Cloonshanville Bog (SAC 000614), Co. Roscommon

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 Cloonshanville 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, Bog Woodland, Degraded Raised Bog and Depressions on peat substrates of the Rhynchosporion.

Active Raised Bog, including Bog Woodland, covers 20.11 ha (13.74%) of the high bog area. A small area of central ecotope is found in the northwest corner of the site. Sub-central ecotope of somewhat lower quality is more widespread across the bog. The most notable actively peat-forming feature of the site is an extensive active flush that bisects the high bog.

Degraded Raised Bog covers 126.23 ha (86.26%) of the high bog area. It is drier than Active Raised Bog and supports a lower abundance of *Sphagnum* mosses. It has a less developed micro-topography, while permanent pools and *Sphagnum* lawns are generally absent. Part of the central flush on the high bog is inactive and contains a deep central channel through which water flows to a former fen east 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. The habitat was widespread in certain sub-central ecotope areas, especially in the northwest of the site and near the central flush.

Cloonshanville Bog features two small areas of birch dominated Bog Woodland that cover a total of 2.17 ha and that are associated with the central flush. The smaller, more northern section of Bog Woodland is lower in stature, but both woodlands are very wet, with high cover of *Sphagnum*, including *S. fimbriatum* and *S. squarrosum*.

Restoration works took place at the site in 2005-2007 under Coillte's LIFE-funded raised bog restoration project. These works included felling two plantations on the high bog and another

plantation on adjoining fen. One drain was blocked on the high bog, but other reduced functional and non-functional drains were not; drains in the adjacent fen were also not blocked due to uncertainties regarding hydrology. These restoration works have led to the restoration of Active Raised Bog in two areas adjacent to the felled plantations.

The current conservation objective for Cloonshanville Bog is to restore the area of Active Raised Bog and Bog Woodland 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 Bog Woodland is 2.17ha while that for Active Raised Bog is 98.63 ha (which includes the area of Bog Woodland). The objective in relation to Structure and Functions (S&Fs) is that at least half of the Active Raised Bog area should be made up of the central ecotope and active flush (i.e. the wetter vegetation communities). These values have been set as Favourable Reference Values or FRVs until more site specific values can be set based on hydrological and topographical studies. The objective for Degraded Raised Bog is for the sub-marginal area to be restored to active peat forming communities as stated above and that no loss or degradation of any kind occurs. Although FRVs could not be established for the Rhynchosporion depressions, the objectives are to increase its extent and to improve its quality to values associated with a favourable conservation status of Active Raised Bog. Therefore, the habitat's objectives are indirectly associated with Active Raised Bog objectives.

There has been a slight decrease in the area of Active Raised Bog (0.07 ha) at Cloonshanville Bog in the 2004 to 2012 period. There have been greater changes in the distribution of Active Raised Bog across the site. Two areas of Active Raised Bog in the western part of the site totalling 0.74 ha have become Degraded Raised Bog in the 2004-2012 period. The reason for these declines is unclear. As noted above, two new areas of Active Raised Bog totalling 0.67 ha have developed on formerly Degraded Raised Bog as a result of restoration works. Several changes to boundaries of central and sub- central ecotope areas and active flushes are as a result of more comprehensive survey, increased mapping accuracy and/or different interpretations of the vegetation in 2012. The area of Bog Woodland at Cloonshanville Bog in 2012 was 2.17 ha.

Drainage within the high bog, on the cutover margins of the bog and in the wider region are judged to be the most threatening current activities at the site. A total of 1.5 km of drains on the high bog remain functional and 2.9 km are reduced functional. Kelly *et al.* (1995) suggested that arterial drainage and river dredging may be impacting on high bog hydrology at Cloonshanville Bog; if so, it is likely that this is still an impacting factor. No fire events have affected the bog in the

reporting period. Only 0.03 ha of high bog has been estimated to have been lost in the reporting period due to peat cutting; peat cutting did not take place at the site in 2012.

Active Raised Bog has been given an overall **Unfavourable Bad–Declining** conservation status assessment. Habitat Area has slightly decreased and quality has remained unchanged in the reporting period. Current area value is below favourable reference values, and S&Fs are below favourable reference values. Future Prospects are considered Unfavourable Bad-Stable as increases in Active Raised Bog due to restoration works are likely to remain counterbalanced by losses for the foreseeable future.

Bog Woodland has been given a **Favourable-Stable** assessment.

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

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

A series of **recommendations** have been also given, these include: ensure cessation of peat cutting; ongoing monitoring and management of existing restoration works; further restoration works, including drain blocking on the high bog and perhaps adjacent cutover; further hydrological and topographical studies to ascertain more accurate FRVs, to understand the hydrological relationships with the adjoining fen and to assess impacts of regional drainage; and further botanical monitoring surveys.

Site identification

SAC Site Code	000614	**6" Sheet:**	RN15
Grid Reference:	E 175000 / N 291000	**1:50,000 Sheet:**	33
High Bog area (ha):	146.34 [1]		
Dates of Visit:	04 to 06/09/12		
Townlands:	Cloonshanville and Sheevannan		

[1] The current extent of the high bog is 146.34ha, while that reported in 2004 was 146.68ha (Fernandez *et al*., 2005). This discrepancy is partially the result of more accurate mapping of the high bog edge by using the higher resolution 2010 aerial images compared to those used in 2004. High bog area has also decreased in the 2004/05-2010 period due to peat cutting. The actual high bog extent in 2004 was 146.37ha (see tables 8.1 and 8.3 2004 (amended) figures).

Site location

Cloonshanville Bog is located approximately 0.5km to the east of Frenchpark, Co. Roscommon. The River Breedoge runs just to the east of the site and the road between Frenchpark and Brackloon crossroads runs by the south. The site may be accessed from this road. There is a small car park on this road that provides easy access to the CoillteLIFE project boardwalk and felled conifer plantation (**CFA**). Kelly *et al.* (1995) grouped Cloonshanville Bog with the raised bogs of NE Galway/NW Roscommon. It lies approximately 2km to the south-west of Bella Bridge Bog (NHA 591), 5km to the south-west of Tullaghan Bog (NHA 1652), 3km to the south of Cornaveagh Bog (NHA 603) and 4km to the north-east of Bellanagare Bog (SAC 592).

Description of the survey

The survey was carried out in September 2012 and involved a vegetation survey of the high bog at Cloonshanville Bog and the recording of impacting activities affecting high bog vegetation. A similar survey was carried out in 2004 by Fernandez *et al*. (2005). High bog vegetation was described and mapped, based on raised bog ecotope vegetation community complexes developed by Kelly and Schouten (2002). Detailed notes were taken on each community complex and any flushed areas that were present. These included: species lists; estimation of % cover of dominant species; percentage *Sphagnum* cover; evidence of damage (due to burning, peat cutting or drainage);

micro-topography; ground firmness; and presence of *Cladonia* species. A list of photographical records is given in Appendix II. The survey aimed to assess the conservation status of Habitats Directive (Council Directive 92/43/EEC) Annex I habitats on the high bog.

The entire high bog of Cloonshanville 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, particularly Bog Woodland quadrats (see Appendix III). The size of quadrats was 4m x 4m for Active Raised Bog and 20 x 20m for Bog Woodland.

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

Cloonshanville Bog has been classified as a Western Raised Bog (Cross, 1990) and geomorphically as a Ridge River Bog (Kelly *et al*., 1995). The high bog is broadly rectangular in shape with a small extra lobe in the south-east, separated from the main lobe of the bog by a drain and a track. To the east the bog still lies close to its original boundary, the River Breedoge. An area of calcareous fen (called Carragnabraher on Ordnance Survey six-inch maps), which occupies the site of a former lake adds to the overall ecological interest of the site as such fen areas are rarely encountered in association with raised bog systems (Kelly *et al.*, 1995; Conaghan & Heery, 2003). This fen was partially planted with *Pinus contorta*, which has been since felled to waste by Coillte as part of a raised bog restoration project (Derwin, 2008).

Ecological Information

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

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

- Active Raised Bog (EU code 7110),
- Degraded Raised Bog (EU code 7120),
- Bog Woodland (EU code 91D0) and
- Depressions on peat substrates of the Rhynchosporion (EU code 7150).

Active Raised Bog (7110)

The current area of Active Raised Bog at Cloonshanville Bog is 20.11 ha (13.74% of the high bog), which is a decrease of 8.18 ha since 1994.

Active Raised Bog includes central ecotope, sub-central ecotope, active flushes and Bog Woodland.

Central ecotope was found at one location (**C1**, see Appendix IV, Map 1). One community complex type, complex 14, was recorded there. Interconnecting pools comprised 34 to 50% of the area, and total *Sphagnum* cover ranged from 51 to 75%. *Sphagnum cuspidatum* dominated the pools, with *S. denticulatum* very rarely also present. *S. papillosum* and *S. pulchrum* lawns fringed the pools, above which rose low hummocks of *S. capillifolium* and *S. austinii*. The oceanic species *Pleurozia purpurea* and *Racomitrium lanuginosum* were present. *Calluna vulgaris* and *Eriophorum vaginatum* were the most abundant vascular plants. Water appeared to flow through the complex towards the southwest in the direction of a steep face bank.

Sub-central ecotope was found at thirteen locations, mapped as **Sc1** to **Sc15**, allowing for changes from ecotope areas mapped in 2004 (see Appendix IV, Map 1). Five main community complex types were recorded. Complex 9/7+P was widespread and dominated **Sc3**, **Sc8**, **Sc12** and **Sc6**. It was characterised by 34 to 50% cover of regular pools dominated by *Sphagnum cuspidatum* with some *Eriophorum angustifolium* interspersed with hummocks of *S. capillifolium* occupied by *Calluna vulgaris* and *E. vaginatum*. In large parts of **Sc6** and **Sc15**, a poorer-quality variant with higher cover of *Narthecium ossifragum* was mapped as 9/7/6+P. Complex 10/4 was the dominant complex type in **Sc1**, **Sc4, Sc5, Sc11** and the eastern parts of **Sc8** and **Sc15**. Pools in this complex were very small and infrequent, but *Sphagnum* cover reached 51 to 75%. Hummocks of *Calluna*, *Sphagnum austinii*, *S. fuscum, S. capillifolium* and *Hylocomium splendens* were interspersed with lawns of *S. pulchrum* and *S. papillosum*. Near flush **FY**, western and flush species, such as *Schoenus nigricans* and *Molinia caerulea*

were present. **Sc4** was a poorer variant of this type. Complex 10/6 was found in **Sc9** and **Sc10** in the southeast lobe of the site. This complex was characterised by low hummocks of *Sphagnum capillifolium*, and more rarely *S. austinii* and *S. fuscum,* interspersed with *S. cuspidatum* in hollows and occasional small pools. Lawns of *S. papillosum* were frequent and the oceanic species *Pleurozia purpurea* and *Racomitrium lanuginosum* were occasional. *Narthecium ossifragum* and *Calluna vulgaris* were the most abundant vascular plants. In these areas, water flowed to the west towards a double drain and track. Two newly regenerating areas adjacent to clearfelled plantations, **Sc13** and **Sc14,** consisted of complex 9/10. Pools were rare in this complex, which was characterised by vigorous new growth of *Sphagnum*. In **Sc13**, the main species were *S. capillifolium, S. papillosum* and *S. magellanicum*; in **Sc14**, the majority of *Sphagnum* cover comprised *S. papillosum, S. magellanicum* and *S. pulchrum*. Otherwise, *Calluna vulgaris, Eriophorum vaginatum* and *E. angustifolium* were the most characteristic species. Complex 9/7/10 was very rare and occurred in **Sc3**.

A large central flush with several arms bisects the site. The section north of the main area of bog woodland (**BW1**) was active and was mapped as flush **FY1**. It was characterised by abundant *Molinia caerulea* with hummocks of *Sphagnum capillifolium* interspersed with *S. fallax*. Scattered birch (*Betula pubescens*) saplings were present with overall cover of 4 to 10%. West of **BW1** was a quaking mat of *S. palustre* that graded into a *Sphagnum cuspidatum* pool. Arms of the flush mapped as **FY2** and **FY4** were also active. These included a flush type dominated by *Sphagnum* with *S. fallax* and *S. palustre* under tall, abundant *Calluna* and *Myrica gale*. This graded into a *Molina caerulea* dominated community with *Menyanthes trifoliata, Comarum palustre, Succisa pratensis* and *Myrica gale* on quaking peat.

Bog Woodland although considered to be part of the Active Raised Bog is described separately below.

Degraded Raised Bog (7120)

The current area of Degraded Raised Bog at Cloonshanville Bog is 126.23 ha (86.26% of the high bog).

Degraded Raised Bog includes the sub-marginal and marginal ecotopes, as well as inactive flushes. 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. The most widespread sub-marginal community complex found across the entire high bog was complex 9/7. Microtopography was dominated by low hummocks and hollows; pools were absent.

Eriophorum vaginatum was dominant at 26 to 33% cover, with *Calluna* the second most abundant species. *Sphagnum* cover ranged from 11 to 25% and mainly comprised *S. capillifolium*. Near flushes, a variant with *Myrica gale* was mapped as 9/7+My. A similar but much wetter sub-marginal complex was 9a/7. *Eriophorum angustifolium* rather than *E. vaginatum* was the dominant species, and *S. magellanicum* was the most abundant *Sphagnum*. Near sub-central areas and often associated with sub-central complex 10/6 was sub-marginal complex 6/3/9a. Pools and sometimes tear pools were occasional in this complex, which was characterised mainly by *Calluna* and *Carex panicea* with *Eriophorum angustifolium* and *Narthecium ossifragum* also frequent. Low hummocks of *Sphagnum austinii*, *S. papillosum* and *S. capillifolium* were present.

Marginal ecotope formed narrow bands around parts of the high bog edge and was widest along the north and the southeastern edge. Complex 3/6/7 was the most common. Typically found on relatively steep slopes, *Calluna* and *Carex panicea* were the most abundant species, usually also with frequent *Narthecium ossifragum*, although this varied across the site. Also frequent was a complex with tall heather and very high *Cladonia portentosa* cover that was described as 7+Cl.

There was no face bank ecotope recorded at Cloonshanville Bog.

The central flush running through the site was inactive (flush **FY**) south of the main body of bog woodland (**Bw1**). Tall, leggy *Calluna* and *Eriophorum vaginatum* dominated the vegetation, which also included the characteristic species *Myrica gale* and *Phragmites australis*. Some parts of the flush were characterised by *Molinia* rather than *Phragmites*. *Sphagnum fallax* was sometimes present in the flush. A deep channel with flowing water and flanked by shrubby *Salix cinerea* ssp. *oleifolia* and young *Betula pubescens* formed the centre of the flush. Flush **FX** was located on the edge of the site, southwest of **Sc6**. *Molinia* and *Calluna* dominated this flush.

Depressions on peat substrates of the Rhynchosporion (7150)

Rhynchosporion vegetation is widespread on Cloonshanville 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. Typical plant species include *Rhynchospora alba*, *Sphagnum cuspidatum, S. papillosum*, *Drosera anglica* and *Narthecium ossifragum*.

R. alba was also found within degraded raised bog, but always associated with wet features such as hollows, water seepage zones and relict pools.

Bog Woodland

Bog Woodland is found at two locations on the high bog at Cloonshanville Bog (**Bw1** and **Bw2**) and it covers 2.17 ha.

The main section of bog woodland (**Bw1**) was dominated by *Betula pubescens* with some *Salix cinerea* ssp. *oleifolia*, *S. aurita* and the hybrid *S.* ×*multinervis*. Canopy height at the centre ranged from 10-12 m, and the woodland includes some large, mature individual birch. The area of tall woodland was narrow in places and fringed by lower, more open woodland that graded very gradually into active flush with scattered birch saplings. The understorey was very wet, with hollows and pools of *Sphagnum fallax* and *S. cuspidatum*. Drier mounds of *S. palustre*, *Polytrichum commune* and *Hylocomium splendens* occurred in between. *Molinia caerulea* was the dominant understorey vascular plant, with *Dryopteris dilatata, D. carthusiana, Juncus effusus, Carex rostrata, Succisa pratensis* and *Comarum palustre* also present. *Sphagnum squarrosum* was recorded here in 2012 and in 1994 (Kelly *et al.*, 1995).

The smaller, northern section of bog woodland (**Bw2**) consisted of a birch stand with c. 40% cover of *Betula pubescens* and canopy height of c. 5 m. There was a very sparse shrub layer of *Myrica gale* and *Calluna vulgaris*. The field layer included abundant to frequent *Eriophorum vaginatum, Empetrum nigrum, Aulacomnium palustre, Sphagnum palustre, S. capillifolium* and *Pleurozium schreberi*. Occasionally occurring were *Vaccinium myrtillus, Agrostis canina, Sphagnum fimbriatum* and *Mnium hornum*.

Detailed vegetation description of the high bog

A detailed description of high bog vegetation recorded during the 2012 survey of Cloonshanville 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 Cloonshanville 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	0.03 ha high bog cut away	Inside High Bog: 1 location along southeast high bog section	**7120/7150**
J02.07	Drainage	H	-1	6.511 km [1]	Inside High Bog	**7110**
J02.07	Drainage	M	-1	6.511 km [1]	Inside High Bog	**7120/7150/91D0**
J02.07	Drainage	H	-1	n/av	Outside High Bog	**7110/7120/7150/91D0**
I01	Invasive alien species	L	-1	17.98 ha [3]	Inside High Bog	**7110/7120/7150**
B02.02	Forestry clearance	H	+1	17.98 ha	Inside High Bog	**7110/7120/7150/91D0**
4.2	Restoring/Improving the hydrological regime	H	+1	0.165 km²	Inside High Bog	**7110/7120/7150/91D0**

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 includes the clearfelled plantations in which occasional *Pinus contorta* saplings are regenerating.

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

Peat cutting

This activity has taken place at 1 location along the south-eastern section of high bog in the 2004-2010 period and has reduced the area of high bog by 0.03ha. The loss of high bog from peat cutting is calculated using GIS techniques on aerial photography from 2004/05 and 2010. Information from the NPWS indicates that 1 plot was cut on Cloonshanville Bog in 2010/2011 and no cutting took place in 2012 and 2013. Thus the area of high bog lost on Cloonshanville Bog during the reporting

period is slightly in excess of 0.03ha, but since there is no aerial photography available post 2010, the area lost from 2010 to 2011 cannot be estimated.

This activity is considered to have a low importance/impact on Degraded Raised Bog and Rhynchosporion vegetation. The low level of peat cutting that has taken place in the most recent reporting period is not considered to have had a significant impact on Active Raised Bog or on Bog Woodland. This is because peat cutting was small in extent, took place relatively far from these habitats, and there was no evidence of impacts on these habitats (e.g. **Sc9** and **Sc10**) arising from recent peat cutting. However, old face banks and high bog and cutover drainage associated with cutting continue to cause significant negative impacts on the high bog habitats.

Drainage

High bog drainage

Table 6.2 shows a decrease on functional drainage as a result of blocking of drains and natural infilling. The majority of drains in the high bog are reduced functional (2.945km), but 1.495 km of functional drains remain. Reduced functional drains are still impacting on high bog habitats and will continue to do so until they are blocked and become completely in-filled and thus non-functional.

High bog drainage is considered to have high importance/impact on Active Raised Bog. High bog drainage is considered medium importance/impact on Degraded Raised Bog and Rhynchosporion vegetation, as these habitats are less sensitive to drainage impacts and there are large areas of these habitats not directly impacted by drainage. The impacts of drainage on Bog Woodland are not obvious, however, it is likely they are at least of medium importance/impact on the hydrology of this habitat.

Table 6.2 High bog drainage summary

Status	2004 (km) [1]	2012 (km)	Change
NB: functional	1.825	1.495	-0.330
NB: reduced functional	2.780	2.945	+0.165
NB: non- functional	2.071	2.071	0.000
B: functional	0.000	0.000	0.000
B: reduced functional	0.000	0.000	0.000
B: non- functional	0.000	0.165	+0.165

B: Blocked; NB: Not blocked

[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 Cloonshanville Bog including any change in their functionality in the 2004 – 2012 reporting period (see Map 3).

Table 6.3 High bog drainage detail

Drain Name	Length (km)	2004 status	2012 status	Change	Comment
bA	0.091	NB: reduced functional	NB: reduced functional	No	
bB	0.731	NB: non-functional	NB: non- functional	No	
bC	0.942	NB: reduced functional	NB: reduced functional	No	Drain incorrectly classified as non-functional in 2004
bD	0.849	NB: reduced functional	NB: reduced functional	No	
bE	0.357	NB: functional	NB: functional	No	Eastern section of double drain bE is functional
bE	0.989	NB: non-functional	NB: non- functional	No	
bE	0.234	NB: reduced functional	NB: reduced functional	No	
bF	0.108	NB: functional	NB: functional	No	
bG	0.481	NB: functional	NB: functional	No	
bG	0.165	NB: functional	B: non- functional	Yes	Southern section of double drain adjacent to felled conifer plantation (west side) has been blocked
bG	0.165	NB: functional	NB: reduced functional	Yes	Southern section of double drain along east side of track has become reduced functional
bH	0.244	NB: non-functional	NB: non- functional	No	
bH	0.258	NB: reduced functional	NB: reduced functional	No	Northern section of bH is non-functional
bJ	0.186	NB: functional	NB: functional	No	
bK	0.315	NB: functional	NB: functional	No	
D1	0.048	NB: functional	NB: functional	No	
D2	0.169	NB: reduced functional	NB: reduced functional	No	Drain already present in 2004 but not mapped
D3	0.107	NB: non-functional	NB: non- functional	No	
D3	0.237	NB: reduced functional	NB: reduced functional	No	Southern section of drain D3 incorrectly classified as non-functional in 2004

Bog margin drainage

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

Kelly *et al.* (1995) noted that there had been a lowering of the regional ground water table due to extensive drainage works in the area around Lough Gara and to the dredging of the Breedoge River. It is unknown whether maintenance (i.e. drain clearance or additional dredging) of these drainage works has been carried out recently. Lowering of the water table and marginal drainage may be responsible for the observed losses of active raised bog areas that are not clearly associated with local drains. The original changes to regional hydrology may be continuing to exert a long-term ecological impact, and subsequent maintenance may serve to increase this impact.

Bog margin drainage, including arterial drainage and river dredging works, is considered to have a high importance/impact on high bog habitats; however, detailed hydrological assessment is required to validate this assessment.

Fire history

No fire events have been reported on the high bog in the 2004-2012 reporting period. No areas of recent fire damage were recorded during the 2004 survey (Fernandez *et al*., 2005). Thus, it is likely that the last burning event on Cloonshanville Bog high bog is that which took place in parts of the east of the site in 1982 (Douglas and Mooney, 1984). Therefore, it appears that most of the site has remained unburned since the mid-1970s when the last major burn at the site took place.

Invasive species

Tree saplings are frequent on the clearfelled conifer plantations, and a large number of these are lodgepole pine (*Pinus contorta*) in addition to native species. Unless controlled, they are likely to mature and spread in the drier parts of the clearfells and perhaps drier parts of the undisturbed high bog. A *Rhododendron ponticum* seedling was noted in clearfell **CFA**.

Two lodgepole pine saplings were recorded in **Sc6** and others were noted to the east of the main block of **CFB**. These were not recorded in 2004 and may have regenerated since then.

Overall, invasive species are considered to have low importance/impact on high bog habitats, with the exception being Bog Woodland where no invasive species were noted.

Afforestation and forestry management

The two lodgepole pine plantations on the high bog reported by Kelly *et al.* (1995) and Fernandez *et al*. (2005) were felled in 2005-2007 as part of the CoillteLIFE project to restore raised bogs (Derwin, 2008). These areas are now mapped as **CFA** and **CFB** (Appendix IV, Map 1) and their vegetation is described in detail in Appendix I. The project also included some drain blocking. Removal of the plantations is considered as having a positive influence on the high bog hydrology and thus on the high bog habitats.

Other impacting activities

Cloonshanville Bog is a demonstration site for Coillte's LIFE project on raised bog restoration. As part of this, access is maintained along an old track that runs along the southeast edge of clearfell **CFA** from where it connects to a boardwalk running a short distance along the northeastern edge of **CFA**. This walking route was used by several people for recreational purposes during the 2012 field survey. The boardwalk has also been used to access the bog for educational purposes, according to the project website (http://www.raisedbogrestoration.ie/life04/raised-bog-demonstration-sites-ireland.html). The boardwalk and its use is considered as having a neutral impact on high bog habitats.

Conservation activities

As noted above, the two lodgepole pine plantations on the high bog were felled and another plantation on fen to the east of the high bog was also felled as part of Coillte's LIFE-funded raised bog restoration project. Restoration activities took place on Cloonshanville Bog in 2005-2007 (Derwin, 2008). Mature plantations were clearfelled and timber removed from site. Poorly developed plantations were felled to waste with the felled material windrowed. A drain along the southeastern edge of clearfell **CFA** was blocked. Drains in the vicinity of the northern clearfell **CFB** did not appear during the 2012 survey to have been blocked. These drains, bE and bC (Appendix IV, Map 3), were found to be reduced functional or non-functional in 2012. Drains in the afforested fen to the east of the high bog have not been blocked due to lack of knowledge about the hydrology of the area (Derwin, 2008).

Two new areas of sub-central ecotope, **Sc13** and **Sc14**, appear to have developed in the intervening period as a direct result of the restoration project. The project ecological monitoring report notes that following conifer removal and drain blocking, there was a rise in the water table in the felled

plantations and on the adjacent high bog (Derwin, 2008). Following restoration works, the water table remains close to the bog surface throughout most of the year the water table in and near the conifer plantations showed significant drops during the summer months.

Conifer removal and drain blocking are reported as positive management actions in Table 6.1.

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 shows a slight decrease (0.07 ha) in the area of Active Raised Bog in the period 2004-2012; however, this masks greater changes in the distribution of Active Raised Bog across the site.

Most changes to the boundaries of central and sub-central ecotope areas are as a result of more comprehensive survey and increased mapping accuracy in 2012. **C1**, **Sc3**, **Sc5**, **Sc6** and **Sc9** were all slightly adjusted because of mapping improvements. A new sub-central area, **Sc10**, was added in the southeast lobe, most likely because of more comprehensive surveying. Similarly, changes to the

boundaries of active flushes **FY1**, **FY2** and **FY4** are due to improvements in mapping, including the amalgamation of **FY3** with **FY1**.

Sc1 was smaller than it was when surveyed in 2004, and this is likely due to interpretation. Reduction in area mainly occurred in its former southern section where sub-marginal complex 9/7/10+Cl was mapped. This complex is borderline sub-central. While it may be that these remapped areas represent a real loss, a loss in **Sc1** coinciding with a slight increase in **C1** is considered unlikely.

The former **Sc7** was remapped in part as active flush **FY2**. Other parts were mapped as sub-marginal ecotope. These changes are likely due to interpretation and improvements in mapping accuracy. *Molinia* and *Phragmites* were frequent here, but had low cover overall.

Former active flush **FY5** was reclassified as sub-central ecotope and added to **Sc8**. The long linear section of **Sc8** was a former drain that now consists of a series of pools and spoil mounds. Characteristic flush species were found to be absent. **Sc6** and **Sc8** are now mapped as being linked, although they have been labelled separately.

Sc11 and **Sc12** were mapped as sub-central in 2012 but were considered part of active flush **FY1** in 2004. Part of **Sc15** was also considered flush **FY4**. These changes to sub-central ecotope are likely to be the result of improvements in mapping and also re-interpretation of the vegetation.

Sc2 (0.36 ha) was mapped to the east of the northern clearfell (then conifer plantation) in 2004, but sub-central ecotope has since been lost here. This area was mapped in 2012 as sub-marginal complex 9/7+Cl. *Sphagnum* cover was lower in 2012 than in 2004, especially cover of *S. papillosum* and *S. cuspidatum*, and *S. capillifolium* showed signs of desiccation.

Similarly, **Sc4** appears to have experienced a real loss in area (0.37 ha). This sub-central section was mapped as two nearby areas in 2004; by 2012, the northern area had disappeared and was mapped as sub-marginal 9/7. The 2004 site report (Fernandez *et al.*, 2005) states that this area was showing signs of degradation at that time, particularly "unhealthy *Sphagnum capillifolium* and *S. imbricatum*". *S. papillosum* was noted as a characteristic of hollows in 2004, whereas this species was rare or absent in the area in 2012.

On the other hand, sub-central areas **Sc13** and **Sc14** appear to have developed recently (0.67 ha total) as the direct result of forestry clearance and drain blocking. Both these sub-central areas are adjacent to the Coillte LIFE project clearfells and are quite wet with vigorous *Sphagnum* growth.

The favourable reference value (FRV) for Area is considered to be the sum of Active Raised Bog (central, sub-central ecotopes, active flush and Bog Woodland) plus sub-marginal ecotope when the

Habitats Directive came into force in 1994 (see table 8.4). Therefore, Active Raised Bog Area FRV is 98.63 ha (based on 1994/5 Kelly *et al.* (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 (20.11 ha) is 79.61% below the FRV. A current Area value more than 15% below FRV falls into the **Unfavourable Bad** assessment category.

The long term (1994/5-2012) trend indicates a reduction in the area of Active Raised Bog at the site (8.18 ha) (see table 8.1). A more recent and short term trend analysis (8 years; 2005-2012), however, is a smaller 0.07 ha (0.35%) reduction in area of Active Raised Bog. Although this change is very small, it reflects a real decline in Active Raised Bog area. Therefore, the trend over this period is assessed to be **Decreasing**.

The Area of Active Raised Bog at Cloonshanville 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 8.97 ha (half of 17.94 ha, the current area of Active Raised Bog (excluding Bog Woodland)). The current value is 3.61 ha which is 59.75% below the FRV. Therefore S&Fs are given an **Unfavourable Bad** assessment.

The long term (1994/5-2012) trend indicates a reduction in the area of central ecotope and active flush at the site (see table 8.1). A more recent and short term trend analysis (8 years; 2005-2012) is for no change, and therefore the S&Fs are given a **Stable** trend.

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

Qc1: This quadrat was newly established in 2012 as no true central ecotope quadrats were recorded in 2004. The quadrat formerly named Qc1 was actually within sub-central ecotope and has been recorded as **Qsc2** (see below). See Appendix II for **Qc1** data.

Qsc1: There were slight differences between the two surveys in this quadrat. The ground is described as quaking as compared with soft in 2004. Low hummocks and lawns are reported as occupying a greater area of the quadrat and hollows and pools occupy less in 2012 than in 2004. *Sphagnum magellanicum* was recorded in 2012 as occupying 11-25% of the quadrat but was noted as absent in 2004. There has been a slight decrease in *S. papillosum* cover, *S. fuscum* is now considered present and *S. austinii* is now considered absent, in comparison with 2004. *Narthecium ossifragum*

cover has decreased from 11-25% to 1-3% and *Cladonia portentosa* cover has increased slightly. These differences are most likely due to observer variation and lack of precision in relocating the 2004 quadrat.

Qsc2: This quadrat was previously classified as central ecotope (Qc1; complex 14+Cl) but was located on the edge of the central ecotope as mapped in 2004. The quadrat location was considered to be sub-central ecotope in 2012, most likely due to improvements in mapping precision. Total *Sphagnum* cover in 2012 was 34-50% as compared with 76-90% in 2004; both *Sphagnum* pools and *Sphagnum* hummocks were lower in 2012. *S. austinii* was recorded as occupying 4-10% of the quadrat in 2004, but was absent in 2012. *Cladonia portentosa* cover was much lower in 2012 than in 2004. As the quadrat was previously located on the edge of the central area, a lack of precision in re-finding the quadrat in 2012 is probably responsible for the significant differences between sampling periods.

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

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

Future Prospects

The area of Active Raised Bog has decreased slightly as a result of balancing losses and gains. New areas of Active Raised Bog have developed as a result of restoration works, including forestry clearance and drain blocking. These gains have been countered by the loss of other sections of Active Raised Bog. The direct causes of these losses are unclear; however, existing functional drains on the high bog, marginal drainage on adjacent cutover bog, and regional arterial drainage may all contribute. A significant amount of water leaves the high bog via the central channel of flush **FY** and flows eastward to an area of fen and clearfelled plantation in the area of a drained lake called Carragnabraher on six-inch OS maps. Although the flush is a natural feature, the channel may have been artificially deepened or flows may have increased following regional drainage. Kelly *et al.* (1995) considered that the lake at Carragnabraher may have drained as a result of dredging works to the adjacent Breedoge River. Active Raised Bog S&Fs have remained stable as the changes described above have taken place within sub-central ecotope. Invasive non-native species are not common within the Active Raised Bog, but regenerating conifer saplings in felled plantations may pose a risk to this habitat in the future.

Habitat **Area** is currently 79.61% below FRV (see table 8.4) and a Stable trend is foreseen. This is because future increases to Active Raised Bog area as a result of past restoration works are likely to be balanced by further losses as have occurred in the 2004-2012 period. The habitat Area is expected to be more than 15% below FRV in the following two reporting periods (12 years). Thus, habitat's **Area Future Prospects** are assessed as **Unfavourable Bad-Stable**. Habitat's **S&Fs** are currently 59.75% below FRV (see table 8.4) and a Stable trend is also foreseen. Therefore S&Fs are expected to more than 25% below FRV in the following two reporting periods. Thus, **S&Fs Future Prospects** are assessed as **Unfavourable Bad-Stable**. **The overall habitat's Future Prospects are Unfavourable Bad-Stable** (see table 8.5).

A hydrological investigation of the high bog and the fen and cleared plantation at Carragnabraher in relation to marginal draining and regional drainage works should be carried out as a matter of urgency. This will provide critical information on the causes of Active Raised Bog decline and the most appropriate restoration strategy for the bog. Blocking of remaining reduced-functional and functional drains both on the high bog and cutover is necessary, particularly drain bG. Ongoing management of regenerating conifers and other measures to consolidate the benefits from forestry clearance are also required (and are currently part of the Coillte LIFE project).

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

Table 8.1 Changes in Active Raised Bog area

Active Ecotopes	**1994**[1]	**2004**	**2004 (amended)**	**2012**	**Change (2004-2012)**	
	Area (ha)	**Area (ha)**	**Area (ha)**	**Area (ha)**	**Area (ha)**	**%**
Central	1.35	0.34	0.56	0.56	0.00	0.00
Sub-central	20.61	16.37	14.40	14.33	(-)0.07	(-)0.49
Active flush	4.16	4.16	3.05	3.05	0.00	0.00
Bog Woodland [2]	2.17	2.17	2.17	2.17	0.00	0.00
Total	**28.29**	**23.04**	**20.18**	**20.11**	**(-)0.07**	**(-)0.35**

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

[2] Bog Woodland area has been amended to include only that part of the larger woodland/scrub area where canopy cover is a minimum of 30%. The larger area estimated in 1994 and 2005 has been amended to equal the current area, on the assumption that the earlier surveys incorporated a significant amount of the adjacent more open birch scrub into the woodland area.

Note: Table 8.1 includes 2004 figures and 2004 amended figures. The latter shows the ecotope area believed to be present in 2004 after surveying improvements in 2012. The comparison between 2004

(amended) and 2012 illustrates the actual changes in ecotope area in the 2004-2012 period. Any change in ecotope area between the 2004 and the 2004 (amended) values is due to improvement in mapping accuracy and/or the result of a more comprehensive survey in 2012 (see table 8.2 for further detail).

Table 8.2 Assessment of changes in individual Active Raised Bog areas

Area	Quadrats	Trend	Comment	Quadrats analysis
C1	Qc1	Stable	Slight changes in boundary (slightly larger). This change is the result of more comprehensive surveying in 2011 which resulted in more accurate mapping.	New quadrat Qc1.
Sc1	Qsc2	Stable	Smaller than mapped in 2004/5. This change is likely to be the result of more comprehensive surveying and re-interpretation of vegetation in 2012 which resulted in more accurate mapping.	Qsc2 was former Qc1, which was located on the edge of the central area **C1**. Differences due to quadrat placement.
Sc2	None	No longer present	Lost due to change to sub-marginal ecotope. Cover of *Sphagnum* significantly lower and remaining *Sphagnum* hummocks and pools showing signs of stress.	
Sc3	None	Stable	Slight changes in boundary (slightly smaller). This change is the result of more comprehensive surveying in 2011 which resulted in more accurate mapping.	
Sc4	None	Decreasing	Smaller than mapped in 2004/5. This change is due drying of wet sub-central habitat and succession to sub-marginal. Area was already degraded in 2004.	
Sc5	None	Stable	Slight changes in boundary (slightly smaller). This change is the result of more comprehensive surveying in 2011 which resulted in more accurate mapping.	
Sc6	Qsc1	Stable	Slight changes in boundary (slightly smaller). This change is the result of more comprehensive surveying in 2011 which resulted in more accurate mapping.	Slight differences due to observer variation and lack of precision.
Sc7	None	No longer present	Now mapped as part of FY2 (active flush) and as sub-marginal ecotope. Likely to be the result of more comprehensive surveying in 2012 and vegetation re-interpretation.	
Sc8	None	Stable	Slight changes in boundary (slightly larger). This change is the result of more comprehensive surveying in 2011 which resulted in more accurate	

Area	Quadrats	Trend	Comment	Quadrats analysis
			mapping.	
Sc9	None	Stable	Larger than mapped in 2004/5. This change is the result of more comprehensive surveying in 2011 which resulted in more accurate mapping.	
Sc10	None	Unknown	This specific area was not surveyed in 2004. This is likely to be the result of more comprehensive surveying in 2011 which resulted in more accurate mapping.	
Sc11	None	Stable	This sub-ecotope area was previously mapped as active flush (FY1). This change is likely to be the result of re-interpretation of vegetation	
Sc12	None	Stable	This sub-ecotope area was previously mapped as active flush (FY1). This change is likely to be the result of re-interpretation of vegetation	
Sc13	None	Newly developed	This sub-central ecotope section has developed as a result of re-wetting associated with the blocking of drains.	
Sc14	None	Newly developed	This sub-central ecotope section has developed as a result of re-wetting associated with the blocking of drains.	
Sc15	None	Stable	This specific area was not surveyed in 2004. This is likely to be the result of more comprehensive surveying in 2011 which resulted in more accurate mapping. Part of former FY4 has now considered to correspond with sub-central ecotope within Sc15.	
BW1	Qbw1,Qbw2	Stable	Slight changes in boundary (slightly smaller). This change is the result of more comprehensive surveying in 2011 which resulted in more accurate mapping.	Similar; however, changes in methodology make direct comparison difficult.
BW2	None	Stable	Slight changes in boundary (slightly smaller). This change is the result of more comprehensive surveying in 2011 which resulted in more accurate mapping.	
FY1	None	Stable	Slight changes in boundary (slightly smaller). This change is the result of more comprehensive surveying in 2011 which resulted in more accurate mapping and re-interpretation of vegetation.	
FY2	None	Stable	Slight changes in boundary (slightly larger). This change is the result of more comprehensive surveying in 2011 which resulted in more accurate mapping.	

Area	Quadrats	Trend	Comment	Quadrats analysis
FY3	None	No longer present	Mapped as part of FY1	
FY4	None	Stable	Slight changes in boundary (slightly smaller). This change is the result of more comprehensive surveying in 2011 which resulted in more accurate mapping.	
FY5	None	No longer present	Now reclassified as sub-central ecotope (complex 9/7+P) as considered part of Sc8.	

Degraded Raised Bog (7120)

Area

The Degraded Raised Bog FRV for Area is 47.71 ha at Cloonshanville Bog. This value corresponds with the difference between the current high bog area (146.34 ha) and the Active Raised Bog FRV (98.63 ha) 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 164.58% bigger than FRV and therefore the habitat Area is given an **Unfavourable Bad** assessment (see table 8.4).

There has been a slight increase (0.07 ha) in the area of sub-marginal ecotope in the reporting period (Table 8.3) as a result of changes from sub-central ecotope as discussed above. There has been a very small loss of marginal ecotope (0.03 ha) as a result of peat cutting (Table 8.3). There have been no changes in the area of inactive flush and (inactive) conifer plantation / clearfell.

Table 8.3 indicates that there has been a total increase (0.04 ha) in the area of Degraded Raised Bog. The increase is the result of decrease of Active Raised Bog and high bog loss caused by peat cutting. Although this increase is very small (0.03% of Degraded Raised Bog Area), it is a real increase, and thus the habitat is given an **Increasing** trend.

The Area of Degraded Raised Bog at Cloonshanville 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

31.56ha (25% of 126.23ha, the current area of Degraded Raised Bog). The current marginal and face bank ecotopes area value (20.00ha) is below FRV (in the particular case of Degraded Raised Bog a current area value equal or smaller than FRV is desirable) (see Table 8.4). Thus S&Fs are assessed as **Favourable**.

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). As table 8.4 indicates, there has not been any major change of its area in the reporting period (0.03 ha or 0.15% of the total marginal and face bank area as a result of peat cutting). Thus, the DRB's S&Fs at Cloonshanville 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 Cloonshanville Bog are assessed as Favourable-Stable (see table 8.5).

Future Prospects

The area of Degraded Raised Bog has increased slightly (0.03ha) as a result of balancing losses and gains. Areas of Degraded Raised Bog have become active due to restoration works, including forestry clearance and drain blocking. These changes have been countered by other areas of Active Raised Bog becoming degraded. As discussed above, the direct causes of these losses are unclear; however, existing functional drains on the high bog, marginal drainage on adjacent cutover bog, and regional arterial drainage may all contribute. Invasive non-native species are not common within the Degraded Raised Bog, except for frequent regenerating conifer saplings in felled plantations that may slow or prevent clearfells and nearby Degraded Raised Bog from becoming Active in the future. Peat cutting has resulted in a very small loss of Degraded Raised Bog, and cutting activities appear to have now ceased. Habitat **Area** is currently 164.58% above FRV (see table 8.4) and a Stable trend is expected in the following two reporting periods (12 years). As a result habitat Area is expected to remain more than 15% above FRV. Thus, habitat's **Area Future Prospects** are assessed as **Unfavourable Bad-Stable**. Habitat's **S&Fs** are currently 36.62% below FRV (see table 8.4). A Stable trend is foreseen in the following two reporting periods, **S&Fs** are expected to remain below FRV. Thus, habitat's **S&Fs Future Prospects** are assessed as **Favourable-Stable**.

Overall, the Future Prospects for Degraded Raised Bog are considered Unfavourable Bad-Stable (see table 8.5). This is because future changes from Degraded to Active Raised Bog area as a result

of past restoration works are likely to be balanced by further losses as have occurred in the 2004-2012 period.

The overall conservation status of Degraded Raised Bog at Cloonshanville Bog is assessed as Unfavourable Bad-Declining (see table 8.5), as an Increasing trend in Degraded Raised Bog habitat Area indicates drier conditions on the habitat and thus an overall negative conservations status. Nevertheless, habitat's Future Prospects are Unfavourable Bad- Stable as positive and negative impacting activities are expected to balance each other. But the habitat will not reach FRVs unless further restoration works are undertaken. Thus, a slightly more positive assessment is expected in the next reporting period.

Table 8.3 Changes in Degraded Raised Bog area

Inactive Ecotopes	**1994**[1]	**2004**	**2004 (amended)**	**2012**	**Change (2004-2012)**	
	Area (ha)	**Area (ha)**	**Area (ha)**	**Area (ha)**	**Area (ha)**	**%**
Sub-marginal	70.34	78.88	82.90	82.97	(+)0.07	(+)0.08
Marginal	18.19	22.08	20.03	20.00	(-)0.03	(-)0.15
Inactive flush	10.22	4.61	5.28	5.28	0.00	0.00
Conifer plantation/Clear felled area	20.03	18.08	17.98	17.98	0.00	0.00
Total	**118.78**	**123.65**	**126.19**	**126.23**	**(+)0.04**	**(+)0.03**

[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.

Notes: Table 8.3 includes 2004 figures and 2004 amended figures. The latter shows the ecotope area believed to be present in 2004 after surveying improvements in 2012. The comparison between 2004 (amended) and 2012 illustrates the actual changes in ecotope area in the 2004-2012 period. Any change in ecotope area between the 2004 and the 2004 (amended) values is due to improvement in mapping accuracy and/or the result of a more comprehensive survey in 2012. Any 2012 marginal and face bank ecotope value given within the report should be taken as a maximum value. Their extent is based on the 2012 habitat survey and 2010 aerial photographs. It cannot be ruled out that further marginal and/or face bank ecotope losses may have taken place in 2011-2012 due to peat cutting.

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 decreased slightly in the reporting period, but this was the result of net changes to sub-marginal ecotope. 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. During the reporting period, restoration activities resulted in gains in Active Raised Bog which were countered by losses caused by factors that remain unclear. These factors are likely to continue to operate in the foreseeable future, unless altered by further management. Any future losses are therefore likely to be slight and result in the expansion of sub-marginal ecotope at the expense of Active Raised Bog. Therefore, the habitat's Area Future Prospects are given an **Unfavourable Bad-Stable** assessment.

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

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

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

Bog Woodland (91D0)

Area

The favourable reference value (FRV) for area is 2.17 ha at Cloonshanville Bog. The FRV corresponds with the area of this habitat present when the Habitats Directive came into force in 1994 (see table 8.4) and therefore the Kelly *et al*. (1995) value. In the present survey, only those parts of the larger wood/scrub area with a minimum canopy cover of 30% were included within the Bog Woodland area, while the adjacent, more open scrub was mapped within flush **FY1**. The greater Bog Woodland area mapped in 2005 (Fernandez *et al*.) is most likely due to the inclusion of some or all of the scrub, and therefore, no real change is thought to have taken place. Thus, the assessment of Area of Bog Woodland is actually considered to be **Favourable**.

The area of Bog Woodland has not changed in the reporting period (see table 8.1) and any change within Bog Woodland between the 2004 and 2012 maps is likely to be due to improvements in mapping as discussed above. Therefore, the habitat Area is given a **Stable** trend assessment.

The Area of Bog Woodland at Cloonshanville Bog is assessed as Favourable-Stable (see table 8.5).

Structure & Functions

The FRV for S&Fs is assessed based on the two monitoring stops assessment in 2012 (see Appendix III). The stops passed at the individual stop level criteria as well as the combined assessment criteria. Only stop 2 failed the canopy cover attribute. Low canopy cover was recorded at this stop because a larger stop size (400 m^2) was used than was used in sites surveyed later in 2012 (100 m^2), and part of the plot extended out of the core woodland area, which was narrow at the point of survey. If the smaller stop size were used, this attribute would have passed.

Thus, the Structure & Functions of Bog Woodland at Cloonshanville Bog are assessed as Favourable-Stable (see table 8.5).

Future Prospects

No impacting activities were noted that significantly affected Bog Woodland during the survey period or that are likely to do so in the foreseeable future

Habitat **Area** is currently equal to the FRV (see table 8.4) and a Stable trend is foreseen in the following two reporting periods (12 years). Thus, habitat's **Area Future Prospects** are assessed as

Favourable-Stable. Habitat's **S&Fs** are given a **Favourable** assessment and a **Stable** trend is also foreseen.

The overall conservation status of Bog Woodland at Cloonshanville Bog is assessed as Favourable-Stable (see table 8.5).

Table 8.4 Habitats favourable reference values

Habitat	Area Assessment			Structure & Functions Assessment		
	FRV Target (ha) [1]	**2012 value (ha)** [2]	**% below target**	**FRV 2012 Target (ha)** [3]	**2012 value (ha)** [4]	**% below target**
7110	98.63	20.11	79.61	8.97	3.61	59.75

[1] 1994 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]	**% below target**
7120	47.71	126.23	164.58	31.56	20.00	36.62

[5] 1994 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.

	FRV Target (ha)	**2012 value (ha)**	**% below target**	**FRV Target (ha)**	**2012 value (ha)**	**% change**
91D0	2.17	2.17	0.00	na	na	na

na: not applicable

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 -Stable.**
- **Bog Woodland is assessed as being Favourable-Stable.**

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-Stable	Unfavourable Bad-Declining
7120	Unfavourable Bad-Increasing	Favourable-Stable	Unfavourable Bad-Stable	Unfavourable Bad-Declining
7150	Unfavourable Bad-Stable	Unfavourable Bad-Stable	Unfavourable Bad-Stable	Unfavourable Bad-Stable
91D0	Favourable-Stable	Favourable-Stable	Favourable-Stable	Favourable-Stable

Conclusions

Summary of impacting activities

- Peat cutting has taken place at 1 location in the 2004-2010 period between surveys, according to interpretation of aerial photography, and also took place at 1 location in 2010/2011, according to information from NPWS. An estimated total of 0.03 ha of high bog have been lost in this period due to peat cutting and this activity is considered to be one of the reasons for the decline in Degraded Raised Bog along the south-eastern section of high bog. Peat cutting did not take place in 2012 and 2013, according to NPWS information.
- Approximately 1.5 km of drains on the high bog remain functional. The most significant of these are two double drains, one northeast of clearfell **CFA** (bG) and one east of clearfell **CFB**.
- Cutover drainage (peripheral drainage) associated with former peat cutting probably continues to impact on the high bog habitats. In addition, there had been a lowering of the regional ground water table prior to 1995 due to regional drainage and river dredging works. It is unknown whether maintenance of these drainage works has been carried out recently. Past drainage works may have altered the hydrology of the raised bog and any subsequent maintenance is likely to have enhanced any impacts.
- No fire events have damaged the high bog in the reporting period and most of the high bog appears to have remained unburned for nearly 40 years.

Changes in active peat forming areas

- Overall, there has been a slight (0.07 ha) decrease in the area of Active Raised Bog in the period 2004-2012. Most changes to the boundaries of central and sub-central ecotope areas

are as a result of more comprehensive survey and increased mapping accuracy in 2012 (**C1**, **Sc3**, **Sc5**, **Sc6**, **Sc9**, **Sc10**, **FY1**, **FY2**, **FY3** and **FY4**). Other changes are as a result of reinterpretation of the vegetation (**Sc1, Sc7**, **Sc8**, **Sc11**, **Sc12**, **Sc15**, **FY2** and **FY5**). Nevertheless, there have been significant changes in the distribution of Active Raised Bog across the site.

- Two areas (**Sc2** and **Sc4**) have declined in quality since 2004. All of **Sc2** and part of **Sc4** are now considered Degraded Raised Bog, sub-marginal ecotope. There were no obvious direct causes of the losses in these areas, which are found on some of the highest ground on the raised bog dome. These losses are part of a negative trend that has continued despite positive management interventions.
- Two new peat forming areas (**Sc13** and **Sc14**) appear to have developed recently (0.67 ha total) as the direct result of forestry clearance and drain blocking. Both these sub-central areas are adjacent to the Coillte LIFE project clearfells and are quite wet with vigorous *Sphagnum* growth.

Other changes

- The area of Bog Woodland has been amended to include only that part of the larger woodland/scrub area where canopy cover is a minimum of 30%. The larger area estimated in 1994/2005 has (2.36ha) been amended to equal the current area (2.17ha), on the assumption that the earlier survey incorporated a significant amount of the adjacent more open birch scrub into the woodland area and not losses took place in the 1994-2012 period.
- There have been no other significant changes in the high bog vegetation. The area of bog woodland in 2012 was lower than the reference area in 1994; however, these changes are most likely due to improvements in mapping, as there were no signs of bog woodland decline during the field survey.

Quadrats analysis

- **Qc1**: This quadrat was newly established in 2012 as no true central ecotope quadrats were recorded in 2004.
- **Qsc1**: There were slight differences between the two surveys in this quadrat most likely due to observer variation and lack of precision in relocating the 2004 quadrat.
- **Qsc2**: This quadrat was previously classified as central ecotope, but was located on the edge of the central ecotope as mapped in 2004. The quadrat location was considered to be sub-central ecotope in 2012, most likely due to improvements in mapping precision. There

were significant differences between the two years, including substantial decreases in *Sphagnum* cover; however, a lack of precision in re-finding the quadrat in 2012 is probably responsible for the significant differences between sampling periods.

Restoration works

- The two lodgepole pine plantations on the high bog were felled and another plantation on fen to the east of the high bog was also felled as part of Coillte's LIFE-funded raised bog restoration project in 2005-2007. A drain along the southeastern edge of clearfell **CFA** was blocked. Drains in the afforested fen to the east of the high bog have not been blocked due to lack of knowledge about the hydrology of the area. These works have led to the development of new sub-central ecotope at **Sc13** and **Sc14**.

Summary of conservation status

- **Active Raised Bog** has been given an **Unfavourable Bad–Declining** conservation status at Cloonshanville Bog. Habitat Area has slightly decreased and quality has not changed in the reporting period. Both values are below the FRVs. Future Prospects are considered Unfavourable Bad-Stable as future increases to Active Raised Bog area as a result of past restoration works are likely to be balanced by further losses as have occurred in the 2004-2012 period.
- **Bog Woodland** has been given a **Favourable-Stable** conservation status at Cloonshanville Bog. Although habitat Area has not changed in the reporting period. Habitat S&Fs are considered to be Favourable-Stable, and Future Prospects are considered to be Favourable-Stable due to the absence of activities that threaten Bog Woodland in the foreseeable future.
- **Degraded Raised Bog** has been given an **Unfavourable Bad-Declining** conservation status at Cloonshanville Bog. Habitat Area has slightly increased despite small losses associated with peat cutting due to degradation of Active Raised Bog. The habitat's structure and functions, however, have remained stable. Habitat Area is above the FRV. An Increasing trend in Degraded Raised Bog habitat Area indicates drier conditions on the habitat and thus an overall negative conservations status. Nevertheless, habitat's Future Prospects are Unfavourable Bad-Stable as positive and negative impacting activities are expected to balance each other. Thus, a slightly more positive assessment is expected in the next reporting period.
- **Depressions on peat substrates of the Rhynchosporion** has been given an **Unfavourable Bad -Stable** conservation status at Cloonshanville Bog. Habitat Area and quality (S&Fs) are

considered to have not changed in the reporting period. Future Prospects are considered Unfavourable Bad-Stable as future changes to high bog are not likely to significantly impact on this habitat.

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

Recommendations

- **Ensuring that peat cutting has ceased.**
- **Ongoing monitoring and management of restoration works** that are being carried out as part of Coillte's LIFE-funded raised bog restoration project should be continued. This includes monitoring of walrags and removal of regenerating conifers.
- **Further restoration works** including blocking of high bog reduced-functional and functional drains, and possibly cutover drains.
- **Further hydrological and topographical studies** should be carried out to ascertain the capacity of the high bog to support Active Raised Bog and thus estimate a more accurate favourable reference value. Hydrological studies should also clarify the relationship between the high bog and the fen at Carragnabraher and help determine whether drains there should be blocked. Hydrological studies should also aim to understand the impacts on the bog arising from regional drainage works.
- **Further botanical monitoring surveys** on the high bog, including Bog Woodland, should be carried out in order to assess changes in habitat conservation status.

References

Conaghan, J. and Heery, S. 2003. A survey of afforested and non-afforested areas within raised bog Special Areas of Conservation with a view to assessing their composition and conservation. Unpublished report, Coillte.

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

Derwin, J. 2008. Restoring Raised Bog in Ireland, Project Reference: LIFE04 NAT/IE/000121. A Report on the Restoration of Project Site No. 8, Cloonshanville, Bog, Co. Roscommon. Unpublished report, Coillte.

Douglas, C. & Mooney, E. 1984. Survey to locate raised bogs of scientific interest in Counties Galway (east) and Roscommon. Unpublished report, National Parks & Wildlife, Department of Environment, Heritage and Local Government, Dublin.

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

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

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

Appendix I Detailed vegetation description of the high bog

Active Raised Bog (7110)

Central Ecotope Complex

COMPLEX 14

- **Location**: **C1**, in northwest corner of site
- **Ground**: quaking
- **Physical indicators**: absent
- ***Calluna* height**: 11-20cm
- ***Cladonia* cover**: 4-10%
- **Macro-topography**: gentle slope (S-SW)
- **Pools**: interconnecting 34-50%
- ***Sphagnum* cover**: 51-75%
- ***Narthecium* cover**: <4%
- **Micro- topography**: Low hummocks, hollows, pools, flats and lawns
- **Tussocks**: *Trichophorum germanicum* (<4%)
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (11-25%), *Eriophorum vaginatum* (4-10%), *Narthecium ossifragum* (<4%), *Rhynchospora alba* (<4%), *Menyanthes trifoliata* (<4%, frequent), *Erica tetralix* (<4%, frequent), *Sphagnum capillifolium* (4-10%), *S. austinii* (<4%), *S. papillosum* (11-25%), *S. pulchrum* (4-10%), *S. cuspidatum* (26-33%), *S. subnitens* (<4%).
- **Additional comments**: Water flowed southwestward towards a steep face bank. *Sphagnum denticulatum* was very rare, compared with the 2004/5 description. This species was present (and was recorded in the 1994/5 survey), but had been mistakenly over-recorded for *S. papillosum*. The oceanic species *Pleurozia purpurea* and *Racomitrium lanuginosum* were present.
- Quadrat **Qc1** was recorded within this complex. Note that this is in a different location than the quadrat taken in 2004/5, which was in a transitional area; the original Qc1 has been recorded as Qsc2 in this study.

Sub-Central Ecotope Complexes

COMPLEX 9/7+P

- **Location**: **Sc1**;**Sc3**;**Sc6**;**Sc8** and **Sc12**
- **Ground**: soft to very soft
- **Physical indicators**: absent
- ***Calluna* height**: 21-40 cm
- ***Cladonia* cover**: 4-10%
- **Macro-topography**: depression
- **Pools**: regular 34-50%
- ***Sphagnum* cover**: 51-75%
- ***Narthecium* cover**: <4%
- **Micro- topography**: Low hummocks, pools, hollows
- **Tussocks**: *Eriophorum vaginatum* <4%
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (11-25%), *Eriophorum angustifolium* (4-10%), *E. vaginatum* (<4%), *Narthecium ossifragum* (<4%), *Menyanthes trifoliata* (<4%), *Sphagnum capillifolium* (4-10%), *S. cuspidatum* (34-50%), *S. magellanicum* (4-10%), *S. pulchrum* (<4%).
- **Additional comments:** The above description is from an extended arm of **Sc6** formerly mapped in error as Flush Y5. This section was a series of pools associated with a defunct drain, interspersed with higher areas (spoil mounds) dominated by *Calluna* and *Eriophorum vaginatum*. Pools were dominated by *Sphagnum cuspidatum* with frequent *Drosera anglica* and *Eriophorum angustifolium*. Pools graded to *Sphagnum magellanicum*, *S. papillosum* and *S. pulchrum* at edges. This complex occurred in large areas of **Sc6** where places with greater cover of *Narthecium ossifragum* were mapped as 9/7/6+P. Parts of **Sc6** were of poorer quality, drier with more *Carex panicea*. Two *Pinus contorta* saplings were present here.

COMPLEX 10/6

- **Location**: **Sc9** and **Sc10**, in southeast lobe, east of track
- **Ground**: very soft
- **Physical indicators**: absent
- ***Calluna* height**: 11-20cm
- ***Cladonia* cover**: 4-10%
- **Macro-topography**: gentle slope

- **Pools**: regular (small) <4%
- ***Sphagnum* cover**: 51-75%
- ***Narthecium* cover**: 4-10%
- **Micro- topography**: Low hummocks, pools, hollows
- **Tussocks**: *Eriophorum vaginatum* <4%
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (4-10%), *Rhynchospora alba* (<4%), *Menyanthes trifoliata* (4-10%), *Narthecium ossifragum* (4-10%), *Sphagnum capillifolium* (4-10%), *S. cuspidatum* (11-25%), *S. papillosum* (11-25%), *S. austinii* (4-10%), *S. fuscum* (<4%), *S. pulchrum* (<4%).
- **Additional comments:** Low hummocks of *Sphagnum capillifolium, S. austinii* and *S. fuscum* were present with *S. cuspidatum* in hollows and pools with *S. papillosum* in between. Oceanic species *Pleurozia purpurea* and *Racomitrium lanuginosum* were occasional. Wet because of water flow towards parallel track drains to west. Very irregular polygon, interspersed with patches of sub-marginal ecotope. Quality decreased towards edges.

COMPLEX 10/4

- **Location**: **Sc1**; **Sc4**; **Sc5**; **Sc8**;**Sc1**1 and **Sc15**
- **Ground**: very soft
- **Physical indicators**: absent
- ***Calluna* height**: 11-20cm
- ***Cladonia* cover**: 11-25%
- **Macro-topography**: gentle slope
- **Pools**: regular (<1%), very small & infrequent
- ***Sphagnum* cover**: 51-75%
- ***Narthecium* cover**: <4%
- **Micro- topography**: Low hummocks, hollows, pools, lawns
- **Tussocks**: *Schoenus nigricans* <4%, *Trichophorum germanicum* <4%
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (11-25%), *Menyanthes trifoliata* (4-10%), *Rhynchospora alba* (4-10%), *Narthecium ossifragum* (<4%), *Schoenus nigricans* (<4%), *Trichophorum germanicum* (<4%), *Sphagnum capillifolium* (4-10%), *S. austinii* (26-33%), *S. papillosum* (11-25%), *S. pulchrum* (4-10%), *S. cuspidatum* (<4%), *S. fuscum* (<4%).
- **Additional comments:** Hummocks of *Calluna, Sphagnum austinii, S. fuscum, S. capillifolium* and *Hylocomium splendens* were interspersed with lawns of *S. pulchrum, S. papillosum* and (rarely) *S.*

magellanicum. Occasional to rare hollows and pools with *S. cuspidatum* were present. Flushing was present at edge of Flush Y with *Schoenus nigricans*, *Molinia caerulea* and *Campylopus atrovirens* all present. *Pinguicula lusitanica* was also present here. **Sc4** was a poorer variant of this type without flush species and much lower cover of *S. austinii*.

COMPLEX 9/10

- **Location**: **Sc13**, north of eastern edge of Clearfell A by parallel drain
- **Ground**: soft to very soft
- **Physical indicators**: absent
- ***Calluna* height**: 11-20cm
- ***Cladonia* cover**: 11-25%
- **Macro-topography**: gentle slope
- **Pools**: absent
- ***Sphagnum* cover**: 51-75%
- ***Narthecium* cover**: <4%
- **Micro- topography**: Low hummocks, hollows
- **Tussocks**: *Eriophorum vaginatum* 11-25%
- **Degradation or regeneration evidence**: healthy new growth of *Sphagnum*
- **Species cover**: *Calluna vulgaris* (11-25%), *Eriophorum vaginatum* (11-25%), *Narthecium ossifragum* (<4%), *Vaccinium oxycoccos* (<4%, frequent), *Sphagnum capillifolium* (26-33%), *S. papillosum* (11-25%), *S. magellanicum* (4-10%).
- **Additional comments:** Newly regenerating area adjacent to clearfell mapped as **Sc13**. Towards the edge, this area dried out with larger, leggy *Calluna* and more vigorous *Eriophorum vaginatum*. Complex was somewhat flushed, with *Sphagnum palustre* present in small amounts. A 5m wide band of active flush was present between **Sc13** and clearfell **CFA** on a former fire-break. This was very wet, with *Sphagnum cuspidatum* cover of 51-75% and *Eriophorum vaginatum* 34-50%; *Aulacomnium palustre* was present at the edge. Another example of complex 9/10 occurred to the north of clearfell **CFB** in **Sc14**. There, *Sphagnum* cover was slightly lower with less *S. capillifolium* but more *S. pulchrum*. Several small, wet hollows and pools with *S. cuspidatum* were present (<4% cover) there.

COMPLEX 9/7/10

- **Location**: **Sc3**
- **Ground**: very soft

- **Physical indicators**: absent
- ***Calluna* height**: 41-60 cm
- ***Cladonia* cover**: 11-25%
- **Macro-topography**: gentle slope
- **Pools**: tear pools 11-25%
- ***Sphagnum* cover**: 51-75%
- ***Narthecium* cover**: <4%
- **Micro- topography**: Low & high hummocks, hollows, pools
- **Tussocks**: *Eriophorum vaginatum* 4-10%
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (11-25%), *Eriophorum vaginatum* (11-25%), *Narthecium ossifragum* (<4%), *Rhynchospora alba* (<4%), *Menyanthes trifoliata* (<4%), *Sphagnum capillifolium* (26-33%), *S. cuspidatum* (11-25%), *S. fallax* (<4%), *S. pulchrum* (<4%).
- **Additional comments:** Tall hummocks of *Sphagnum capillifolium* with *Calluna, Eriophorum vaginatum* and *Cladonia portentosa*. In between were long tear pools dominated by *Sphagnum cuspidatum* with some *Menyanthes trifoliata, Narthecium ossifragum* and *Rhynchospora alba*.

Active flushes

FLUSH Y

The main body of this flush, a long central flush bisecting the site, was inactive and is described below. Discrete arms of this flush are mapped and described separately below.

FLUSH Y1

The flush north of bog woodland **Bw1** was mainly active and was characterized by abundant *Molinia caerulea* with hummocks of *Sphagnum capillifolium* interspersed with *S. fallax*. *Menyanthes trifoliata* and *Empetrum nigrum* were frequent. Scattered *Betula pubescens* saplings were present with overall cover of 4-10%. At IG 175352 291451, west of the bog woodland, was a quaking mat of *Sphagnum palustre* grading into a *Sphagnum cuspidatum* pool with *Molinia, Menyanthes trifoliata* and *Myrica gale*. At its edges the active part of the flush graded into drier, inactive flush, as described below.

FLUSH Y2

This flush was similar to **FY4** described below.

FLUSH Y4

From the west, there was a transition from *Sphagnum*-dominated flush with *S. fallax and S. palustre* with tall, abundant *Calluna vulgaris, Myrica gale* and *Menyanthes trifoliata* to a *Molinia caerulea* dominated community with *Menyanthes trifoliata, Comarum palustre, Succisa pratensis* and *Myrica gale* on quaking peat. Flush was about 8-10 m wide with a sub-marginal transition to sub-central ecotope.

Degraded Raised Bog (7120)

Sub-Marginal Ecotope Complexes

COMPLEX 9A/7

- **Location**: found across many sections of high bog, occasionally near sub-central areas
- **Ground**: very soft
- **Physical indicators**: absent
- ***Calluna* height**: 21-40cm
- ***Cladonia* cover**: 26-33%
- **Macro-topography**: gentle slope
- **Pools**: absent
- ***Sphagnum* cover**: 11-25%
- ***Narthecium* cover**: absent
- **Micro- topography**: Low hummocks/hollows/flats
- **Tussocks**: *Eriophorum vaginatum* (<4%)
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (11-25%), *Eriophorum vaginatum* (<4%), *Eriophorum angustifolium* (26-33%), *Erica tetralix* (4-10%), *Menyanthes trifoliata* (4-10%), *Sphagnum capillifolium* (<4%), *S. papillosum* (<4%), *S. magellanicum* (4-10%), *Sphagnum tenellum* (<4%)
- **Additional comments:** Very wet ecotope. Tallish hummocks of *Calluna* and *Erica tetralix* were present along with extensive hollow/flat areas with *Eriophorum angustifolium* and *Menyanthes trifoliata*.

COMPLEX 6/3/9A

- **Location**: mostly found surrounding sub-central areas such as **Sc4**,**Sc6**,**Sc9**,**Sc10**,**Sc13** and **Sc15**

- **Ground**: soft
- **Physical indicators**: absent
- ***Calluna* height**: 21-40cm
- ***Cladonia* cover**: 11-25%
- **Macro-topography**: gentle slope
- **Pools**: regular (<4%) and tear (<4%)
- ***Sphagnum* cover**: 11-25%
- ***Narthecium* cover**: 4-10%
- **Micro- topography**: Low hummocks/hollows/pools
- **Tussocks**: *Eriophorum vaginatum* (<4%)
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (11-25%), *Carex panicea* (11-25%), *Eriophorum vaginatum* (<4%), *Eriophorum angustifolium* (4-10%), *Narthecium ossifragum* (4-10%), *Menyanthes trifoliata* (<4%), *Rhynchospora alba* (<4%), *Sphagnum capillifolium* (4-10%), *S. papillosum* (4-10%), *S. austinii* (4-10%), *S. cuspidatum* (<4%).
- **Additional comments:** Often associated with sub-central complex 10/6. Pools and tear pools were occasional with *Rhynchospora* and *Menyanthes*. Where *Eriophorum vaginatum* replaced *E. angustifolium*, it was mapped as 6/3/9. Where tear pools were present, it was mapped as 6/3/9a+TP. Vegetation similar to sub-central 10/6 occurred around many or most pools. Flush **FZ** to the north of clearfell **CFA** is now considered this complex. It was a variant with less *Narthecium* and more *Rhynchospora*. This complex was also common to the west of flush **FY1**. *Sphagnum pulchrum* and *S. papillosum* sometimes formed small lawns there.

COMPLEX 9/7

- **Location**: the most widespread sub-marginal ecotope complex on the site and thus was found across the entire high bog
- **Ground**: soft
- **Physical indicators**: absent
- ***Calluna* height**: 21-40cm
- ***Cladonia* cover**: 11-25%
- **Macro-topography**: gentle slope
- **Pools**: absent
- ***Sphagnum* cover**: 11-25%
- ***Narthecium* cover**: <4%

- **Micro- topography**: Low hummocks/hollows
- **Tussocks**: *Eriophorum vaginatum* (26-33%)
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (11-25%), *Eriophorum vaginatum* (26-33%), *Eriophorum angustifolium* (<4%), *Sphagnum capillifolium* (4-10%), *S. papillosum* (<4%).
- **Additional comments:** A variant with *Myrica gale* occurred by flushes mapped as 9/7+My.

COMPLEX 9/7/6

- **Location**: this complex was frequently found across the southwest section of high bog
- **Ground**: firm to soft
- **Physical indicators**: small (<1%) patches of bare peat
- ***Calluna* height**: 21-40cm
- ***Cladonia* cover**: 26-33%
- **Macro-topography**: gentle slope
- **Pools**: absent
- ***Sphagnum* cover**: 11-25%
- ***Narthecium* cover**: 4-10%
- **Micro- topography**: Low hummocks/hollows
- **Tussocks**: *Eriophorum vaginatum* (11-25%)
- **Degradation or regeneration evidence**: small patches of bare peat
- **Species cover**: *Calluna vulgaris* (26-33%), *Eriophorum vaginatum* (11-25%), *Narthecium ossifragum* (4-10%), *Rhynchospora alba* (<4%), *Carex panicea* (<4%), *Sphagnum capillifolium* (<4%), *S. papillosum* (<4%), *S. fuscum* (<4%), *S. tenellum* (<4%), *S. austinii* (<4%).
- **Additional comments:** Characterised by low hummocks of *Eriophorum vaginatum* and *Cladonia portentosa* with *Calluna vulgaris*. Hollows of bare peat, *Narthecium* and *Rhynchospora alba* were present. To the north of the southwest lobe, areas had *Carex panicea* increasing to 4-10% cover.

Marginal Ecotope Complexes

COMPLEX 3/6/7

- **Location**: this complex was found in the south, southeastern and northwestern edge of high bog
- **Ground**: firm to soft
- **Physical indicators**: none

- ***Calluna* height**: 21-40cm
- ***Cladonia* cover**: 11-25%
- **Macro-topography**: steep slope
- **Pools**: absent (see comments)
- ***Sphagnum* cover**: 4-10%
- ***Narthecium* cover**: 4-10%
- **Micro- topography**: low hummocks & hollows
- **Tussocks**: *Eriophorum vaginatum* (<4%)
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (26-33%), *Narthecium ossifragum* (4-10%), *Carex panicea* (4-10%), *Eriophorum vaginatum* (<4%), *Sphagnum papillosum (*<4%), *Sphagnum capillifolium* (<4%), *Sphagnum tenellum* (<4%), *Sphagnum subnitens* (<4%).
- **Additional comments**: Cover of *Narthecium* varied. Along southern boundary near road, tear pools were frequent and erosion channels were present.

COMPLEX 7+CL (CLADONIA)

- **Location**: this complex was found in the southeastern, eastern, northwestern and northwestern edge of high bog
- **Ground**: firm
- **Physical indicators**: none
- ***Calluna* height**: 21-40cm
- ***Cladonia* cover**: 51-75%
- **Macro-topography**: steep slope
- **Pools**: absent
- ***Sphagnum* cover**: <4%
- ***Narthecium* cover**: absent
- **Micro- topography**: low hummocks & hollows
- **Tussocks**: *Eriophorum vaginatum* (4-10%)
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (34-50%), *Eriophorum vaginatum* (4-10%), *Sphagnum capillifolium* (<4%).
- **Additional comments**: A variant 7+My occurred on the eastern boundary of the site where *Cladonia portentosa* cover was very low and *Myrica gale* was frequent.

COMPLEX 3/9A

- **Location**: southeast lobe by old track & double drain (north of **Sc9**)
- **Ground**: firm to soft
- **Physical indicators**: eroding bare peat
- ***Calluna* height**: 11-20 cm
- ***Cladonia* cover**: 4-10%
- **Macro-topography**: steep slope
- **Pools**: absent
- ***Sphagnum* cover**: 4-10%
- ***Narthecium* cover**: <4%
- **Micro- topography**: low hummocks & hollows
- **Tussocks**: *Eriophorum vaginatum* (<4%)
- **Degradation or regeneration evidence**: eroding and drying *Sphagnum* patches
- **Species cover**: *Calluna vulgaris* (11-25%), *Eriophorum vaginatum* (<4%), *E. angustifolium* (4-10%), *Narthecium ossifragum* (<4%), *Carex panicea* (4-10%), *Rhynchospora alba* (<4%), *Erica tetralix* (4-10%), *Sphagnum capillifolium* (<4%), *S. papillosum* (<4%).
- **Additional comments**: *Sphagnum pulchrum* and *S. austinii* rarely present. Occurred in a c. 20 m wide band along old track. Also found at northern edge of high bog with no bare peat. *Cladonia portentosa* cover here was 51-75% and *Calluna vulgaris* cover was slightly less; otherwise, vegetation was much the same.

Inactive flushes

FLUSH X

This newly mapped flush was located to the southwest of **Sc6** along the site margin. Site sloped and water drained to the south & southeast here. *Molinia* (51-75% cover) and *Calluna* (26-33% cover) were abundant. Hummocks of *Sphagnum capillifolium, S. subnitens* and *Hylocomium splendens* were present. Other species occurring included *Trichophorum germanicum, Potentilla erecta, Blechnum spicant, Eriophorum vaginatum, Carex panicea* and *Succisa pratensis*.

FLUSH Y

- **Location**: extending from centre of site to northern boundary of the southeast lobe
- **Ground**: soft
- **Physical indicators**: absent

- ***Calluna* height**: 41-60 cm
- ***Cladonia* cover**: 11-25%
- **Macro-topography**: gentle slope
- **Pools**: absent
- ***Sphagnum* cover**: 11-25%
- ***Narthecium* cover**: absent
- **Micro- topography**: High hummocks/hollows
- **Tussocks**: *Eriophorum vaginatum* 11-25%
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (26-33%), *Eriophorum vaginatum* 11-25%, *Myrica gale* (<4%), *Phragmites australis* (<4%), *Empetrum nigrum* (<4%), *Sphagnum capillifolium* (4-10%), *S. subnitens* (<4%).
- **Additional comments:** Also in scattered patches in southeast lobe. Some patches characterised by *Molinia caerulea* rather than *Phragmites*. *Sphagnum fallax* was sometimes present. Southeast of bog woodland (IG 175350 291171), inactive flush flanked a deep channel with flowing water. The channel was bounded by tall, leggy *Myrica gale* and *Calluna vulgaris* with *Salix cinerea* and *Betula pubescens*. This flush included areas formerly mapped as marginal ecotope (at IG 175408 291226). Changes are due to interpretation. This area was a species-poor stand of *Calluna, Molinia* and *Myrica*.

Clearfells

CLEARFELL A

- **Location**: south edge of site
- **Ground**: firm
- **Physical indicators**: stumps and brash lines
- ***Calluna* height**: 21-40 cm
- ***Cladonia* cover**: <1%
- **Macro-topography**: flat
- **Pools**: absent
- ***Sphagnum* cover**: <4%
- ***Narthecium* cover**: absent
- **Tussocks**: *Eriophorum vaginatum* 76-90%
- **Degradation or regeneration evidence**: felled conifers

- **Species cover**: *Calluna vulgaris* (11-25%), *Eriophorum vaginatum* (76-90%), *Chamerion angustifolium* (4-10%), *Juncus effusus* (4-10%), *Sorbus aucuparia* (<4%), *Betula pubescens* (<4%), *Polytrichum juniperinum* (4-10%), *Salix aurita* (<4%), *Pinus contorta* (<4%).
- **Additional comments:** Former lodgepole pine stand felled under Coillte's LIFE-funded raised bog restoration project. Patches were dominated by *Eriophorum vaginatum*. Tree saplings were frequent (see species cover above). Stumps, typically associated with patches of *Polytrichum juniperinum*, were a major feature of topography. Some wet hollows were present with *Sphagnum palustre* and *S. cuspidatum*. *Rhododendron* seedlings were present. There were also patches of *Hypnum jutlandicum, S. capillifolium, S. subnitens* and *Vaccinium oxycoccos* present.

CLEARFELL B

- **Location**: in north part of site east of **Sc1**
- **Ground**: very firm
- **Physical indicators**: stumps and brash lines
- ***Calluna* height**: 21-40 cm
- ***Cladonia* cover**: <4%
- **Macro-topography**: flat
- **Pools**: absent
- ***Sphagnum* cover**: <4%
- ***Narthecium* cover**: absent
- **Tussocks**: *Eriophorum vaginatum* 51-75%
- **Degradation or regeneration evidence**: felled conifers
- **Species cover**: *Calluna vulgaris* (26-33%), *Eriophorum vaginatum* (51-75%), *E. angustifolium* (<4%), *Empetrum nigrum* (<4%), *Salix aurita* (<4%, occasional), *Pinus contorta* (4-10%, frequent), *Sphagnum capillifolium* (<4%).
- **Additional comments:** Former lodgepole pine stand felled under Coillte's LIFE-funded raised bog restoration project. The clearfell occupied a high point in the bog. The area was quite dry and development of wet bog habitats in the near future appears highly unlikely. Microtopography was characterised by stumps on former ridges and low hollows occupying former forest drains.

Bog Woodland (91D0)

Bog Woodland BW1

The main section of bog woodland was an extensive stand dominated by *Betula pubescens* with some *Salix cinerea* ssp. *oleifolia*, *S. aurita* and the hybrid *S.* ×*multinervis*. Canopy height ranged from 10-12 m, and the woodland included some large, mature individual birch. The central area of tall woodland was narrow in places, fringed by lower, more open woodland that graded very gradually into active flush with scattered birch saplings. The boundary between bog woodland and birch flush was arbitrary (conventionally set at 30% canopy cover). The understorey was very wet, with hollows and pools of *Sphagnum fallax* and *S. cuspidatum*. Drier mounds of *S. palustre*, *Polytrichum commune* and *Hylocomium splendens* occurred in between. *Molinia caerulea* was the dominant understorey vascular plant, with *Dryopteris dilatata, D. carthusiana, Juncus effusus, Carex rostrata, Succisa pratensis* and *Comarum palustre* also present. In drier, more open areas, *Rubus fruticosus* occurred. *Sphagnum girgensohnii* was also recorded here.

Bog Woodland BW2

The smaller, northern section of bog woodland consisted of a birch stand with c. 40% cover of *Betula pubescens* and canopy height of c. 5 m. There was a very sparse shrub layer of *Myrica gale* and *Calluna vulgaris*. The field layer included abundant to frequent *Eriophorum vaginatum*, *Empetrum nigrum, Aulacomnium palustre, Sphagnum palustre, S. capillifolium* and *Pleurozium schreberi*. Occasionally occurring were *Vaccinium myrtillus, Agrostis canina, Sphagnum fimbriatum* and *Mnium hornum*.

Depressions on peat substrates of the Rhynchosporion (7150)

The habitat occurred at Cloonshanville Bog in both Active and Degraded Raised Bog. Only *Rhynchospora alba* was recorded within the 2012 survey at this site.

R. alba was found in all ecotopes, including: central ecotope (14), sub-central ecotope (10/6, 10/4, 9/7/10), sub-marginal ecotope (6/3/9a, 9/7/6), and marginal ecotope (3/9a).

The species becomes very frequent within complexes 10/4 (sub-central), 6/3/9a (sub-marginal, some variants), and 3/6 (marginal, but within run off channels).

The species is always found associated with wet features such as *Sphagnum* pools, *Sphagnum* lawns and hollows, along with *Sphagnum magellanicum*, *S. papillosum* and *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
00213	NE	Overview	Qsc1	05/09/2012
00217	NW	Overview	QBw1	06/09/2012
00218	W	Overview	QBw2	06/09/2012
00219	W	Detail	QBw2	06/09/2012
00221	NE	Overview	Qsc2	06/09/2012
00222	NE	Overview	Qc1	06/09/2012

Appendix III Quadrats

Ecotope type	**Central**	**Sub-central**	**Sub-central**	**Sub-central**	**Central**
Complex Name	**14 + Cl**	**10/4**	**9/7/6 + p**	**9/7+P**	**14**
Quadrat Name	Qc1	Qsc2	Qsc1	Qsc1	Qc1
Easting	174857	174860.05	175008	175001.09	174818.60
Northing	292147	292145.83	291284	291293.25	292086.80
Date	11/11/04	06/09/2012	11/11/04	05/09/2012	06/09/2012
Firmness	quaking	Very soft	soft	Quaking	Quaking
Burnt	No	No	No	No	No
Algae in hollows %	Absent	Absent	Absent	Absent	Absent
Algae in pools %	Absent	Absent	Absent	Absent	Absent
Bare peat %	Absent	1-3 (many indiv)	1-3 (many indiv)	1-3 (few indiv)	Absent
High hummocks %	na	Absent	na	Absent	Absent
Low hummocks %	34-50	26-33	11-25	34-50	26-33
Hollows %	4-10	4-10	11-25	4-10	4-10
Lawns %	Absent	Absent	Absent	11-25	4-10
Pools %	34-50	11-25	4-10	1-3 (several indiv)	34-50
Pool type	Interconnecting	Interconnecting	Regular	Interconnecting	Interconnecting
S.austinii hum type	na	Absent	na	Absent	Absent
S.austinii hum %	4-10	Absent	1-3 (many indiv)	Absent	Absent
S.austinii height(cm)	na	Absent	na	Absent	Absent
S.fuscum hum type	na	Absent	na	Relic	Absent
S.fuscum hum %	Absent	Absent	Absent	1-3 (few indiv)	Absent
S.fuscum	na	Absent	na	0-10	Absent

Ecotope type	**Central**	**Sub-central**	**Sub-central**	**Sub-central**	**Central**
Complex Name	**14 + Cl**	**10/4**	**9/7/6 + p**	**9/7+P**	**14**
height(cm)					
Leucobryum glaucum	Absent	Absent	Absent	Absent	Absent
Trichophorum type	Tussocks	Flats	Tussocks	Tussocks	Flats
Trichophorum %	4-10	1-3 (several indiv)	4-10	4-10	1-3 (many indiv)
S.magellanicum %	Absent	Absent	Absent	11-25	Absent
S.cuspidatum %	11-25	11-25	4-10	4-10	26-33
S.papillosum %	4-10	4-10	4-10	1-3 (many indiv)	11-25
S.denticulatum %	4-10	Absent	na	Absent	Absent
S.capillifolium%	4-10	11-25	4-10	4-10	11-25
S.tenellum %	na	1-3 (many indiv)	na	1-3 (few indiv)	Absent
S.subnitens %	Absent	Absent	na	1-3 (many indiv)	4-10
R.fusca %	Absent	Absent	Absent	Absent	Absent
R.alba %	4-10	4-10	1-3 (many indiv)	4-10	4-10
N.ossifragum %	1-3 (many indiv)	1-3 (many indiv)	11-25	1-3 (several indiv)	1-3 (many indiv)
Sphag pools %	34-50	11-25	4-10	1-3 (several indiv)	34-50
Dominant pool Sphag	S.cuspidatum	S.cuspidatum	S.cuspidatum	S.cuspidatum	S.cuspidatum
Sphag lawns %	Absent	Absent	Absent	11-25	4-10
Sphag humm %	34-50	11-25	11-25	11-25	11-25
Sphag holl %	4-10	4-10	4-10	4-10	1-3 (many indiv)
Total Sphag %	76-90	34-50	34-50	34-50	51-75
Hummocks indicators	S.austinii	Absent	S.austinii	S.fuscum	Absent
Cladonia portent %	51-75	26-33	4-10	11-25	1-3 (many indiv)
Other Cladonia sp	na	C.uncialis	na	C uncialis	
C. panicea %	na	1-3 (many indiv)	na	Absent	Absent

Ecotope type	**Central**	**Sub-central**	**Sub-central**	**Sub-central**	**Central**
Complex Name	**14 + Cl**	**10/4**	**9/7/6 + p**	**9/7+P**	**14**
Calluna cover %	26-33	26-33	11-25	11-25	11-25
Calluna height(cm)	21-30	11-20	21-30	11-20	11-20
Other Notable Species		*S. pulchrum; P. purpurea*		*Pleurozia purpurea*	D.anglica;P.purpurea;S.pulchrum
Other comment		former Qc1 (different description to decide reason)		diffs b/co location	New quadrat recorded in 2012

Note: Data for those 2004 quadrats re-surveyed in 2013 is given to the right of the original 2004 quadrat data in table above. Not all quadrats reported in 2004 were re-surveyed in 2013. Nonetheless, all 2004 quadrat data is given above. Additional quadrats were recorded where necessary. Some 2004 quadrats may have been classified under a different ecotope category in 2013; further detail is given within the report.

91D0 Bog woodland: Assessment sheet

Site name	Cloonshanville	Recorders	FFV, KC, GS	Photo no.s	DSC000127
Stop Number	1	Date	06/09/12	Grid ref	175327.291516

Positive indicator species	✓	Negative indicator species	% Cover
Trees and woody species		*Pteridium aquilinum*	0
Betula pubescens	✓	*Rubus* agg.	1%
Salix aurita	✓	*Rhododendron ponticum*	0
Salix atrocinerea	✓	Non-native conifer species	0
Dwarf shrubs, herbs & ferns		List:	
Dryopteris dilatata	✓		
D. carthusiana.	✓		
Carex rostrata	✓		
Juncus effusus	✓		
Molinia caerulea	✓		
Vaccinium oxycoccos			
Empetrum nigrum			
Vaccinium myrtillus			
Epilobium palustre		Others	0
Calluna vulgaris		List:	
Potentilla erecta	✓		
Mosses			
Polytrichum commune	✓		
Sphagnum fimbriatum			
Sphagnum fallax	✓		
Sphagnum palustre	✓		
Hylocomium splendens	✓		
Aulacomnium palustre			
Pass = *Betula pubescens*, *Sphagnum* species plus ≥5 of the other species	Pass	Pass = Negative indicator species <10%	Pass

Structural data	Result	Stop level	Passes
Median canopy height >4m	P	≥7 passes = pass	
Total canopy cover >30% of plot	P	<7 passes = fail	
Betula pubescens >50% of canopy	P		
Dwarf shrub layer cover <50%	P	**Result=9**	Pass
Calluna cover <40%	P		
% *Sphagnum* cover (pass = ≥25%)	P		
% Bryophyte cover (pass = ≥50%)	P		

Note: *Pinus sylvestris* 0%

Target tree species dbh	✓	Old trees & dead wood (any species)	Result
Betula pubescens 5-10 cm	✓	No. of old/senescing trees or dead stems >10cm	3

Target tree species dbh	✓	**Old trees & dead wood (any species)**	**Result**
10-20 cm	✓	No. of standing dead trees >10cm	3
>20 cm	✓	No. of fallen dead trees/branches >10cm	1
Pass = Over all stops each size class represented	(see below)	Pass = 1+ old/senescing trees (or dead stems) in >25% of stops and 4+ standing dead or fallen dead in total number of stops	(see below)
Betula pubescens regeneration	13		
Pass = ≥1 sapling >1m in all stops	(see below)		

Site name	**Cloonshanville**	**Recorders**	**KD, GS**	**Photo no.s**	DSC000218-219
Stop Number	**2**	**Date**	**06/09/12**	**Grid ref**	175154.291544

Positive indicator species	✓	**Negative indicator species**	**% Cover**
Trees and woody species		*Pteridium aquilinum*	0
Betula pubescens	✓	*Rubus* agg.	5%
Salix aurita	✓	*Rhododendron ponticum*	0
Salix atrocinerea		Non-native conifer species	0
Dwarf shrubs, herbs & ferns		List:	
Dryopteris dilatata			
D. carthusiana.			
Carex rostrata	✓		
Juncus effusus			
Molinia caerulea	✓		
Vaccinium oxycoccos			
Empetrum nigrum	✓		
Vaccinium myrtillus			
Epilobium palustre		Others	0
Calluna vulgaris	✓	List:	
Potentilla erecta	✓		
Mosses			
Polytrichum commune			
Sphagnum fimbriatum			
Sphagnum fallax	✓		
Sphagnum palustre	✓		
Hylocomium splendens	✓		
Aulacomnium palustre			
Pass = *Betula pubescens*, *Sphagnum* species plus ≥5 of the other species	Pass	Pass = Negative indicator species <10%	Pass

Structural data	Result	Stop level	Passes
Median canopy height >4m	P	≥7 passes = pass	
Total canopy cover >30% of plot	F	<7 passes = fail	
Betula pubescens >50% of canopy	P		
Dwarf shrub layer cover <50%	P	**Result=8**	Pass
Calluna cover <40%	P		
% *Sphagnum* cover (pass = ≥25%)	P		
% Bryophyte cover (pass = ≥50%)	P		

Note: *Pinus sylvestris* 0%

Target tree species dbh	✓	**Old trees & dead wood (any species)**	**Result**
Betula pubescens		No. of old/senescing trees or dead stems >10cm	0
5-10 cm	✓		
10-20 cm	✓	No. of standing dead trees >10cm	0
>20 cm		No. of fallen dead trees/branches >10cm	0
Pass = Over all stops each size class represented	Pass	Pass = 1+ old/senescing trees (or dead stems) in >25% of stops and 4+ standing dead or fallen dead in total number of stops	Pass
Betula pubescens regeneration	24		
Pass = ≥1 sapling >1m in all stops	Pass		

Summary results:

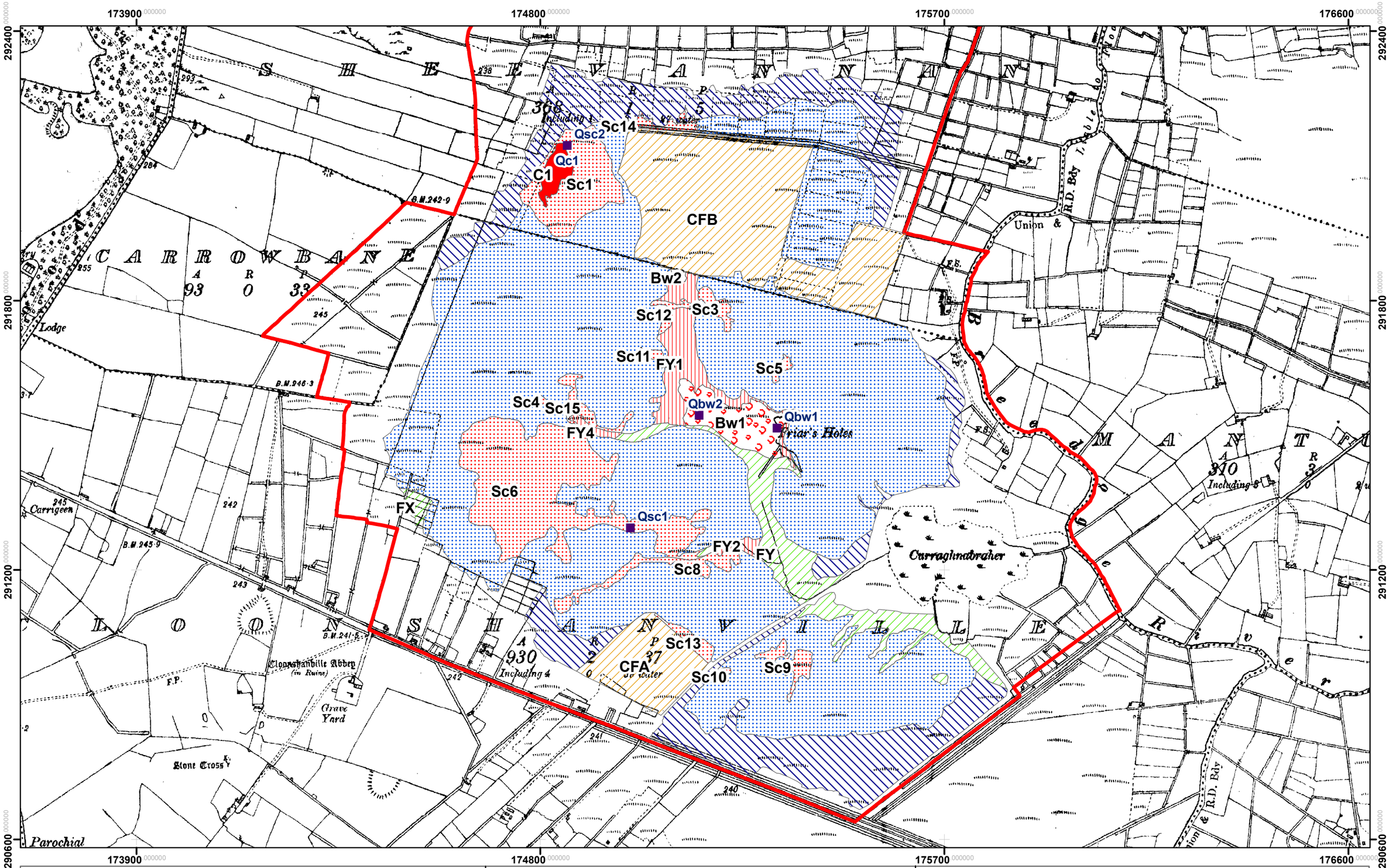
- Single stop level – 2 stop passes
- Combined stops level – 4 passes

According to the standardized assessment criteria, these results would result in a site assessment of Green (Favourable).

This bog woodland is wet and healthy, however, with birch and Salix species in a range of size classes. Regeneration is present. Stop 2 fails at canopy cover because the tall, well developed bog woodland is narrow at this point in the site, grading into more open woodland and birch-scrub flush. A 400 m² stop size was used at this site as it was the first bog woodland site surveyed in 2012. After this (and because of concerns about fitting this size plot in frequently small bog woodlands), 100 m² stops were used. If this stop size were used, Stop 2 would have passed at canopy cover level.

The overall site assessment is Green (Favourable).

Appendix IV Survey maps



Raised Bog Monitoring & Assessment Survey 2013

Map 1: Ecotopes Map and Quadrats

Ecology and Environmental Consultants Ireland Ltd.

Cloonshanville SAC (000614)
Co. Roscommon

1:8,000

N

0 100 200 400 600 800 Meters

Legend

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

Raised Bog Monitoring & Assessment Survey 2013

Map 2: Vegetation community complexes

Ecology and Environmental Consultants Ireland Ltd.

Cloonshanville SAC (000614)
Co. Roscommon

1:8,000

N

0 115 230 460 690 920 Meters

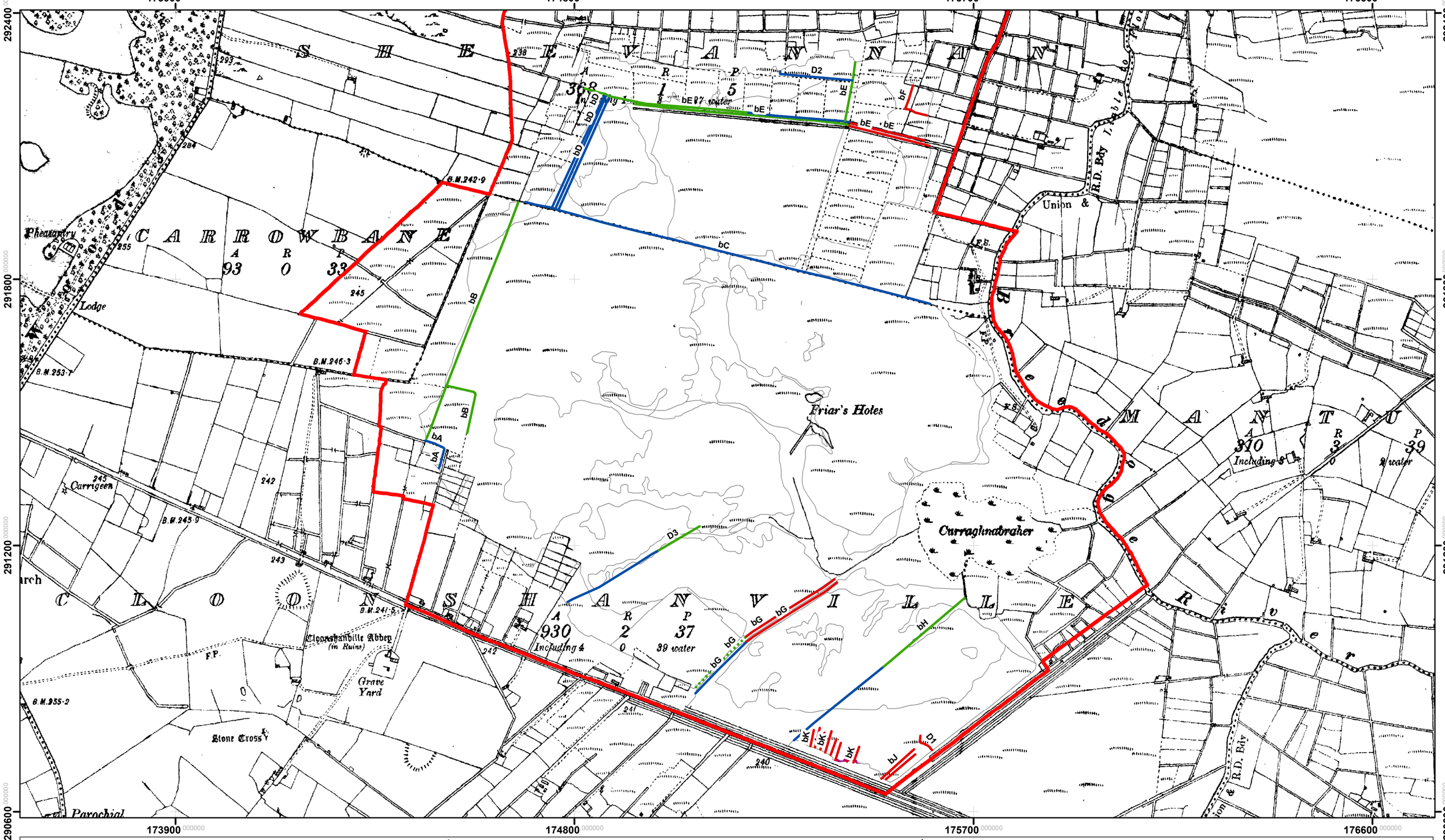
Legend

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.

Cloonshanville SAC (000614)
Co. Roscommon

1:8,000

N

0 112.5 225 450 675 900 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