical indicators**: no bare peat or burning in the description area, but some bare peat and erosion channels elsewhere in the complex
- ***Calluna* height**: 41-50cm
- ***Cladonia* cover**: 11-25%
- **Macro-topography**: steep slope
- **Pools**: absent
- ***Sphagnum* cover**: <4%
- ***Narthecium* cover**: 4-10%
- **Micro- topography**: low hummocks/occasional high hummocks
- **Tussocks**: *Trichophorum germanicum* (4-10%)
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (51-75%), *Erica tetralix* (4-10%), *Eriophorum vaginatum* (4-10%), *E. angustifolium* (<4%), *Narthecium ossifragum* (4-10%), *Carex panicea* (4-10%), *Trichophorum germanicum* (4-10%), *Sphagnum capillifolium* (H; <4%), *S. tenellum* (H; <4%).
- **Additional comments**: none.

Inactive flushes

No inactive flushes recorded at Ferbane Bog.

Face bank Complexes

COMPLEX 1

- **Location**: this complex was found along the bog margin
- **Ground**: firm
- **Physical indicators**: bare peat (4-10%)
- ***Calluna* height**: <50cm
- ***Cladonia* cover**: <4%
- **Macro-topography**: steep slope
- **Pools**: absent
- ***Sphagnum* cover**: generally absent but <4% in places
- ***Narthecium* cover**: <4%
- **Micro- topography:** tall robust *Calluna vulgaris*/low hummocks
- **Tussocks:** *Trichophorum germanicum* (<4%)
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (76-90%), *Erica tetralix* (4-10%), *Trichophorum germanicum* (<1%), *Narthecium ossifragum* (<4%), *Andromeda polifolia* (<1%), *Sphagnum capillifolium* (H; <1%), *S. tenellum* (H; <1%), *S. subnitens* (H; <1%), *Hypnum jutlandicum* (<4%).
- **Additional comments**: none.

Depressions on peat substrates of the Rhynchosporion (7150)

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

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

The species becomes most frequent within complexes 4/10 (sub-central); 14 and 10/15 (central) and 9/7 + P (sub-central).

The Rhynchosporion vegetation occurred within *Sphagnum* hollows and along *Sphagnum* pool edges and in lawns. Typical plant species included *Rhynchospora alba*, *Sphagnum cuspidatum, S. papillosum, S. magellanicum, S. papillosum*, *Drosera anglica* and *Eriophorum angustifolium*.

Appendix II Photographical records

Photograph Number	Aspect	Type	Feature	Date
DSCF3576	NE	Overview	Qsc3	11/09/2012
DSCF3577	NE	Overview	Qsc2	11/09/2012
DSCF3578	NE	Overview	Qc1	11/09/2012
DSCF3581	NE	Overview	Qsc1	12/09/2012

Appendix III Quadrats

Ecotope type	**Central**	**Central**	**Sub-central**	**Sub-central**
Complex Name	**10/15**	**14**	**3/10 + Cl**	**9/7/10**
Quadrat Name	Qc1	Qc1	Qsc1	Qsc1
Easting	210666	210671.03	211165	211164.72
Northing	226134	226133.40	226128	226127.15
Date	15/03/05	11/09/2012	15/03/05	12/09/2012
Firmness	very soft	Quaking	very soft	Soft
Burnt	No	No	No	No
Algae in hollows %	Absent	Absent	Absent	Absent
Algae in pools %	Absent	Absent	Absent	Absent
Bare peat %	Absent	Absent	Absent	Absent
High hummocks %	Na	Absent	na	26-33
Low hummocks %	11-25	26-33	34-50	51-75
Hollows %	1-3 (many indiv)	Absent	1-3 (many indiv)	4-10
Lawns %	34-50	26-33	Absent	Absent
Pools %	4-10	26-33	Absent	Absent
Pool type	Na	Interconnecting	Absent	Absent
S.austinii hum type	Na	Absent	na	Active
S.austinii hum %	1-3 (many indiv)	Absent	1-3 (many indiv)	4-10
S.austinii height(cm)	Na	Absent	na	21-30
S.fuscum hum type	Na	Absent	na	Absent
S.fuscum hum %	Absent	Absent	1-3 (many indiv	Absent
S.fuscum height(cm)	Na	Absent	na	Absent
Leucobryum glaucum	Absent	Absent	Absent	Absent
Trichophorum type	Absent	Flats	Tussocks	Absent
Trichophorum %	Absent	1-3 (several indiv)	4-10	Absent
S.magellanicum %	11-25	4-10	11-25	11-25
S.cuspidatum %	34-50	26-33	1-3 (many indiv)	Absent
S.papillosum %	11-25	34-50	11-25	4-10
S.denticulatum %	Absent	Absent	Absent	Absent
S.capillifolium%	4-10	4-10	11-25	11-25
S.tenellum %	Na	Absent	na	1-3 (many indiv)

Ecotope type	**Central**	**Central**	**Sub-central**	**Sub-central**
Complex Name	**10/15**	**14**	**3/10 + Cl**	**9/7/10**
S.subnitens %	Absent	Absent	Absent	Absent
R.fusca %	Absent	Absent	Absent	Absent
R.alba %	11-25	4-10	Absent	1-3 (many indiv)
N.ossifragum %	1-3 (many indiv)	1-3 (many indiv)	1-3 (many indiv)	1-3 (few indiv)
Sphag pools %	4-10	26-33	Absent	Absent
Dominant pool Sphag	S.cuspidatum	S.cuspidatum	S.cuspidatum	
Sphag lawns %	34-50	26-33	Absent	Absent
Sphag humm %	11-25	26-33	34-50	34-50
Sphag holl %	1-3 (many indiv)	Absent	1-3 (many indiv)	4-10
Total Sphag %	76-90	76-90	34-50	51-75
Hummocks indicators	S.austinii	Absent	S.austinii & S.fuscum	S.imbricatum
Cladonia portent %	4-10	1-3 (many indiv)	26-33	1-3 (many indiv)
Other Cladonia sp	Na		na	Clad uncialis
C. panicea %	Na	Absent	11-25	1-3 (many indiv)
Calluna cover %	4-10	4-10	Nov-25	51-75
Calluna height(cm)	11-20	11-20	21-30	31-40
Other NotableSpecies		Drosera anglica, Vaccinium oxycoccos.		Vaccinium oxycoccos
Other comment		Re-classification of complex due to re-interpretation of data		Quadrat differences due to location. Surrounding vegetation similar to 2005 description.

Ecotope type	**Sub-central**	**Sub-central**	**Sub-central**	**Sub-central**
Complex Name	**4/10**	**4/10**	**10/3**	**9/7+P**
Quadrat Name	Qsc2	Qsc2	Qsc3	Qsc3
Easting	210996	210993.95	210981	210985.85
Northing	225986	225987.77	225805	225806.11
Date	15/03/05	11/09/2012	15/03/05	11/09/2012
Firmness	soft	Very soft	very soft	Very soft
Burnt	No	No	No	No
Algae in hollows %	Absent	Absent	Absent	Absent

Ecotope type	**Sub-central**	**Sub-central**	**Sub-central**	**Sub-central**
Complex Name	**4/10**	**4/10**	**10/3**	**9/7+P**
Algae in pools %	Absent	Absent	Absent	Absent
Bare peat %	Absent	1-3 (many indiv)	1-3 (many indiv)	Absent
High hummocks %	Na	4-10	na	11-25
Low hummocks %	26-33	34-50	34-50	34-50
Hollows %	1-3 (many indiv)	4-10	1-3 (many indiv)	Absent
Lawns %	Absent	34-50	Absent	Absent
Pools %	Absent	Absent	4-10	26-33
Pool type	Absent	Absent	Regular	Regular
S.austinii hum type	Na	Active	na	Active
S.austinii hum %	1-3 (many indiv)	4-10	1-3 (many indiv)	4-10
S.austinii height(cm)	Na	21-30	na	11-20
S.fuscum hum type	Na	Absent	na	Absent
S.fuscum hum %	1-3 (many indiv	Absent	Absent	Absent
S.fuscum height(cm)	Na	Absent	na	Absent
Leucobryum glaucum	Absent	Absent	Absent	Absent
Trichophorum type	Absent	Absent	Absent	Flats
Trichophorum %	Absent	Absent	Absent	1-3 (few indiv)
S.magellanicum %	26-33	34-50	11-25	1-3 (many indiv)
S.cuspidatum %	1-3 (many indiv)	1-3 (many indiv)	1-3 (many indiv)	11-25
S.papillosum %	11-25	11-25	26-33	26-33
S.denticulatum %	Absent	Absent	Absent	Absent
S.capillifolium%	4-10	4-10	11-25	11-25
S.tenellum %	Na	1-3 (many indiv)	na	4-10
S.subnitens %	Absent	Absent	na	Absent
R.fusca %	Absent	Absent	Absent	Absent
R.alba %	11-25	26-33	4-10	4-10
N.ossifragum %	1-3 (many indiv)	1-3 (many indiv)	1-3 (many indiv)	4-10
Sphag pools %	Absent	Absent	4-10	26-33
Dominant pool Sphag	S.cuspidatum		S.cuspidatum	S.papillosum
Sphag lawns %	Absent	34-50	Absent	Absent
Sphag humm %	26-33	34-50	34-50	Absent
Sphag holl %	1-3 (many indiv)	Absent	1-3 (many indiv)	Absent
Total Sphag %	51-75	76-90	76-90	76-90
Hummocks indicators	S.austinii & S.fuscum	S.imbricatum	S.austinii	S.imbricatum

Ecotope type	**Sub-central**	**Sub-central**	**Sub-central**	**Sub-central**
Complex Name	**4/10**	**4/10**	**10/3**	**9/7+P**
Cladonia portent %	4-10	4-10	26-33	11-25
Other Cladonia sp	Na	C.sp1 (collected)	na	
C. panicea %	Na	Absent	4-10	Absent
Calluna cover %	11-25	26-33	11-25	26-33
Calluna height(cm)	11-20	21-30	21-30	31-40
Other Notable Species	Aulacomnium palustre & Polytrichum alpestre	Menyanthes trifoliata; Aulacomnium palustre; Dicranum scoparium; Pleurozium schreberi		Drosera anglica; Menyanthes trifoliata
Other comment		similar to 2005 quadrat.		Quadrat differences due to location. Surrounding vegetation similar to 2005 description.

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

Appendix IV Survey maps

209900.000000 210800.000000 211700.000000

226400.000000 225800.000000 225200.000000

Qc1 C1 C2 Qsc1 Qsc2 Sc1 Qsc3

Cage's Br.

Raised Bog Monitoring & Assessment Survey 2013

Map 1: Ecotopes Map and Quadrats

Ecology and Environmental Consultants Ireland Ltd.

Ferbane SAC (000575)
Co. Offaly

1:6,500

N

0 80 160 320 480 640 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

209900 000000 | 210800 000000 | 211700 000000

226400 000000 | 225800 000000 | 225200 000000

Raised Bog Monitoring & Assessment Survey 2013

Map 2: Vegetation community complexes

Ecology and Environmental Consultants Ireland Ltd.

Ferbane SAC (000575)
Co. Offaly

1:6,500

N

0 90 180 360 540 720 Meters

Legend

Ecotope type

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

Boundary type

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

Raised Bog Monitoring & Assessment Survey 2013

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

Ecology and Environmental Consultants Ireland Ltd.

Ferbane SAC (000575)
Co. Offaly

1:6,500

N

0 87.5 175 350 525 700 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