

Addergoole Bog (SAC 000297), Co. Galway

Executive Summary

This survey, carried out in October 2012, aimed to assess the conservation status of habitats listed on Annex I of the European Habitats Directive (92/43EEC) on the high bog at Addergoole 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 covers 39.22 ha (25.07%) of the high bog area. A large, very wet active flush is situated in the centre of the site. Central ecotope with *Sphagnum* cover in excess of 75% is found at two locations in the north-eastern part of the bog, surrounded by high quality sub-central ecotope. Additional sub-central ecotope areas, most of which support good quality *S. cuspidatum* bog pools, are found across the bog, particularly south of the central flush. Western raised bog indicator species, as well as indicators of flushed conditions, were found throughout Active Raised Bog.

Degraded Raised Bog covers 117.2 ha (74.93%) of the high bog area. It is drier than Active Raised Bog and supports a lower density of *Sphagnum* mosses. It has a less developed micro-topography and *Sphagnum* lawns are generally absent. Species indicative of flushed conditions were relatively frequent throughout Degraded Raised Bog areas, especially in the northern half of the site. At the northern edge of the site, there is an intact transition from (inactive) raised bog to *Cladium* fen. Inactive flush occurs in the transition zone, and is also found around the central active flush and in the southwest of the site.

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 sub-central ecotope in Active Raised Bog.

Addergoole Bog features a Bog Woodland (1.22 ha) surrounded by active and inactive flush composed of pure downy birch (*Betula pubescens*). Epiphytic lichens were notably abundant. The *Sphagnum* layer was well-developed, mainly comprising *S. palustre* and *S. cuspidatum*.

No restoration works have taken place at the site.

The current conservation objective for Addergoole 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 1.22 ha while that for Active Raised Bog is 99.67 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. The objective for the Rhynchosporion depression is retain the Area and quality of the habitat by preventing any further drying out of the high bog.

There has been a decrease in the area of Active Raised Bog (0.5 ha) at Addergoole Bog in the 2005 to 2012 period. This has occurred in the northeast of the site, where peat cutting has led to drying out of the bog surface. Peat cutting is currently taking place within 50 m of sub-central ecotope in this part of the bog, and large volumes of water were noted flowing off the high bog through erosion channels and drains. Some new peat forming areas have been described at the site, which are the result of a more comprehensive field mapping rather than actual changes.

Peat cutting, associated drainage and drainage on adjoining cutover are the most threatening current activities at the site. A total of 1.90 ha of high bog have been lost in the reporting period due to peat cutting and this activity is considered to be the main reason for the decline in Active Raised Bog along the north-eastern section of high bog. 4.042 km of drains remain functional and 1.392 km are reduced functional. Drains are present on cutover adjacent to the high bog, and the drainage system to the west is particularly wide and deep.

Active Raised Bog has been given an overall **Unfavourable Bad–Declining** conservation status assessment. Habitat Area has slightly decreased and quality has remained inadequate in the reporting period. Current area value is below favourable reference values, whereas S&Fs are below favourable reference values. Future Prospects are considered Unfavourable Bad-Declining as impacting activities (peat cutting and drainage) continue to threaten the habitat.

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 an **Unfavourable Bad-Declining** conservation status assessment.

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

A series of **recommendations** have been also given, these include: cessation of peat cutting; restoration works on the high bog and cutover areas; further hydrological and topographical studies to ascertain more accurate FRVs; further hydrological studies to clarify potential impacts of restoration works on nearby fen and agricultural land; and further botanical monitoring surveys.

Site identification

SAC Site Code	000297	6" Sheet:	GY69
Grid Reference:	E 131000 / N 234000	1:50,000 Sheet:	45
High Bog area (ha):	156.42ha ¹		
Dates of Visit:	22 to 25/10/12		
Townlands:	Addergoole, Lisheenanoran, Curraghmore & Baranny		

¹ The current extent of the high bog is 156.42ha, while that reported in 2005 was 157.82ha (Fernandez *et al.*, 2005). This discrepancy is the result of more accurate mapping of the high bog edge by using the higher resolution 2010 aerial images compared to those used in 2005, rather than any actual increase in high bog extent. High bog area has in fact decreased in the 2005-2012 period due to peat cutting. The actual high bog extent in 2005 was 158.32ha (see tables 8.1 and 8.3 2004 (amended) figures).

Site location

Addergoole Bog is located on the eastern shores of Lough Corrib approximately 8 km north of Galway city in County Galway. This site is part of the Lough Corrib SAC (000297) and was previously a proposed NHA (former site code 000223). The River Clare runs to the south and the Cregg River to the north. The Galway to Headford road runs to the east of the present extent of the site. The site may be accessed from a bog road, leading west from the Galway to Headford road, which runs along the south of the bog. It should be noted that the bog road is normally closed with a locked gate to deter fly-tipping.

Description of the survey

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

ground firmness; and presence of *Cladonia* species. A list of photographic 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 Addergoole Bog was re-surveyed. Sections mapped as sub-marginal, sub-central and central ecotope in 2005 were surveyed in more detail. These are the areas where changes were likely to have occurred. Quadrats, which describe the micro-topographical features and indicator species, recorded in the 2005 project (Fernandez *et al.* 2005) were re-surveyed 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 10 x 10m 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

Addergoole Bog has been classified geomorphologically as a Broad Floodplain bog type (Kelly *et al.*, 1995) and as a Western/Intermediate type raised bog (Cross, 1990). The bog is roughly shaped as a square with regular sides and many small lobes around the edges. Lough Corrib occurs to the west of the bog and there is an intact bog/fen transition along the north-western margin.

Ecological Information

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

The following Raised Bog EU Annex I habitats, are found in Addergoole 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 Addergoole Bog is 39.22 ha (25.07% of the high bog), which is a decrease of 26.09 ha since 1994.

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

Central ecotope was found at two locations (C1 and C2), and sub-central ecotope was found at ten locations (Sc1 to Sc4 and Sc9 to Sc14) (see Appendix IV, Map 1). Western raised bog indicators, including *Campylopus atrovirens* and *Pleurozia purpurea*, occurred throughout the Active Raised Bog. Species indicative of flushed conditions, such as *Myrica gale*, *Molinia caerulea*, *Aulacomnium palustre* and *Empetrum nigrum* were more frequent throughout Active Raised Bog, especially in the northern half of the site, than is typical for raised bogs.

Two central ecotope community complex types were recorded. Complex 15 was characterised by high (51-75%) cover of *Sphagnum* with 11 to 25% cover of interconnected *Sphagnum cuspidatum* and *S. denticulatum* pools. Lawns of *S. papillosum*, *S. magellanicum*, and *S. cuspidatum* extended from pools. Low and high hummocks of *S. capillifolium*, *S. austinii*, *S. fuscum* and *Leucobryum glaucum* were present. In association with this complex was complex 10/15, which consisted of very wet lawns of *Sphagnum* (cover c. 85%), mainly *S. papillosum* and *S. magellanicum*, with frequent low hummocks of *S. capillifolium*, *S. austinii*, *Aulacomnium palustre* and occasionally *S. fuscum*.

The highest quality sub-central community complex recorded was 4+P. The ground in this complex was very soft to quaking with high (51-75%) *Sphagnum* cover and frequent (11-25% cover) interconnecting pools dominated by *S. cuspidatum* with some *S. denticulatum*. Interpool areas were low, with prominent *Rhynchospora alba* and *Myrica gale*, as well as *Eriophorum* species. *Campylopus atrovirens* was locally frequent. The most widespread sub-central community complex recorded was 10/4, which was characterised by low hummocks and lawns of *Sphagnum papillosum* and *S. magellanicum* with low *Calluna vulgaris*, *Rhynchospora alba* and *Eriophorum angustifolium*. Small pools were scattered throughout, and these were mainly shallow and filled with *S. cuspidatum*. In the northeast of the site, a very wet and somewhat flushed complex 9/10 was recorded in which tall *Calluna* was abundant, along with *Eriophorum vaginatum* and lesser amounts of *E. angustifolium*, *Erica tetralix*, *Empetrum nigrum* and *Aulacomnium palustre*. *Sphagnum capillifolium* and *S. papillosum*

were the most abundant *Sphagna*. Another flushed complex type found in the northern half of the site was 9/7+P, which was similar to 4+P but with less *Sphagnum* and more cover of *Eriophorum vaginatum* and *E. angustifolium*. A poor quality complex transitional to sub-marginal ecotope that was frequently recorded in the southern half of the site was 9/7/6+P. This complex was characterised by frequent (11-25% cover) *Sphagnum cuspidatum* dominated pools separated by high interpool areas dominated by *Calluna* that were relatively dry and firm underfoot.

The active part of the central flush **Z** that bisected the site was very wet and contained two pool systems. The southern pool consisted of two areas of open water with some emergent *Menyanthes trifoliata*. These were bounded by stands of *Molinia caerulea* and occasional *Juncus effusus* that graded into floating mats of *Sphagnum cuspidatum* with some *S. fallax* and *S. palustre*. The pool at the north-east end of the flush consisted of open water and a floating *Sphagnum cuspidatum* mat with occasional tussocks of *Molinia caerulea*. Away from the pools, the transition from inactive to active flush comprised a seasonally flooded area with frequent pools containing *Sphagnum cuspidatum* and *S. palustre*. *Aulacomnium palustre* hummocks were frequent at the edges of the pools with tall *Calluna vulgaris*, *Eriophorum vaginatum* and *Myrica gale* abundant between pools. At the time of survey, the interpool areas were flooded to a depth of 10-50 cm. The central part of flush **Z** was extremely wet and treacherous. It was in effect a large *Sphagnum cuspidatum* dominated pool with abundant islands comprised of *Aulacomnium palustre* topped by *Calluna vulgaris*, *Molinia caerulea* and *Juncus effusus*. *Menyanthes trifoliata* was locally abundant.

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 Addergoole Bog is 117.2 ha (74.93% of the high bog).

Degraded Raised Bog includes the sub-marginal, marginal and face bank ecotope, 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. Species indicative of flushed conditions, such as *Myrica gale*, *Molinia caerulea*, *Phragmites australis* and *Empetrum nigrum*, were more frequent throughout Degraded Raised Bog areas, especially in the northern half of the site, than is typical for raised bogs.

The sub-marginal ecotope features the most developed micro-topography within Degraded Raised Bog. The most widespread sub-marginal ecotope complex at Addergoole Bog was 9/7/6, which was characterised by low hummocks and hollows forming reasonably good microtopography. *Calluna*

vulgaris, *Narthecium ossifragum* and *Eriophorum vaginatum* were the most abundant vascular plants, with *Sphagnum* cover averaging 11 to 25%, mainly *S. capillifolium*. Flushed variants of this complex with *Myrica gale* or *Phragmites australis* with *Myrica* were abundant in the northern half of the site. Complex 9/7 was a wetter community complex type that occurred in places, particularly near flushes. It differed from the more common 9/7/6 in higher *Sphagnum* cover (26-33%) and greater abundance of *E. vaginatum* (34-50%).

Marginal ecotope is slightly drier than sub-marginal ecotope and mainly occurs as a narrow band near the margins of the high bog. The most frequent complex type was 6/7/3. Microtopography was generally poor and mainly consisted of *Calluna* hummocks interspersed with hollows and flats dominated by *Narthecium ossifragum* and *Carex panicea*. At the high bog edges, *Myrica gale* and/or *Phragmites australis* were often present; where these were frequent, the complex was mapped as 6/7/3+My or 6/7/3+Ph, respectively. Marginal complex 3/6 was found in some places and differed from the previous complex in the poorer microtopography dominated by *Narthecium* flats. Bare peat, sometimes with algal cover, was frequent.

Face bank ecotope is characterised by firm ground, tall *Calluna vulgaris*, poor *Sphagnum* cover and a flat micro-topography. This ecotope was encountered in several places along the bog margin.

The high bog also features several inactive flushes (**I**, **X** and **Z**). Flush **I** was fairly dry, and *Molinia caerulea*, *Myrica gale*, *Calluna vulgaris*, *Carex panicea*, *Narthecium ossifragum* and *Sphagnum capillifolium* were the most abundant species, with *Schoenus nigricans* locally frequent. Flush **X** is located where the raised bog is in transition to *Cladium mariscus* fen. The vegetation of flush **X** consisted of abundant *Molinia caerulea* and frequent *Phragmites australis*, *Calluna vulgaris*, *Myrica gale* and *Erica tetralix*. The inactive south-eastern arm of flush **Z** consisted of a narrow band of tall, flushed vegetation. *Schoenus nigricans*, *Aulacomnium palustre* and *Myrica gale* were abundant here, with *Molinia caerulea* locally so. Along the northern side of flush **Z**, the inactive flush zone was a band of vegetation similar to sub-marginal complex 9/7, with the addition of frequent flush species, including *Myrica gale*, *Aulacomnium palustre* and frequent *Sphagnum capillifolium*. This area was mainly flooded at the time of survey. The inactive parts of the western arm of flush **Z** were dominated by tall *Myrica gale*, *Calluna vulgaris* and *Molinia caerulea* with frequent *Rubus fruticosus*.

Depressions on peat substrates of the Rhynchosporion (7150)

Rhynchosporion vegetation was widespread on Addergoole Bog. It was 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 occurred within *Sphagnum* hollows and

along *Sphagnum* pool edges and on lawns. Typical plant species included *Rhynchospora alba*, *Sphagnum cuspidatum*, *S. magellanicum*, *S. papillosum*, *Eriophorum angustifolium* and *Myrica gale*.

R. alba was also found within Degraded Raised Bog, but always associated with wet features such as hollows and run off channels.

R. fusca was recorded in small relict pools in marginal ecotope along the southern edge of the high bog.

Bog Woodland

Bog Woodland is found on the high bog at Addergoole Bog within the central flush Z and it covers 1.22 ha.

The Bog Woodland was a healthy stand of pure downy birch (*Betula pubescens*). In the centre and northern parts of the stand, canopy height was approximately 8 m tall and canopy cover was approximately 40%. The trees were notably clothed in an abundance of epiphytic lichens, especially *Usnea* species, as well as *Hypnum andoi*. *Sphagnum palustre*, *S. cuspidatum* and *Eriophorum vaginatum* were the most abundant field layer species. *Osmunda regalis*, *Dryopteris carthusiana*, *Juncus effusus*, *Myrica gale* and *Sphagnum squarrosum* were found at least occasionally. *Pteridium aquilinum* was occasional in the main body of the woodland, but became abundant towards the northern edge. Towards the woodland edge, trees decreased in height to approximately 6-8 m with canopy cover of 30-40%. Cover of lichens was less and the surface was much more flushed, with abundant standing water. *Juncus effusus* was abundant as was *Sphagnum palustre*, at least in patches. *Osmunda regalis* and *Myrica gale* were frequent, while *Dryopteris carthusiana*, *Sphagnum squarrosum*, *S. fimbriatum*, *S. fallax*, *S. cuspidatum*, *Aulacomnium palustre*, *Polytrichum commune*, *Hylocomium splendens*, *Eriophorum vaginatum* were also present. The boundary between woodland and very open birch scrub (where saplings average 1 m height) on active flush was abrupt.

Detailed vegetation description of the high bog

A detailed description of high bog vegetation recorded during the 2012 survey of Addergoole 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 Addergoole 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	H	-1	1.90 ha of the high bog cut away	Inside High Bog: 28 different locations around High Bog	7110/7120/7150
J02.07	Drainage	H	-1	5.434 km ¹	Inside High Bog	7110
J02.07	Drainage	M	-1	5.434 km ¹	Inside High Bog	7120/7150
J02.07	Drainage	H	-1	n/av	Outside High Bog	7110
J02.07	Drainage	M	-1	n/av	Outside High Bog	7120/7150
G01.03	Motorised vehicles	L	-1	c. 1 km	Inside High Bog	7120
I01	Invasive alien species	L	-1	< 0.1 ha ³	Inside High Bog	7120

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

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

² This figure includes blocked drains on high bog.

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

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

Peat cutting

This activity has taken place at 28 locations along the northwest (3 locations (plots)), northeast and east (8 locations) and south and southwest (17 locations) sections of high bog, as well as some other locations on the northwest cutover adjacent to the high bog (E 130582/ N234018) in the 2004-2010 period. This has reduced the area of high bog by 1.90 ha. 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 49 plots were cut on Addergoole Bog in 2010/2011; 33 plots were cut in 2012 and 12 in 2013. Thus the area of high bog lost on Addergoole Bog during the reporting period

is in excess of 1.90 ha, but since there is no aerial photography available post 2010, the area lost from 2010 to 2012 cannot be estimated.

Much of the turf cutting at Addergoole Bog is lateral cutting along trenches dug deep into the high bog from the margins. Peat cutting seems particularly intensive on the western and north-western margins of the high bog, including near the sensitive location where flush **Z** exits the high bog (E 1306634 / N 233457). Active peat cutting also took place in the 2004-2010 period within 50 m to the east of **Sc1** (E 131788 / N 233848). Significant cracking and slumping of the high bog was noted in this area during the 2012 survey, and losses of sub-central ecotope within the eastern section of **Sc1** appear to be the direct result of peat cutting.

Significant cracking and slumping of the high bog was recorded near active peat cutting along the south-eastern margin of the bog at E 131442 / N 233038.

A significant flow of water was noted leaving the high bog at a face bank southwest of **Sc14**. This was not associated with a drain, but instead with erosion channels in the area. Similar significant amounts of water exiting the bog were noted to the northeast of **Sc1**.

Peat cutting is considered to have a high importance/impact on high bog habitats. Although no impacts on Bog Woodland were noted in this assessment, there is the potential for future impacts on this habitat from peat cutting. The continuation of these peat cutting will prevent the recovery of the high bog, and the recovery of ARB towards FRVs as restoration works cannot be employed until such activities stop. In addition, old face banks and high bog and cutover drainage associated with cutting continue to cause negative impacts on the high bog habitats.

Drainage

High bog drainage

Table 6.2 shows an increase in the length of functional drains on Addergoole Bog. This is the net result of the maintenance of a formerly reduced functional drain in addition to the loss of some functional drains due to removal of the high bog surrounding them by peat cutting. The majority of drains in the high bog remain functional (4.042 km). Reduced functional drains are still impacting on high bog habitats and will continue to do so until they are blocked and become completely infilled and thus non-functional.

Due to the large number of short drains around the bog margin, it was not possible to survey most of them in 2012. Thus, some of these drains may have become naturally blocked and the actual extent of functional drains may be less than is indicated in table 6.2. Conversely, some new, short

drains associated with lateral peat cutting may have been overlooked and not digitised in 2012, leading to an underestimate.

High bog drainage is considered to have a high importance/impact on Active Raised Bog and a medium importance/impact on Degraded Raised Bog and Rhynchosporion depressions. Although no impacts on Bog Woodland were noted in this assessment, there is the potential for future impacts on this habitat from drainage.

No blockage of drains has occurred to date.

Table 6.2 High bog drainage summary

Status	2005 (km) ¹	2012 (km)	Change
NB: functional	3.939	4.042	(+)0.103
NB: reduced functional	1.575	1.392	(-)0.183
NB: non- functional	0.902	0.902	0.000
B: functional	n/a	n/a	n/a
B: reduced functional	n/a	n/a	n/a
B: non- functional	n/a	n/a	n/a

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

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

Table 6.3 below provides a more detail description of the drainage present on the high bog at Addergoole Bog including any change in their functionality in the 2005 – 2012 reporting period (see Map 3).

Table 6.3 High bog drainage detail

Drain Name	Length (km)	2005 status	2012 status	Change	Comment
bA1	0.183	NB: reduced functional	NB: functional	Yes	Drain maintained; water flowing recorded during visit
bA2	0.517	NB: non-functional	NB: non- functional	No	Drain wrongly classified as functional in 2005; this drains corresponds with flush Z and it is not visible on the ground
bA3-6	0.526	NB: functional	NB: functional	No	Lots of bare peat noted near bA3 during visit; likely to have been maintained
bB1-7	0.847	NB: functional	NB: functional	No	
bC	0.670	NB: reduced	NB: reduced	No	

Drain Name	Length (km)	2005 status	2012 status	Change	Comment
		functional	functional		
bD	0.457	NB: reduced functional	NB: reduced functional	No	
bD1;2	0.150	NB: functional	NB: functional	No	
bD3	0.034	NB: reduced functional	NB: reduced functional	No	This drain was wrongly classified as functional in 2005
bD4	0.035	NB: functional	NB: functional	No	
bE	0.089	NB: reduced functional	NB: reduced functional	No	
bF	0.068	NB: functional	NB: functional	No	
bG	0.230	NB: non-functional	NB: non- functional	No	
bH	0.155	NB: non-functional	NB: non- functional	No	
bJ	0.062	NB: functional	NB: functional	No	
bK1-3	0.160	NB: functional	NB: functional	No	
bL1-3	0.211	NB: functional	NB: functional	No	
bM1-5	0.149	NB: functional	NB: functional	No	
bN1-10	0.747	NB: functional	NB: functional	No	
bO1-8	0.904	NB: functional	NB: functional	No	
bP	0.079	NB: reduced functional	NB: reduced functional	No	This drain was wrongly classified as functional in 2005
bQ	0.063	NB: reduced functional	NB: reduced functional	No	Drain already present in 2005 but not mapped

Bog margin drainage

The cutover areas were not surveyed for drains during 2012.

Drains associated with either currently active or no longer active peat cutting are present along the entire cutover, which surrounds the remnant high bog with the exception being the northern margin, which grades naturally into fen. These drains continue to drain the high bog and impact on high bog habitats. A 1.5 km long, wide drainage system is located to the west of the high bog on cutover bog (E 130414 / N 233275); it flows mainly north into the Cregg River and eventually into Lough Corrib. It is likely that this drain is actively maintained.

High bog drainage is considered to have a high importance/impact on Active Raised Bog and a medium importance/impact on Degraded Raised Bog and Rhynchosporion depressions. Although

no impacts on Bog Woodland were noted in this assessment, there is the potential for future impacts on this habitat from drainage.

Fire history

No fire events have been reported on the high bog in the 2005-2011 reporting period.

Kelly *et al.* (1995) mapped several areas of high bog that had been recently burnt prior to their survey, especially in the south-eastern corner and immediately south of flush Z. Fernandez *et al.* (2005) cite Conaghan (pers. comm.) in stating that this part of the high bog had been burnt two years in succession in the early nineties. Kelly *et al.* (1995) believed that fire frequently disturbed the high bog vegetation, as there were few large hummocks and the *Cladonia* spp. cover was sparse. Douglas and Grogan (1985) also noted that lichens and hummocks were uncommon and that the bog had been burnt in the past.

Based on vegetation characteristics, Fernandez *et al.* (2005) suggest that large parts of the site had burnt in the 1995-2005 period. They suggested 2000-2001 as the most likely period for fire damage, based on the absence of evidence of fire in the 2000 aerial photographs and the absence of clear, recent burn damage during the 2005 survey. They noted that *Calluna vulgaris* cover was sparse and short, *Cladonia* spp. cover was sparse, *Rhynchospora alba* was frequent, and microtopography was quite poorly developed with the dominance of flats with few low hummocks. Given the unusual, transitional nature of the vegetation at Addergoole Bog, however, caution should be used in interpreting vegetation in the absence of other evidence of fire. The vegetation characteristics noted by Fernandez *et al.* (2005) still persisted in 2012 despite the absence of fire. It is likely that the oceanic climate of the site and the flushing seen throughout the high bog are responsible for at least some of these vegetation features. In conclusion, it appears that the site has not been burned for at least 12 years and has probably remained unburned for closer to 20 years.

Invasive species

The non-native moss *Campylopus introflexus* was recorded colonising bare peat in marginal ecotope and was locally abundant in complex 3/6. No invasive tree species were recorded in 2012.

Invasive species are considered to have low importance/impact on Degraded Raised Bog.

Afforestation and forestry management

There are no forest plantations on or near Addergoole Bog. The Bog Woodland is unmanaged.

Other impacting activities

Machinery appear to traverse part of the northwest section of high bog (at grid references E 130604 / N 233321 and E 130656 / N 233726), leaving visible tracks approximately 1 km in total length. This traffic is likely to be associated with peat cutting operations, and the high bog is probably used rather than lower-lying and wetter ground adjacent to Lough Corrib. This activity is considered to have low importance/impact on Degraded Raised Bog.

Dumping was a negative activity formerly taking place on adjoining cutover. This appears to have mainly ceased due to the installation of a locked gate on the track to the south of the high bog.

Conservation activities

No conservation management actions have been carried out on Addergoole Bog.

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 that 0.5 ha of Active Raised Bog has been lost since the previous survey in 2005. This represents the actual loss of Active Raised Bog habitat, but greater changes to area estimates have been made as a result of more comprehensive surveying which led to improved mapping accuracy and re-interpretation of the vegetation.

Sub-central ecotope area **Sc1** has experienced a real loss of 0.5 ha due to the northeast part drying out. This is a direct result of peat cutting, which is taking place within 50 m of **Sc1**. As noted above, significant volumes of water were noted flowing off the high bog to the northeast of **Sc1**, and major cracking and slumping of the high bog was noted to the east of **Sc1**.

Changes were made to the boundaries of **Sc1**, **Sc2**, **Sc3** and **Sc9** as a result of more comprehensive surveying in 2012 which led to more accurate mapping. Similar changes due to more comprehensive surveying were also made to the boundaries of flush **Z**. Open water areas within flush **Z** have also been remapped to follow boundaries as they appear on recent, higher resolution aerial photography. Although there may have been some infilling in the intervening period, the vast majority of changes would be due to increased mapping accuracy.

Sub-central ecotope areas **Sc5**, **Sc6**, **Sc7** and **Sc8** are no longer present, as they are now considered to be part of a much larger **Sc4**. **Sc4** includes areas of sub-marginal ecotope which were considered too small to map. This means that the area of ARB may be overestimated to some extent. A detail resurvey of this area would be useful. These changes are the result of more comprehensive surveying, leading to more accurate mapping, and also due to re-interpretation of the vegetation.

Central ecotope areas **C1** and **C2** have been newly mapped as a result of more comprehensive surveying, more accurate mapping and re-interpretation of the vegetation.

Sc10, **Sc11**, **Sc12**, **Sc13** and **Sc14** were mapped for the first time in 2012 as a result of more comprehensive surveying and mapping.

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 99.67 ha (based on 1994 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 (39.22 ha) is 60.65% below the FRV. A current area value more than 15% below FRV falls into the **Unfavourable Bad** assessment category.

The long term (1994-2012) trend indicates a significant reduction in the area of Active Raised Bog at the site (26.09ha) (see table 8.1). A more recent and short term trend analysis (7 years; 2005-2012) shows a slower rate of loss with a 0.5 ha (1.26%) decrease of Active Raised Bog. Nevertheless, the habitat Area is given a **Decreasing** trend assessment.

The Area of Active Raised Bog at Addergoole 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 ecotope and active flush, i.e. the higher quality wetter vegetation communities. This value is 19.0 ha (half of 38.0 ha, the current area of Active Raised Bog (excluding Bog Woodland)). The current value is 6.94 ha, which is 63.47% below the FRV. Therefore S&Fs are given an **Unfavourable Bad** assessment.

Both long term (1994-2012) and short term (7 years; 2005-2012) assessments indicate no real change in the area of central ecotope and active flush, and therefore the S&Fs are given a **Stable** trend.

Quadrats analysis (**Qc1**, **Qsc3**, **Qsc6** and **Qsc7**) indicates the following:

Qc1: this quadrat was previously classified as sub-central ecotope (Qsc1; complex 4/10). The main difference between surveys was that in 2012 total *Sphagnum* cover was higher (76-90% compared with 60% in 2005). This was mainly due to higher cover of *S. magellanicum* and *S. papillosum* lawns. Pools occupied slightly less of the quadrat in 2012 (1-3%) than in 2005 (4-10%). *Aulacomnium palustre*, which indicates flushed conditions, was noted from the quadrat in both years. The differences between survey years may represent real changes, i.e. wetter conditions possibly due to subsidence related to peat cutting to the northeast and east. Differences in quadrat methodology between years, including larger quadrat size and not using a defined quadrat boundary, as well as error in repositioning the quadrat, however, mean that apparent changes may not in fact be real.

Qsc3: as with the previous quadrat, the main difference between surveys was higher estimated cover of *Sphagnum* in 2012 (34-50%) as compared with 2005 (30%). This consisted of higher cover of both *Sphagnum* hummocks and pools. *S. cuspidatum* and *S. papillosum* were both recorded as occupying 11-25% cover in 2012 and 4-10% cover in 2005; *S. magellanicum* was also estimated to be more abundant in 2012 (4-10% versus 1-3% in 2005). The ground was considered to be softer in 2012 than in 2005. These differences were considered in the field to be minor, and it is most likely that they are due to changes in quadrat recording methods and error in repositioning the quadrat.

Qsc6 and **Qsc7**: were newly recorded in 2012, as no quadrats were recorded in 2005 in the southern half of the site. Both were recorded in the expanded **Sc4** sub-central ecotope area in different community complexes. See Appendix II for quadrat data.

Typical good quality indicators and typical plant species are still found in central and sub-central ecotope and active flush throughout the entire bog. *Cladonia portentosa* is notably uncommon on Addergoole Bog; however, this may be due to the more oceanic and flushed conditions at this site compared with typical raised bogs.

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

Future Prospects

Although the rate of decrease in Active Raised Bog area has slowed as compared to the previous reporting period, pressures from impacting activities and the lack of conservation management mean that further decreases in area are highly likely. Peat cutting and marginal drainage associated with peat cutting are the most significant activities impacting on the conservation status of Addergoole Bog. Peat cutting currently takes place at a number of locations around most of the high bog margin. As noted above, peat cutting seems particularly intensive on the western and north-western margins of the high bog; as this is where flush **Z** exits the high bog, increases in the rate of drainage could lead to drying of the active flush in the future, thus negatively impacting raised bog S&Fs. Furthermore, peat cutting is occurring within 50m of sub-central area **Sc1** and has resulted in significant cracking and slumping of the high bog. Unless peat cutting stops in this area and conservation measures are taken quickly, further losses of Active Raised Bog here are inevitable. These might also include losses of the nearby central ecotope.

The remaining high bog dome is raised considerably above the cutover surface that surrounds it. The cutover itself supports several drainage channels, some of which are quite wide and deep. These factors imply that even if peat cutting is halted immediately, water loss from face banks and via the surrounding drainage network will continue to negatively impact on Active Raised Bog in the absence of conservation works.

Cutover areas will play a major role in the restoration of the habitat as the current characteristics of the high bog (i.e. small size and steep slopes caused by cutting and drainage) may make it difficult to regenerate previous Active Raised Bog values on the high bog.

Habitat **Area** is currently 39.22% below FRV (see table 8.4) and a Decreasing trend is foreseen. The habitat Area is expected to be more than 15% below FRV in the following two reporting periods (12

years). Thus, habitat's **Area Future Prospects** are assessed as **Unfavourable Bad-Decreasing**. Habitat's **S&Fs** are currently 63.47% below FRV (see table 8.4) and a declining trend is also foreseen. Therefore S&Fs are expected to be more than 25% below FRV in the following two reporting periods. **S&Fs Future Prospects** are assessed as **Unfavourable Bad-Declining**.

The overall habitat's Future Prospects are Unfavourable Bad-Declining (see table 8.5). Blocking of remaining reduced-functional and functional drains both on the high bog and cutover and cessation of peat cutting is necessary.

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

Table 8.1 Changes in Active Raised Bog area

Active Ecotopes	1994 ¹	2005	2005 (amended)	2012	Change (2005-2012)	
	Area (ha)	Area (ha)	Area (ha)	Area (ha)	Area (ha)	%
Central	0.00	0.00	2.48	2.48	0.00	0.00
Sub-central	60.79	22.07	31.56	31.06	(-)0.50	(-)1.58
Active flush	3.30	3.30	4.46	4.46	0.00	0.00
Bog Woodland	1.22	1.22	1.22	1.22	0.00	0.00
Total	65.31	26.59	39.72	39.22	(-)0.5	(-)1.26

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

Note: Table 8.1 includes 2005 figures and 2005 amended figures. The latter shows the ecotope area believed to be present in 2005 after surveying improvements in 2012. The comparison between 2005 (amended) and 2012 illustrates the actual changes in ecotope area in the 2005-2012 period. Any change in ecotope area between the 2005 and the 2005 (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	Unknown	This specific area within Sc1 was not comprehensively surveyed in 2004. This is likely to be the result of more comprehensive surveying in 2012 which resulted in more accurate mapping. However, also the result of re-interpretation of	Higher cover of <i>Sphagnum</i> , especially <i>S. magellanicum</i> and <i>S. papillosum</i> lawns and fewer pools in 2012. Possibly due to wetter conditions following slight subsidence, but not possible to rule out methodological differences and

Area	Quadrats	Trend	Comment	Quadrats analysis
			vegetation.	quadrat location error.
C2	None	Unknown	This specific area within Sc1 was not comprehensively surveyed in 2004. This is likely to be the result of more comprehensive surveying in 2012 which resulted in more accurate mapping. However, also the result of re-interpretation of vegetation.	
Sc1	Qsc3	Decreasing	Slight changes in boundary (smaller). This change is the result of more comprehensive surveying in 2012 which resulted in more accurate mapping. Nonetheless, Sc1 has decreased to the NE as a result of drying out associated with peat cutting along NE section of high bog.	Higher cover of <i>Sphagnum</i> hummocks and pools (<i>S. cuspidatum</i> , <i>S. papillosum</i> and <i>S. magellanicum</i>) in 2012. Differences most likely due to methodological differences and quadrat location error.
Sc2	None	Stable	Slight changes in boundary (larger). This change is the result of more comprehensive surveying in 2012 which resulted in more accurate mapping.	
Sc3	None	Stable	Slight changes in boundary (smaller). This change is the result of more comprehensive surveying in 2012 which resulted in more accurate mapping.	
Sc4	Qsc6; Qsc7	Stable	Slight changes in boundary (larger). This change is the result of more comprehensive surveying in 2012 which resulted in more accurate mapping. However, also the result of re-interpretation of vegetation.	New quadrats in 2012.
Sc5	None	No longer present	This former sub-central section is now part of Sc4 which is larger than mapped in 2004/5 as a result of more comprehensive surveying in 2012 which resulted in more accurate mapping.	
Sc6	None	No longer present	""	
Sc7	None	No longer present	""	
Sc8	None	No longer present	""	
Sc9	None	Stable	Slight changes in boundary (smaller). This change is the result of more comprehensive surveying in 2012 which resulted in more accurate mapping.	
Sc10	None	Unknown	This specific area was not surveyed	

Area	Quadrats	Trend	Comment	Quadrats analysis
			in 2004. This is likely to be the result of more comprehensive surveying in 2012 which resulted in more accurate mapping.	
Sc11	None	Unknown	This specific area was not comprehensively surveyed in 2004. This is likely to be the result of more comprehensive surveying in 2012 which resulted in more accurate mapping.	
Sc12	None	Unknown	This specific area was not comprehensively surveyed in 2004. This is likely to be the result of more comprehensive surveying in 2012 which resulted in more accurate mapping.	
Sc13	None	Unknown	This specific area was not surveyed in 2004. This is likely to be the result of more comprehensive surveying in 2012 which resulted in more accurate mapping.	
Sc14	None	Unknown	This specific area was not surveyed in 2004. This is likely to be the result of more comprehensive surveying in 2012 which resulted in more accurate mapping.	
Z	None	Stable	Slight changes in boundary (larger). This change is the result of more comprehensive surveying in 2012 which resulted in more accurate mapping.	

Degraded Raised Bog (7120)

Area

The Degraded Raised Bog FRV for Area is 56.75 ha at Addergoole Bog. This value corresponds with the difference between the current high bog area (156.42 ha) and the Active Raised Bog FRV (99.67 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 106.52% greater than FRV and therefore the habitat Area is given an **Unfavourable Bad** assessment (see table 8.4).

Table 8.3 shows the net changes in area of different Degraded Raised Bog ecotopes that are the result of a number of different factors. A total of 0.5 ha of sub-central ecotope has degraded to sub-

marginal at **Sc1**. A total of 0.5 ha of sub-marginal ecotope has in turn degraded to marginal to the northeast and east of **Sc1**. An additional 0.05 ha of sub-marginal bog has been lost as a direct loss of peat cutting. Thus, the net loss of sub-marginal ecotope over the 2005-2012 period is 0.05 ha. The net loss of 0.95 ha of marginal ecotope is due to the 0.5 ha increase resulting from change from sub-marginal countered by the loss of 1.45 ha of marginal ecotope to peat cutting. A total of 0.40 ha of face bank ecotope has been lost to peat cutting.

Table 8.3 indicates that there has been a total decrease of 1.4 ha in the area of Degraded Raised Bog. The decrease is the result of high bog loss of 1.9 ha caused by peat cutting counterbalanced by an increase of 0.5 ha due to Active Raised Bog degradation. As a result the habitat is given a **Decreasing** trend. It should be noted that this decreasing trend in Degraded Raised Bog area is a negative result as the losses are due to peat cutting rather an improvement to Active Raised Bog.

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

Structure & Functions

The FRV for S&Fs is for a maximum 25% of the Degraded Raised Bog area to be made up of marginal and face bank, i.e. the lower quality and drier vegetation communities. This value is 29.30ha (25% of 117.20ha, the current area of Degraded Raised Bog). The current marginal and face bank ecotopes area value (32.98ha) is 12.56% above the FRV (in the particular case of Degraded Raised Bog a current area value equal or smaller than FRV is desirable). A current value between 5 and 25% above FRV falls into the **Unfavourable Inadequate** assessment category.

The area of marginal and face bank ecotopes have decreased by 0.95 ha and 0.40 ha, respectively, due to peat cutting (table 8.3). In addition 0.5ha of sub-marginal ecotope has in turn degraded to marginal to the northeast and east of **Sc1**. S&Fs trend is assessed based on actual changes within marginal and face banks ecotope (e.g. decreases due to rewetting processes or increases as a result of further drying out). Thus, the DRB's S&Fs at Addergoole Bog are given a **Declining** trend.

Typical good quality indicators and typical plant species are still found throughout the entire bog on sub-marginal ecotope. *Cladonia portentosa* is notably uncommon on Addergoole Bog; however, this may be due to the more oceanic and flushed conditions at this site compared with typical raised bogs.

The Structure & functions of Degraded Raised Bog at Addergoole Bog are assessed as Unfavourable Inadequate-Declining (see table 8.5) as losses are due to peat cutting.

Future Prospects

Degraded Raised Bog has decreased as result of peat cutting. This activity, which has continued in 2013, also damaged the habitats S&Fs. Furthermore, drainage on the high bog and on the cutover continues to damage the habitat and hinder its recovery to FRVs, as well as minimising the chances to convert face bank and marginal ecotope into sub-marginal and/or Active Raised bog. Habitat **Area** is currently 106.52% above FRV (see table 8.4) and a Decreasing 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-Decreasing**. Habitat's **S&Fs** are currently 12.56% above FRV (see table 8.4). A Declining trend is foreseen in the following two reporting periods as a result of ongoing negatively impacting activities. **S&Fs** are expected to remain between 5 and 25% above FRV. Thus, habitat's **S&Fs Future Prospects** are assessed as **Unfavourable Bad-Declining**.

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

Table 8.3 Changes in Degraded Raised Bog area

Inactive Ecotopes	1994 ¹	2005	2005 (amended)	2012	Change (2005-2012)	
	Area (ha)	Area (ha)	Area (ha)	Area (ha)	Area (ha)	%
Sub-marginal	34.36	80.37	74.68	74.63	(-)0.05	(-)0.07
Marginal ²	42.49	39.26	32.07	31.12	(-)0.95	(-)2.96
Face bank ²	n/a	2.62	2.26	1.86	(-)0.40	(-)17.70
Inactive flush	17.05	8.48	8.96	8.96	0.00	0.00
Open water	0.50	0.50	0.63	0.63	0.00	0.00
Total	94.40	131.23	118.6	117.2	(-)1.4	(-)1.18

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

² Any 2012 marginal and face bank ecotope value given within the report should be taken as a maximum value. Their extent is based on the 2012 habitat survey and 2010 aerial photographs. It is likely that further marginal and/or face bank ecotope losses have taken place at the margin of the high bog in the 2011-2012 period associated with peat cutting.

Note: Table 8.3 includes 2005 figures and 2005 amended figures. The latter shows the ecotope area believed to be present in 2005 after surveying improvements in 2012. The comparison between 2005 (amended) and 2012 illustrates the actual changes in ecotope area in the 2005-2012 period. Any

change in ecotope area between the 2005 and the 2005 (amended) values is due to improvement in mapping accuracy and/or the result of a more comprehensive survey in 2012.

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

Depressions on peat substrates of the Rhynchosporion (7150)

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

The physical structure and distribution of the habitat across large sections of the high bog makes the process of calculating its area unfeasible and as a consequence makes the process of calculating realistic FRVs unfeasible. Thus, the assessment of the habitat 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 combined area of Active Raised Bog and sub-marginal has slightly decreased in the reporting period (0.55 ha). As result habitat Area is given a **Decreasing** trend.

The habitat's Area Future Prospects status is equally based on the Active Raised Bog Area Future Prospects status assessment and the Area Future Prospects trend is based on the trend expected for Active Raised Bog and sub-marginal ecotope in the following two reporting periods. Impacting activities such as peat cutting, marginal drainage and drainage on cutover adjacent to the high bog continue to threaten Active and Degraded Raised Bog. Logically this has to have a long term negative effect on Rhynchosporion depressions. Therefore, the habitat's Area Future Prospects are given an **Unfavourable Bad-Decreasing** assessment.

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

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

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

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

Bog Woodland (91D0)

Area

The favourable reference value (FRV) for area is 1.22 ha at Addergoole 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. The current area is 1.22 ha, and therefore equal to FRV. Therefore, the Area of this habitat is assessed as being **Favourable**.

As the area of Bog Woodland has not changed in the reporting period (see table 8.1), the habitat Area is given a **Stable** trend assessment.

The Area of Bog Woodland at Addergoole 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). Both monitoring stops passed the single stop level criteria, but only 2 of 3 criteria passed the combined stop level. The criteria that failed were presence of large diameter deadwood and senescent trees. This result would ordinarily result in an Unfavourable-Inadequate assessment. However, the woodland was considered to be wet, healthy and of very high quality during the field survey. The large diameter deadwood is likely to quickly fall in this exposed site and become engulfed by *Sphagnum*. Given these considerations and the fact that all other criteria passed, the habitat's S&Fs are therefore given a **Favourable-Stable** assessment.

The Structure & Functions of Bog Woodland at Addergoole Bog are assessed as Favourable-Stable (see table 8.5).

Future Prospects

The central location of the Bog Woodland at Addergoole Bog appears to have isolated it to a large extent from the activities that impact on the remainder of the bog habitats. It is likely to remain in good conservation status in the following two reporting periods (12 years). Nevertheless an increase in intensity of impacting activities can result on negative Future Prospects for the habitat. Further significant levels of peat cutting to the west of the Bog Woodland, however, pose the risk of

altering the hydrology of the woodland and surrounding flush further into the future. The recent absence of fire at the site is likely to continue, which will benefit the Bog Woodland.

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** have been given a Favourable assessment and a Stable trend is also foreseen. Thus, **S&Fs Future Prospects** are assessed as **Favourable-Stable**.

Therefore, the Future Prospects for Bog Woodland are considered Favourable-Stable (see table 8.5).

The overall conservation status of Bog Woodland at Addergoole 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	2012 value	% below	FRV 2012	2012 value	% below
	(ha) ¹	(ha) ²	target	Target (ha) ³	(ha) ⁴	target
7110	99.67	39.22	60.65	19.00	6.94	63.47
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	2012 value	% above	FRV 2012	2012 value	% above
	(ha) ⁵	(ha) ⁶	the FRV	Target (ha) ⁷	(ha) ⁸	target
7120	56.75	117.20	106.52	29.30	32.98	12.56
⁵ Current high bog area minus 7110 area FRV.						
⁶ 2012 Degraded Raised Bog area.						
⁷ 25% of the current Degraded Raised Bog habitat area. The target is that the extent of marginal and face bank ecotopes should not be larger than 25% of the current Degraded Raised Bog habitat area.						
⁸ Current marginal and face bank ecotopes area.						
	FRV Target	2012 value	% below	FRV Target	2012 value	% change
	(ha)	(ha)	target	(ha)	(ha)	
91D0	1.22	1.22	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–Declining.**
- **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-Declining	Unfavourable Bad-Declining
7120	Unfavourable Bad-Decreasing	Unfavourable Inadequate-Declining	Unfavourable Bad-Declining	Unfavourable Bad-Declining
7150	Unfavourable Bad-Decreasing	Unfavourable Bad-Stable	Unfavourable Bad-Declining	Unfavourable Bad-Declining
91D0	Favourable-Stable	Favourable-Stable	Favourable-Stable	Favourable-Stable

Conclusions

Summary of impacting activities

- Peat cutting still continues at the site and has taken place at 28 locations during 2005-2010. A total of 1.90 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 Active Raised Bog in the north-eastern section of high bog. Peat cutting at 49 locations in 2010/2011; at 33 locations in 2012 and 12 in 2013 has led to further losses of high bog that cannot be estimated with the information currently available.
- Over 4 km of drains on the high bog remain functional. Most of these are associated with peat cutting along the margins of the bog.
- Cutover drainage (peripheral drainage) associated with either currently active or no longer active peat cutting continue to impact on the high bog habitats. A significant drainage system flowing into Lough Corrib is located to the west of the high bog.
- No fire events have damaged the high bog in the reporting period. It appears that the site has not been burned for at least 12 years and has probably remained unburned for closer to 20 years.
- Machinery associated with peat cutting have traversed the north-western section of high bog, resulting in low level disturbance and compaction of the bog surface.

Changes in active peat forming areas

- A total of 0.5 ha of sub-central ecotope in **Sc1** has degraded to sub-marginal ecotope.
- Changes were made to the boundaries of **Sc1**, **Sc2**, **Sc3**, **Sc9** and flush **Z** as a result of more comprehensive surveying and more accurate mapping. **Sc10**, **Sc11**, **Sc12**, **Sc13** and **Sc14** were newly mapped as a result of more comprehensive surveying and mapping.
- Sub-central ecotope areas **Sc4**, **Sc5**, **Sc6**, **Sc7** and **Sc8** have been combined into a much larger **Sc4** due to more comprehensive surveying, more accurate mapping and re-interpretation of the vegetation.
- Central ecotope areas **C1** and **C2** have been newly mapped as a result of more comprehensive surveying, more accurate mapping and re-interpretation of the vegetation.

Other changes

- A total of 0.5 ha of sub-marginal ecotope in the northeast of the high bog has degraded to marginal ecotope as a result of peat cutting.
- Peat cutting has led to significant cracking and slumping of the high bog along the northeast and southern margins.
- There have been no changes to the area of Bog Woodland.

Quadrats analysis

- Quadrat **Qc1** previously was previously classified as **Qsc1**; the main difference between surveys was that in 2012 *Sphagnum* cover, especially cover of *S. magellanicum* and *S. papillosum* lawns, was significantly higher. It is unclear whether the differences between survey years represent real changes or are the result of differences in quadrat methodology and/or error in repositioning the quadrat.
- Quadrat **Qsc3** also exhibited higher *Sphagnum* cover in 2012, mainly higher cover of *Sphagnum* hummocks and pools. Overall, differences are minor and are likely to be due to changes in quadrat recording methods and error in repositioning the quadrat.
- **Qsc6** and **Qsc7**: were newly recorded in 2012, as no quadrats were recorded in 2005 in the southern half of the site.

Restoration works

- No restoration works have been undertaken at the site.

Summary of conservation status

- **Active Raised Bog** has been given an **Unfavourable Bad-Declining** conservation status at Addergoole Bog. Current habitat area of 39.22 ha is 60.65% below the FRV of 99.67 ha, and area has decreased by 0.5 ha during the reporting period due to drying out associated with peat cutting. Active Raised Bog S&Fs is also 63.47% below the FRV, although the quality of this habitat has remained stable during the reporting period. Future Prospects are considered Unfavourable Bad-Declining as impacting activities, especially peat cutting and drainage, continue to threaten the habitat.
- **Bog Woodland** has been given a **Favourable-Stable** conservation status at Addergoole Bog. Habitat area has not changed in the reporting period, and current area of 1.22 ha equals the FRV. Habitats S&Fs are considered Favourable-Stable despite the scarcity of large diameter deadwood and absence of regeneration of native species other than *Betula pubescens*. Future Prospects are considered Favourable-Stable, at least for the immediate future. Nevertheless, negative Future Prospects in a longer period cannot be ruled based on current impacting activities.
- **Degraded Raised Bog** has been given an **Unfavourable Bad-Declining** conservation status at Addergoole Bog. Current habitat area of 117.2 ha is 106.52% above the FRV of 56.75 ha; although area has decreased by 1.4 ha during the reporting period, these losses are due to peat cutting rather than improvement, which is a negative result. As the area of marginal and face bank ecotopes has decreased as a result of peat cutting, Degraded Raised Bog S&Fs is also considered to be Unfavourable Inadequate-Declining. Future Prospects are considered Unfavourable Bad-Declining due to threatening impacting activities.
- **Depressions on peat substrates of the Rhynchosporion** has been given an **Unfavourable Bad-Declining** conservation status at Addergoole Bog. Habitat Area is considered to have decreased and quality (S&Fs) remained stable. Future Prospects are considered Unfavourable Bad-Declining, however, as a result of threatening impacting activities.

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

Recommendations

- **Cessation of peat cutting.**
- **Restoration works** including blocking of high bog reduced-functional and functional drains, as well as cutover drains.

- **Further research into the hydrology of adjacent cutover and nearby fens** should be carried out, in order to anticipate and mitigate any negative impacts raised bog restoration works may have on Annex I fen habitats or on adjoining agricultural land.
- **Further hydrological and topographical studies** are required to ascertain the capacity of the high bog to support Active Raised Bog and thus estimate a more accurate favourable reference value.
- **Further botanical monitoring surveys** should be undertaken on the high bog in order to assess change in habitat's conservation status.

References

- 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.
- Douglas, C. & Grogan, H. 1985. *Survey to locate raised bogs of scientific interest in counties Galway (E) and Roscommon. Part II*. Unpublished report, Forest and Wildlife Service, 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 15

- **Location:** C1 and C2, in northeast corner of site
- **Ground:** quaking
- **Physical indicators:** absent
- **Calluna height:** 11-20cm
- **Cladonia cover:** 4-10%
- **Macro-topography:** gentle slope
- **Pools:** 11-25% interconnected
- **Sphagnum cover:** 51-75%
- **Narthecium cover:** 4-10%
- **Micro- topography:** High & low hummocks, hollows, pools, lawns
- **Tussocks:** absent
- **Degradation or regeneration evidence:** absent
- **Species cover:** *Calluna vulgaris* (11-25%), *Erica tetralix* (4-10%), *Narthecium ossifragum* (4-10%), *Rhynchospora alba* (<4%, occasional), *Empetrum nigrum* (<4%, occasional), *Sphagnum capillifolium* (4-10%), *S. papillosum* (34-50%), *S. cuspidatum* (11-25%), *S. magellanicum* (11-25%), *S. austinii* (<4%, frequent), *S. fuscum* (<4%, occasional), *S. denticulatum* (4-10%), *Aulacomnium palustre* (4-10%), *Campylopus atrovirens* (<4%, occasional), *Leucobryum glaucum* (<4%, rare).
- **Additional comments:** High quality active raised bog with *Sphagnum cuspidatum* and *S. denticulatum* pools. Lawns of *S. papillosum*, *S. magellanicum*, and *S. cuspidatum* extended from pools. Low and high hummocks of *S. capillifolium*, *S. austinii*, *S. fuscum* and *Leucobryum glaucum* were present. Vascular plants were very much a minor component of this complex.

COMPLEX 10/15

- **Location:** C1 and C2, in northeast corner of site
- **Ground:** very soft

- **Physical indicators:** absent
- **Calluna height:** 0-10cm
- **Cladonia cover:** <4%
- **Macro-topography:** flat
- **Pools:** <4% regular
- **Sphagnum cover:** 76-90% (c. 85%)
- **Narthecium cover:** 4-10%
- **Micro- topography:** Low hummocks, hollows, pools, lawns
- **Tussocks:** *Trichophorum germanicum* <4%
- **Degradation or regeneration evidence:** absent
- **Species cover:** *Calluna vulgaris* (11-25%), *Erica tetralix* (4-10%), *Narthecium ossifragum* (4-10%), *Rhynchospora alba* (<4%, frequent), *Trichophorum germanicum* (<4%), *Sphagnum capillifolium* (4-10%), *S. papillosum* (34-50%), *S. cuspidatum* (11-25%), *S. magellanicum* (34-50%), *S. austinii* (<4%, frequent), *S. fuscum* (<4%, occasional), *Aulacomnium palustre* (4-10%), *Odontoschisma sphagni* (4-10%).
- **Additional comments:** Very wet lawns of *Sphagnum* dominate with small regular pools and hollows of *Sphagnum cuspidatum*. Low hummocks of *Sphagnum* and *Aulacomnium palustre* were frequent. *Sphagnum austinii* was notably frequent, and *Odontoschisma sphagni* was notably abundant. This complex grades into sub-central 10/4 at edges. Quadrat **Qc1** was recorded in this complex.

Sub-Central Ecotope Complexes

COMPLEX 4+P

- **Location:** Sc1;Sc2;Sc4; Sc10 and Sc12
- **Ground:** very soft to quaking
- **Physical indicators:** absent
- **Calluna height:** 11-20cm
- **Cladonia cover:** <4%
- **Macro-topography:** flat to gentle slope
- **Pools:** 11-25% interconnecting
- **Sphagnum cover:** 51-75% (34-50% towards complex edges)
- **Narthecium cover:** 4-10%
- **Micro- topography:** Low hummocks, hollows, pools, lawns, flats

- **Tussocks:** *Eriophorum vaginatum* <4%
- **Degradation or regeneration evidence:** absent
- **Species cover:** *Calluna vulgaris* (11-25%), *Erica tetralix* (4-10%), *Eriophorum angustifolium* (4-10%), *E. vaginatum* (4-10%), *Rhynchospora alba* (11-25%), *Myrica gale* (4-10%), *Carex panicea* (<4%, occasional-frequent), *Sphagnum capillifolium* (11-25%), *S. papillosum* (4-10%), *S. cuspidatum* (11-25%), *S. magellanicum* (<4%), *S. tenellum* (<4%, frequent), *S. fuscum* (<4%, occasional), *S. denticulatum* (<4%, occasional).
- **Additional comments:** This was a good quality sub-central complex. Good interconnecting pools were present dominated by *Sphagnum cuspidatum* with some *S. denticulatum*. Interpool areas were low; *Rhynchospora alba* and *Myrica gale*, as well as *Eriophorum* species, were prominent here. At the margins, this vegetation graded into a community dominated more by *Eriophorum* species and *Calluna vulgaris* with smaller, fewer pools. *Campylopus atrovirens* was locally frequent in examples of this complex, especially in **Sc1** the northeast corner.

Quadrats **Qsc3** and **Qsc6** were recorded in this community complex in areas **Sc1** and **Sc4**, respectively.

COMPLEX 10/4

- **Location:** **Sc1;Sc2;Sc3;Sc4** and **Sc9**
- **Ground:** soft
- **Physical indicators:** absent
- **Calluna height:** 0-10cm
- **Cladonia cover:** <4%
- **Macro-topography:** flat to gentle slope
- **Pools:** <4% regular
- **Sphagnum cover:** 51-75%
- **Narthecium cover:** 4-10%
- **Micro- topography:** Low hummocks, hollows, pools, lawns
- **Tussocks:** *Eriophorum vaginatum* <4%
- **Degradation or regeneration evidence:** absent
- **Species cover:** *Calluna vulgaris* (11-25%), *Erica tetralix* (<4%, frequent), *Eriophorum angustifolium* (4-10%), *E. vaginatum* (4-10%), *Rhynchospora alba* (4-10%), *Carex panicea* (<4%, occasional), *Sphagnum capillifolium* (4-10%), *S. papillosum* (26-33%), *S. cuspidatum* (4-10%), *S. magellanicum* (26-33%), *S. tenellum* (<4%, frequent).

- **Additional comments:** This complex was characterised by low hummocks and lawns of *Sphagnum papillosum* and *S. magellanicum* with low *Calluna vulgaris*, *Rhynchospora alba* and *Eriophorum angustifolium*. Small pools were approximately 0.5 x 1.2 m in size. These were mainly shallow and filled with *S. cuspidatum*. Where this complex occurred in **Sc9**, it was in mosaic with sub-marginal complex 9/7/6 at the edges, especially in inter-pool areas.

Quadrat **Qsc7** was recorded in this complex.

COMPLEX 10/9A

- **Location:** **Sc4**
- **Ground:** soft
- **Physical indicators:** absent
- **Calluna height:** 11-20 cm (low end of range)
- **Cladonia cover:** absent
- **Macro-topography:** flat
- **Pools:** absent
- **Sphagnum cover:** 76-90%
- **Narthecium cover:** 4-10%
- **Micro- topography:** Lawns, low hummocks, hollows
- **Tussocks:** *Eriophorum vaginatum* <4%; *Trichophorum germanicum* (4-10%)
- **Degradation or regeneration evidence:** absent
- **Species cover:** *Calluna vulgaris* (11-25%), *Erica tetralix* (4-10%, frequent), *Eriophorum angustifolium* (<4%, occasional), *E. vaginatum* (26-33%), *Rhynchospora alba* (<4%, rare), *Trichophorum germanicum* (4-10%), *Sphagnum capillifolium* (10-25%), *S. papillosum* (51-75%), *S. magellanicum* (<4%, occasional), *S. tenellum* (<4%, occasional).
- **Additional comments:** This complex was characterised by carpets of *Sphagnum papillosum* and *S. capillifolium* with some very slight hummock-hollow development. The vegetation had a grassy appearance with *Eriophorum vaginatum* and *Trichophorum germanicum* prominent.

COMPLEX 9/10

- **Location:** Located on the west side of **Sc1** near the former 2004 quadrat **Qsc5**
- **Ground:** soft
- **Physical indicators:** absent
- **Calluna height:** 20-30cm
- **Cladonia cover:** <4%

- **Macro-topography:** flat
- **Pools:** <4%
- **Sphagnum cover:** 34-50%
- **Narthecium cover:** absent
- **Micro- topography:** Low hummocks/hollows/pools
- **Tussocks:** *Eriophorum vaginatum* 4-10%
- **Degradation or regeneration evidence:** absent
- **Species cover:** *Calluna vulgaris* (26-33%), *Erica tetralix* (4-10%), *Eriophorum angustifolium* (4-10%), *E. vaginatum* (11-25%), *Rhynchospora alba* (<4%), *Menyanthes trifoliata* <4%, *Empetrum nigrum* <4%, *Sphagnum capillifolium* (H; 11-25%), *S. papillosum* (H; 11-25%), *S. cuspidatum* (Hollows (Hl); <4%), *Aulacomnium palustre* (<4%, locally 4-10%), *Hypnum jutlandicum* (<4%).
- **Additional comments:** This complex was very wet and flushy. It graded into sub-marginal 9/7 as it became drier further west. The change in the boundary of the western lobe of **Sc1** was likely to be due to interpretation.
- South of **Sc1** and just east of the extended area of flush **Z**, a variant of 9/10 was 9a/10 where *Eriophorum angustifolium* (11-25%) was more abundant than *E. vaginatum* (<4%), and there was standing water >10cm deep.

COMPLEX 9/7+P

- **Location:** **Sc1** and **Sc10**
- **Ground:** very soft to quaking
- **Physical indicators:** absent
- **Calluna height:** 11-20cm
- **Cladonia cover:** <4%
- **Macro-topography:** gentle slope
- **Pools:** 11-25% interconnecting
- **Sphagnum cover:** 34-50% (-75% in places)
- **Narthecium cover:** 4-10%
- **Micro- topography:** Low hummocks, hollows, pools, lawns, flats
- **Tussocks:** absent
- **Degradation or regeneration evidence:** absent
- **Species cover:** *Calluna vulgaris* (11-25%), *Erica tetralix* (4-10%), *Eriophorum angustifolium* (4-10%), *E. vaginatum* (4-10%), *Rhynchospora alba* (<4%), *Myrica gale* (4-10%, locally abundant), *Carex panicea* (4-10%, locally abundant), *Sphagnum capillifolium* (4-10%), *S. papillosum* (4-10%), *S.*

cuspidatum (11-25%), *S. magellanicum* (<4%, locally abundant), *S. tenellum* (<4%, occasional), *S. denticulatum* (<4%, occasional), *S. austinii* (<4%, occasional).

- **Additional comments:** Somewhat fewer pools, less *Sphagnum* and more *Eriophorum* species than 4+P. *Myrica gale* was abundant in patches. *Carex panicea* abundant where *M. gale* was not. *Pleurozia purpurea* and *Leucobryum glaucum* were present.

COMPLEX 9A+P

- **Location:** northern section of Sc3
- **Ground:** very soft
- **Physical indicators:** absent
- **Calluna height:** 11-20cm
- **Cladonia cover:** <4%
- **Macro-topography:** depression
- **Pools:** 11-25% regular (4-10% in places)
- **Sphagnum cover:** 34-50%
- **Narthecium cover:** <4%
- **Micro- topography:** Low hummocks, hollows, pools, lawns
- **Tussocks:** *Trichophorum germanicum* <4%; *Eriophorum vaginatum* 4-10%
- **Degradation or regeneration evidence:** absent
- **Species cover:** *Calluna vulgaris* (11-25%), *Erica tetralix* (<4%, frequent), *Eriophorum angustifolium* (34-50%), *E. vaginatum* (11-25%), *Rhynchospora alba* (<4%, frequent), *Menyanthes trifoliata* (<4%, occasional), *Sphagnum capillifolium* (4-10%), *S. papillosum* (11-25%), *S. cuspidatum* (11-25%), *S. magellanicum* (4-10%), *S. subnitens* (4-10%), *S. denticulatum* (<4%, frequent), *Aulacomnium palustre* (4-10%), *Polytrichum strictum* (<4%, occasional), *Campylopus atrovirens* (<4%, occasional).
- **Additional comments:** Low hummocks, hollows and lawns of *Eriophorum angustifolium* and *Calluna vulgaris* with *Sphagnum capillifolium*, *S. papillosum*, *S. magellanicum* and *S. subnitens* characterised this complex. These areas were interspersed with long, regular pools of *S. cuspidatum* and *S. denticulatum* with *S. papillosum* and *S. magellanicum* lawns at margins. This was a distinctly flushed complex adjacent to flush Z. Where *E. vaginatum* was dominant, this complex was mapped as 9+P.

COMPLEX 9/7/6+P

- **Location:** Sc13; Sc14 and SE and SW section of Sc4
- **Ground:** firm (interpools) to very soft (by pools)

- **Physical indicators:** absent
- **Calluna height:** 21-30cm
- **Cladonia cover:** <4%
- **Macro-topography:** steep slope
- **Pools:** 11-25% regular (interconnected in best places)
- **Sphagnum cover:** 34-50%
- **Narthecium cover:** 4-10%
- **Micro- topography:** Low hummocks, hollows, pools
- **Tussocks:** *Trichophorum germanicum* <4%; *Eriophorum vaginatum* 4-10%
- **Degradation or regeneration evidence:** absent
- **Species cover:** *Calluna vulgaris* (34-50%), *Erica tetralix* (<4%, frequent), *Eriophorum vaginatum* (4-10%), *Rhynchospora alba* (<4%, occasional), *Myrica gale* (<4%, frequent), *Carex panicea* (<4%, frequent), *Trichophorum germanicum* (<4%), *Sphagnum capillifolium* (11-25%), *S. papillosum* (4-10%), *S. cuspidatum* (11-25%)
- **Additional comments:** Large, *Sphagnum cuspidatum* – dominated pools were present. Interpool areas were raised high and dry and were relatively firm underfoot. This complex was flushed, and in Sc13, the apparent water flow path was towards the southwest. This was a borderline sub-central complex with low *Sphagnum* cover between pools – mainly *S. capillifolium* hummocks. Pools shrunk in size and interpool *Sphagnum* decreased towards complex margins and transition to sub-marginal complex 9/7/6.

Active flushes

FLUSH Z

Flush Z was an extensive, mainly active flush that was very wet and extremely treacherous. Only the edges of the active flush were penetrated during the survey. There were two pool systems within the flush. The southern pool consisted of two areas of open water with some emergent *Menyanthes trifoliata*. These were bounded by stands of *Molinia caerulea* and occasional *Juncus effusus*. At the west end of the pool system *Osmunda regalis* and *Betula pubescens* saplings were locally frequent. The *Molinia* stands graded into floating mats of *Sphagnum cuspidatum* with some *S. fallax* and *S. palustre*. These mats supported a scattering of *Eriophorum angustifolium* and occasional emergent *Molinia caerulea*. A narrow connection between the two open water areas or lobes was almost entirely choked with this *S. cuspidatum* mat vegetation. There were also locally dense stands of a medium-sized *Carex* that had gone over to a deep brown at the time of survey.

The pool at the north-east of the flush included open water with a cover of *Sphagnum cuspidatum* (50%), and in the centre, occasional tussocks of *Molinia caerulea*. Towards the edges of the pool were *Eriophorum angustifolium* (26-33%) and *Menyanthes trifoliata* (4-10%). The edge of the pool was fringed with tall *Calluna vulgaris* 30-40 cm high, *Myrica gale* (4-10%) and scattered *Molinia caerulea* (<4%).

To the north, west and to a lesser extent to the east of the northern pool, the boundary of the active flush has been extended to include a seasonally flooded area with frequent pools containing *Sphagnum cuspidatum* (26-33%) as well as *S. palustre*. *Aulacomnium palustre* hummocks were frequent (11-25% cover) at the edges of the pools. Between the pools, tall *Calluna vulgaris*, *Eriophorum vaginatum* and *Myrica gale* were abundant. *Sphagnum capillifolium* was frequent and there were locally frequent patches of *Osmunda regalis* and *Molinia caerulea*. *Dicranum scoparium* and *Hypnum jutlandicum* were also present. This graded to the north into inactive flush supporting vegetation similar to sub-marginal complex 9/7, as further described below.

Between the two pools, the flush was extremely wet and was not surveyed in detail. It was in effect a large *Sphagnum cuspidatum* dominated pool with a high cover (51-75%) of islands comprised of *Aulacomnium palustre*. *Menyanthes trifoliata* was locally abundant. Topping the *Aulacomnium* mounds was *Calluna vulgaris* (26-33%), *Molinia caerulea* (4-10%) and *Juncus effusus* (<4% cover overall, but locally abundant).

West of the Bog Woodland a narrow band of active flush Z extends westward. Although not as wet as the eastern flush it included tall *Calluna vulgaris* (34-50%), *Eriophorum vaginatum* (11-25%), *Pteridium aquilinum* (11-25%) *Myrica gale* (4-10%), *Sphagnum palustre* hummocks (4-10%), *Aulacomnium palustre* (4-10%), *Vaccinium oxycoccos* (<4%), *Osmunda regalis* (<4%), *Juncus effusus* (4-10%), *Menyanthes trifoliata* (<4%), *Potentilla erecta* (<1%), *Molinia caerulea* (<4%). Towards the edge, cover of *Juncus effusus* and *Myrica gale* increased and *Calluna* and *Eriophorum vaginatum* decreased. Other species present included *Rubus fruticosus*, *Dryopteris dilatata* and *Athyrium filix-femina*. The actual extent of active versus inactive flush in the western arm was unclear as *S. palustre* cover was locally abundant (up to 26-33% cover) but inconsistent. The active/inactive flush boundary mapped in 2004 was retained.

Degraded Raised Bog (7120)

Sub-Marginal Ecotope Complexes

COMPLEX 9/7

- **Location:** surrounding Sc1; east of Sc13 and west of flush Z
- **Ground:** soft to very soft
- **Physical indicators:** absent
- **Calluna height:** 11-20cm
- **Cladonia cover:** absent
- **Macro-topography:** flat
- **Pools:** absent
- **Sphagnum cover:** 26-33% (~50% in places)
- **Narthecium cover:** <4%
- **Micro- topography:** Low hummocks, hollows
- **Tussocks:** *Eriophorum vaginatum* 11-25%, *Trichophorum germanicum* <4%
- **Degradation or regeneration evidence:** absent
- **Species cover:** *Calluna vulgaris* (11-25%), *Erica tetralix* (<4%, frequent), *Eriophorum angustifolium* (<4%, occasional), *E. vaginatum* (34-50%), *Empetrum nigrum* (<4%, occasional), *Carex panicea* (<4%, occasional), *Sphagnum capillifolium* (26-33%), *S. papillosum* (<4%, occasional), *S. subnitens* (<4%, frequent), *S. tenellum* (<4%, frequent), *S. austinii* (<4, occasional), *Aulacomnium palustre* (4-10%), *Pleurozium schreberi* (<4%, frequent).
- **Additional comments:** *Eriophorum vaginatum* was present in tussocks and on hummocks with *Sphagnum capillifolium*, the main *Sphagnum*. *Calluna vulgaris* was scattered throughout. Complex was very grassy in appearance. Somewhat flushed, judging by species complement. Where *E. angustifolium* takes over from *E. vaginatum*, such as near flush Z, the complex was mapped as 9a/7. This variant was obviously flushed with much standing water. *Sphagnum* cover in this variant was only 4-10% in the wettest parts.

COMPLEX 9/7/6

- **Location:** throughout site
- **Ground:** soft
- **Physical indicators:** bare peat / algae locally <4% cover
- **Calluna height:** 11-20cm
- **Cladonia cover:** <1% (rare)
- **Macro-topography:** gentle slope
- **Pools:** absent (sometimes near sub-central ecotope regular pools 4-10%)
- **Sphagnum cover:** 11-25%
- **Narthecium cover:** 11-25% (higher end of range on average)

- **Micro- topography:** Low hummocks, hollows, flats (locally pools)
- **Tussocks:** *Eriophorum vaginatum* 4-10%, *Trichophorum germanicum* <4%
- **Degradation or regeneration evidence:** absent
- **Species cover:** *Calluna vulgaris* (11-25%), *Erica tetralix* (4-10%), *Eriophorum angustifolium* (<4%, occasional), *E. vaginatum* (4-10%), *Carex panicea* (<4%), *Rhynchospora alba* (<4%, occasional), *Sphagnum capillifolium* (4-10%), *S. papillosum* (<4%), *S. subnitens* (<4%), *S. tenellum* (4-10%), *S. cuspidatum* (<4%).
- **Additional comments:** Typically with low hummocks and hollows forming reasonably good microtopography. *Narthecium* flats were interspersed with *Eriophorum vaginatum* tussocks. *Calluna vulgaris* occurred on flats with *Erica tetralix*. Bare peat often with algal cover was found in some patches, particularly at margins.
- At the northern edge of the site, a variant with *Myrica gale* cover of 4-10% and *Carex panicea* 4-10% (up to 25%) was common. This flushed variant was mapped as 9/7/6+My. Also in this area was a variant with both *Myrica gale* and *Phragmites australis*, which was mapped as 9/7/6+Ph. Here *Sphagnum* cover was typically lower (4-10%), but the ground was still soft.
- At the southern edge of the bog just north of flush I, there was a variant of 9/7/6, where *Eriophorum angustifolium* replaced *E. vaginatum* and *Carex panicea* (4-10%) replaced *Narthecium ossifragum*. It was called 9a/7/3. Also present were *Erica tetralix* (4-10%) and *Myrica gale* (4-10%) and *Sphagnum* cover was 10-15%.

Marginal Ecotope Complexes

COMPLEX 6/7/3

- **Location:** found across entire high bog edge
- **Ground:** firm
- **Physical indicators:** occasional bare peat areas associated with former turf cutting
- ***Calluna* height:** 21-30cm
- ***Cladonia* cover:** <4%
- **Macro-topography:** gentle slope
- **Pools:** absent
- ***Sphagnum* cover:** 4-10% (-25% in patches)
- ***Narthecium* cover:** 10-25%
- **Micro- topography:** Low hummocks, hollows, flats
- **Tussocks:** *Trichophorum germanicum* <4%

- **Degradation or regeneration evidence:** absent
- **Species cover:** *Calluna vulgaris* (11-25%), *Narthecium ossifragum* (11-25%), *Eriophorum angustifolium* (<4%, frequent), *E. vaginatum* (<4%, occasional), *Carex panicea* (11-25%, locally 4-10%), *Myrica gale* (<4%, frequent), *Phragmites australis* (<4%, frequent), *Rhynchospora alba* (<4%, locally frequent), *Trichophorum germanicum* (<4%), *Sphagnum capillifolium* (4-10%), *S. papillosum* (<4%), *S. tenellum* (<4%).
- **Additional comments:** Heterogeneous marginal ecotope by edge of bog. Poor microtopography. Often with *Myrica gale* and/or *Phragmites australis* at edges. Where these were frequent, the complex was mapped as 6/7/3+My or 6/7/3+Ph, respectively.

COMPLEX 3/6

- **Location:** southwest corner of site and east margin of high bog
- **Ground:** firm
- **Physical indicators:** bare peat / algae associated with drains 4-10%
- ***Calluna* height:** 11-20cm (averaging towards low end of range)
- ***Cladonia* cover:** <1% very rare
- **Macro-topography:** gentle slope
- **Pools:** <4% regular algal
- ***Sphagnum* cover:** <4%
- ***Narthecium* cover:** 34-50%
- **Micro-topography:** Low hummocks, hollows, flats
- **Tussocks:** absent
- **Degradation or regeneration evidence:** absent
- **Species cover:** *Calluna vulgaris* (4-10%), *Narthecium ossifragum* (34-50%), *Erica tetralix* (11-25%), *Eriophorum angustifolium* (<4%, frequent), *E. vaginatum* (<4%, occasional), *Carex panicea* (<4%, frequent), *Pedicularis palustris* (<4%), *Sphagnum capillifolium* (<4%), *S. papillosum* (<4%), *S. subnitens* (<4%), *S. tenellum* (<4%), *S. cuspidatum* (<4%), *Campylopus introflexus* (<4%, locally dominant).
- **Additional comments:** Flats of *Narthecium ossifragum* and associated species with much bare peat and algal cover in patches. Hummocks were relict mounds rather than *Sphagnum* hummocks. Microtopography was very poor.

Face bank Complexes

COMPLEX 1

- **Location:** Described from the north-west edge, this complex was found intermittently along the bog margin
- **Ground:** firm
- **Physical indicators:** bare peat (<4%)
- ***Calluna* height:** 40-50cm
- ***Cladonia* cover:** 26-33%
- **Macro-topography:** steep slope
- **Pools:** absent
- ***Sphagnum* cover:** generally absent but <4% in places
- ***Narthecium* cover:** absent
- **Micro- topography:** tall robust *Calluna vulgaris*/low hummocks
- **Tussocks:** absent
- **Degradation or regeneration evidence:** absent
- **Species cover:** *Calluna vulgaris* (76-90%), *Carex panicea* (<4%), *Myrica gale* (<4%), *Phragmites australis* (<4%), *Sphagnum capillifolium* (H; <1%), *Hypnum jutlandicum* (<4%).
- **Additional comments:** none

Inactive flushes

FLUSH I

This was a previously mapped inactive flush area at southern edge of high bog. *Molinia caerulea* was widespread (11-25%), *Myrica gale* (4-10% and locally up to 25%). *Schoenus nigricans* was locally frequent (4-10%). *Calluna vulgaris* (4-10%), *Carex panicea* (4-10%), *Narthecium ossifragum* (4-10%), *Sphagnum capillifolium* (4-10%). *Eriophorum vaginatum* (<4%), *E. angustifolium* (<4%). Overall the ground was quite firm and fairly dry.

FLUSH X

This flush was previously mapped as marginal ecotope. This area at the northern edge of the site was a transition zone to adjacent *Cladium* fen. This transition was very gradual and the end of the flush and the end of the high bog was mapped as being where scattered *Cladium mariscus* individuals began occurring. The vegetation of flush X consisted of abundant *Molinia caerulea* and frequent *Phragmites australis*, *Calluna vulgaris*, *Myrica gale* and *Erica tetralix*. Occasionally found in this area were *Potentilla erecta*, *Eriophorum vaginatum* and *Sphagnum capillifolium* (<4% cover).

FLUSH Z

The south-eastern arm of this flush was inactive and consisted of a narrow band of tall, flushed vegetation. *Schoenus nigricans*, *Aulacomnium palustre* and *Myrica gale* were abundant here, with *Molinia caerulea* locally so. Frequently occurring were *Calluna vulgaris*, *Erica tetralix*, *Menyanthes trifoliata*, *Eriophorum vaginatum* and *Vaccinium oxycoccos*. This part of the flush graded into sub-marginal complex 9/7/6+My. The boundary of the flush was indistinct and was identified where *Myrica* was only frequent and *E. vaginatum* and *Calluna* were less tall and leggy.

Along the northern side of flush Z, the inactive flush zone was a band of vegetation similar to sub-marginal complex 9/7, with the addition of frequent flush species, including *Myrica gale*, *Aulacomnium palustre* and frequent *Sphagnum capillifolium*. This area was mainly flooded at the time of survey with 10-50 cm of standing water. This was apparently seasonal flooding, as normally non-aquatic species, such as *Calluna* and *Aulacomnium palustre* were completely submerged at the time of survey. This zone graded into active flush, as described above.

The inactive parts of the western arm of flush Z were dominated by tall *Myrica gale*, *Calluna vulgaris* and *Molinia caerulea* with frequent *Rubus fruticosus*.

A newly mapped arm of inactive flush extended from the north-eastern side of flush Z towards Sc1.

It is described as follows:

- **Location:** southwest of Sc1
- **Ground:** soft to very soft
- **Physical indicators:** absent
- **Calluna height:** 21-30cm
- **Cladonia cover:** absent
- **Macro-topography:** depression
- **Pools:** absent
- **Sphagnum cover:** 34-50%
- **Narthecium cover:** absent
- **Micro- topography:** Low hummocks, hollows
- **Tussocks:** *Eriophorum vaginatum* 34-50%
- **Degradation or regeneration evidence:** absent
- **Species cover:** *Calluna vulgaris* (11-25%), *Erica tetralix* (<4%, frequent), *Eriophorum vaginatum* (34-50%), *Myrica gale* (4-10%), *Vaccinium oxycoccos* (<4%, frequent), *Empetrum nigrum* (<4%, occasional to locally abundant), *Sphagnum capillifolium* (34-50%), *Aulacomnium palustre* (10-25%)
- **Additional comments:** This tussocky flush was a newly mapped arm of flush Z. Low hummocks of *Sphagnum capillifolium* and *Aulacomnium palustre* were abundant. Some very tall

(40+ cm) stands of dense *Myrica gale* were present. Otherwise, this flush was mainly composed of *Eriophorum vaginatum* with scattered *M. gale* 20-40 cm tall.

Bog Woodland (91D0)

Bog Woodland BW1

The Bog Woodland occupying the centre of the site was a healthy stand of pure *Betula pubescens*. The canopy was approximately 8 m high and canopy cover was approximately 40%. The high abundance of epiphytic lichens, especially *Usnea* species, and *Hypnum andoi* clothing the trees was notable. The field layer consisted of abundant *Sphagnum palustre*, *S. cuspidatum* and *Eriophorum vaginatum* with frequent *Osmunda regalis*, *Dryopteris carthusiana*, *Juncus effusus* and *Myrica gale*. *Pteridium aquilinum* was occasionally present throughout, but was abundant at the northern edge of the wood. *Sphagnum squarrosum* was also occasionally noted.

Towards the woodland edge with the active flush Z, trees became smaller and less frequent with a canopy cover of 30-40% and height of 6-8m. There was an abrupt change to open flush with frequent birch trees less than 1 m tall. Epiphytic lichen cover was less towards the woodland edge, and the field layer was more flushed, with abundant standing water. *Juncus effusus* was abundant and *Sphagnum palustre* was locally so. *Osmunda regalis* and *Myrica gale* remained frequent, and *S. squarrosum*, *S. fimbriatum*, *S. fallax*, *S. cuspidatum*, *Aulacomnium palustre*, *Polytrichum commune*, *Hylocomium splendens*, *Eriophorum vaginatum* and *Dryopteris carthusiana* were all occasionally present.

Depressions on peat substrates of the Rhynchosporion (7150)

The habitat occurs at Addergoole Bog in both Active and Degraded Raised Bog. Both *Rhynchospora alba* and *R. fusca* were recorded within the 2012 survey at this site.

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

The species becomes very frequent within complexes 4+P and 10/4 (sub-central).

The species is always found associated with wet features such as *Sphagnum* pools, interpool flats with *Myrica gale*, *Eriophorum angustifolium* and *E. vaginatum*, and lawns of *S. papillosum* and *S. magellanicum*. *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.

R. fusca was recorded in small relict pools in marginal ecotope along the southern edge of the high bog.

Appendix II Photographical records

Photograph Number	Aspect	Type	Feature	Date
DSC00352	NE	Overview	Qc1	23/10/2012
DSC00353	NE	Overview	Qsc3	23/10/2012
DSC00364	NE	Overview	Qsc6	25/10/2012
DSC00365	NE	Overview	Qsc7	25/10/2012
DSC00361	NE	Detail	Qbw1	24/10/2012
DSC00360	NE	Overview	Qbw1	24/10/2012
DSC00362	NE	Overview	Qbw2	24/10/2012
DSC00363	NE	Detail	Qbw2	24/10/2012

Appendix III Quadrats

Ecotope type	Sub-central	Central	Sub-central	Sub-central
Complex Name	4/10	10/15	6/4/10 + P	4/9/10 +P
Quadrat Name	Qsc1	Qc1	Qsc2	Qsc4
Easting	131594.05	131593.09	131721	131663
Northing	233654.94	233654.20	233599	233904
Date	13/04/2005	23/10/2012	13/04/2005	13/04/2005
Firmness	very soft	Very soft	soft	very soft
Burnt	No	No	No	No
Algae in hollows %	1-3 (many indiv)	Absent	1-3 (many indiv)	Absent
Algae in pools %	Absent	Absent	1-3 (many indiv)	Absent
Bare peat %	1-3 (many indiv)	Absent	1-3 (many indiv)	Absent
High hummocks %	Na	Absent	na	Na
Low hummocks %	11-25	26-33	4-10	11-25
Hollows %	4-10	1-3 (several indiv)	11-25	11-25
Lawns %	11-25	51-75	Absent	11-25
Pools %	4-10	1-3 (many indiv)	11-25	11-25
Pool type	Na	Regular	Tear	Tear
S.austinii hum type	Na	Absent	na	Na
S.austinii hum %	1-3 (many indiv)	Absent	Absent	11-25
S.austinii height(cm)	Na	Absent	na	Na
S.fuscum hum type	Na	Absent	na	Na
S.fuscum hum %	1-3 (many indiv)	1-3 (several indiv)	Absent	Absent
S.fuscum height(cm)	Na	11-20	na	Na
Leucobryum glaucum	Absent	Absent	Absent	Absent

Ecotope type	Sub-central	Central	Sub-central	Sub-central
Complex Name	4/10	10/15	6/4/10 + P	4/9/10 +P
Trichophorum type	Tussocks	Flats	Tussocks	Absent
Trichophorum %	4-10	1-3 (few indiv)	1-3 (many indiv)	Absent
S.magellanicum %	4-10	34-50	1-3 (many indiv)	Absent
S.cuspidatum %	11-25	11-25	4-10	11-25
S.papillosum %	11-25	34-50	4-10	Absent
S.denticulatum %	Absent	Absent	4-10	Absent
S.capillifolium%	4-10	4-10	4-10	11-25
S.tenellum %	Na	Absent	na	Na
S.subnitens %	Absent	Absent	Absent	Absent
R.fusca %	Absent	Absent	Absent	Absent
R.alba %	4-10	1-3 (many indiv)	11-25	26-33
N.ossifragum %	4-10	4-10	11-25	4-10
Sphag pools %	4-10	1-3 (many indiv)	11-25	11-25
Dominant pool Sphag	S.cuspidatum	S.cuspidatum	S.cuspidatum;S. denticulatum	S.cuspidatum
Sphag lawns %	11-25	51-75	Absent	11-25
Sphag humm %	11-25	11-25	4-10	11-25
Sphag holl %	4-10	1-3 (several indiv)	4-10	11-25
Total Sphag %	51-75	76-90	26-33	51-75
Hummocks indicators	S.austini&S.fuscu m	S.fuscu	Absent	S.austinii
Cladonia portent %	1-3 (many indiv)	1-3 (several indiv)	1-3 (many indiv)	Absent
Other Cladonia sp	Na	0	na	Na
C. panicea %	Na	Absent	na	Na
Calluna cover %	11-25	11-25	na	11-25
Calluna height(cm)	11-20	0-10	21-30	11-20

Ecotope type	Sub-central	Central	Sub-central	Sub-central
Complex Name	4/10	10/15	6/4/10 + P	4/9/10 +P
Other Notable Species	<i>Aulacomnium palustre</i>	<i>Aulacomium pal</i> 11-25% <i>Odonto spha</i> 4-10%	<i>Racomitrium lanuginosum</i> , <i>Menyanthes</i> , <i>Pleurozia purpurea</i>	
Other comment		2004 had 60% <i>Sphagnum</i> and classified as SC (Qsc1) previously		

Ecotope type	Sub-central	Sub-central	Sub-central	Sub-central
Complex Name	4/9a/6 + p	4+poools	9/7/10	4+P
Quadrat Name	Qsc3	Qsc3	Qsc5	Qsc6
Easting	131439	131440.68	131219	130934.24
Northing	233986	233988.22	233692	233068.39
Date	13/04/2005	23/10/2012	13/04/2005	25/10/2012
Firmness	Soft	Very soft	soft	Quaking
Burnt	No	No	No	No
Algae in hollows %	1-3 (many indiv)	Absent	Absent	Absent
Algae in pools %	1-3 (many indiv)	Absent	Absent	Absent
Bare peat %	1-3 (many indiv)	Absent	Absent	Absent
High hummocks %	Na	Absent	na	Absent
Low hummocks %	4-10	26-33	34-50	34-50
Hollows %	4-10	34-50	26-33	11-25
Lawns %	4-10	Absent	Absent	Absent
Pools %	4-10	11-25	Absent	11-25
Pool type	Tear	Regular	Absent	Regular
S.austinii hum type	Na	Absent	na	Absent

Ecotope type	Sub-central	Sub-central	Sub-central	Sub-central
Complex Name	4/9a/6 + p	4+poools	9/7/10	4+P
S.austinii hum %	Na	Absent	4-10	Absent
S.austinii height(cm)	Na	Absent	na	Absent
S.fuscum hum type	Na	Absent	na	Absent
S.fuscum hum %	Absent	Absent	Absent	Absent
S.fuscum height(cm)	Na	Absent	na	Absent
Leucobryum glaucum	Absent	Absent	Absent	Absent
Trichophorum type	Tussocks	Flats	Tussocks	Flats
Trichophorum %	1-3 (many indiv)	1-3 (few indiv)	1-3 (many indiv)	1-3 (few indiv)
S.magellanicum %	1-3 (many indiv)	4-10	Absent	1-3 (few indiv)
S.cuspidatum %	4-10	11-25	Absent	11-25
S.papillosum %	4-10	11-25	4-10	Absent
S.denticulatum %	1-3 (many indiv)	Absent	Absent	Absent
S.capillifolium%	4-10	4-10	26-33	4-10
S.tenellum %	Na	1-3 (few indiv)	na	1-3 (several indiv)
S.subnitens %	Absent	1-3 (several indiv)	Absent	1-3 (few indiv)
R.fusca %	Absent	Absent	Absent	Absent
R.alba %	4-10	11-25	Absent	4-10
N.ossifragum %	4-10	11-25	Absent	4-10
Sphag pools %	4-10	11-25	Absent	11-25
Dominant pool Sphag	S.cuspidatum;S. denticulatum	S.cuspidatum	Absent	S.cuspidatum
Sphag lawns %	4-10	Absent	Absent	4-10
Sphag humm %	4-10	26-33	34-50	11-25
Sphag holl %	4-10	4-10	11-25	4-10
Total Sphag %	26-33	34-50	34-50	34-50
Hummocks indicators	S.austinii	Absent	S.austinii	Absent

Ecotope type	Sub-central	Sub-central	Sub-central	Sub-central
Complex Name	4/9a/6 + p	4+pools	9/7/10	4+P
Cladonia portent %	1-3 (many indiv)	Absent	Absent	1-3 (few indiv)
Other Cladonia sp	Na	0	na	Uncialis
C. panicea %	Na	Absent	na	Absent
Calluna cover %	4-10	4-10	na	11-25
Calluna height(cm)	11-20	0-10	21-30	0-10
Other Notable Species		<i>Myrica</i> 4-10%, <i>Erica tet</i> 4-10% <i>Erioph ang</i> 4-10 <i>E vag</i> <4%	<i>Pedicularis sylvatica</i>	<i>Erio ang</i> 4-10% <i>Meny tri</i>
Other comment		difference from 2004 due to interpretation		new quadrat

Ecotope type	Sub-central
Complex Name	10/4
Quadrat Name	Qsc7
Easting	130961.08
Northing	233227.52
Date	25/10/2012
Firmness	Very soft
Burnt	No
Algae in hollows %	1-3 (several indiv)
Algae in pools %	1-3 (several indiv)
Bare peat %	Absent
High hummocks %	Absent
Low hummocks %	76-90
Hollows %	11-25
Lawns %	Absent

Ecotope type	Sub-central
Complex Name	10/4
Pools %	4-10
Pool type	Regular
S.austinii hum type	Active
S.austinii hum %	26-33
S.austinii height(cm)	11-20
S.fuscum hum type	Active
S.fuscum hum %	1-3 (several indiv)
S.fuscum height(cm)	11-20
Leucobryum glaucum	Absent
Trichophorum type	Flats
Trichophorum %	1-3 (few indiv)
S.magellanicum %	Absent
S.cuspidatum %	4-10
S.papillosum %	26-33
S.denticulatum %	Absent
S.capillifolium%	4-10
S.tenellum %	1-3 (several indiv)
S.subnitens %	1-3 (several indiv)
R.fusca %	Absent
R.alba %	4-10
N.ossifragum %	4-10
Sphag pools %	4-10
Dominant pool Sphag	S.cuspidatum
Sphag lawns %	Absent
Sphag humm %	51-75
Sphag holl %	1-3 (many indiv)

Ecotope type	Sub-central
Complex Name	10/4
Total Sphag %	51-75
Hummocks indicators	Absent
Cladonia portent %	Absent
Other Cladonia sp	
C. panicea %	Absent
Calluna cover %	Absent
Calluna height(cm)	0-10
Other Notable Species	Meny tri, Raco lan <4, Pleur pur, Ped pal.
Other comment	new quadrat

Note: Data for those 2005 quadrats re-surveyed in 2012 is given to the right of the original 2005 quadrat data in table above. Not all quadrats reported in 2005 were re-surveyed in 2012. Nonetheless, all 2005 quadrat data is given above. Additional quadrats were recorded where necessary. Some 2005 quadrats may have been classified under a different ecotope category in 2012; further detail is given within the report.

91D0 Bog woodland: Assessment sheet

Site name	Addergoole	Recorders	GS, KD	Photo no.s	DSC000360-361	
Stop Number	Qbw1	Date	24/10/12	Grid ref	130946.61/233382.38	
Positive indicator species		✓	Negative indicator species		% Cover	
Trees and woody species			<i>Pteridium aquilinum</i>		<1%	
<i>Betula pubescens</i>		✓	<i>Rubus</i> agg.		0	
<i>Salix aurita</i>			<i>Rhododendron ponticum</i>		0	
<i>Salix atrocinerea</i>			Non-native conifer species		0	
Dwarf shrubs, herbs & ferns			List:			
<i>Dryopteris dilatata</i>						
<i>D. carthusiana.</i>		✓				
<i>Carex rostrata</i>						
<i>Juncus effuses</i>		✓				
<i>Molinia caerulea</i>		✓				
<i>Vaccinium oxycoccos</i>		✓				
<i>Empetrum nigrum</i>						
<i>Vaccinium myrtillus</i>						
<i>Epilobium palustre</i>			Others		0	
<i>Calluna vulgaris</i>			List:			
<i>Potentilla erecta</i>						
Mosses						
<i>Polytrichum commune</i>		✓				
<i>Sphagnum fimbriatum</i>						
<i>Sphagnum fallax</i>		✓				
<i>Sphagnum palustre</i>		✓				
<i>Hylocomium splendens</i>						
<i>Aulacomnium palustre</i>		✓				
Pass = <i>Betula pubescens</i> , <i>Sphagnum</i> species plus ≥5 of the other species		Pass	Pass = Negative indicator species <10%		Pass	
Structural data		Result	Stop level		Passes	
Median canopy height >4m		Pass	≥7 passes = pass		Pass	
Total canopy cover >30% of plot		Pass	<7 passes = fail			
<i>Betula pubescens</i> >50% of canopy		Pass				
Dwarf shrub layer cover <50%		Pass				
<i>Calluna</i> cover <40%		Pass				
% <i>Sphagnum</i> cover (pass = ≥25%)		Pass(60%)				
% Bryophyte cover (pass = ≥50%)		Pass(60%)				
			Result=9			

Note: *Pinus sylvestris* 0%

Target tree species dbh	✓	Old trees & dead wood (any)	Result
--------------------------------	---	--	---------------

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

Additional potential indicator species recorded in Stop 1:

Osmunda regalis

Myrica gale

Menyanthes trifoliata

Sphagnum squarrosum

Deadwood notes Stop 1:

- 1 m tall snag > 10cm diameter present
- 4 dead stems 5-10 cm present

Site name	Addergoole	Recorders	GS, KD	Photo no.s	DSC000362-363
Stop Number	Qbw2	Date	24/10/12	Grid ref	131004.73/233395.42
Positive indicator species		✓	Negative indicator species		% Cover
Trees and woody species			Pteridium aquilinum		0
Betula pubescens		✓	Rubus agg.		0
Salix aurita			Rhododendron ponticum		0
Salix atrocinerea			Non-native conifer species		0
Dwarf shrubs, herbs & ferns			List:		
Dryopteris dilatata					
D. carthusiana.		✓			
Carex rostrata					
Juncus effuses		✓			
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		Pass	≥7 passes = pass		Pass
Total canopy cover >30% of plot		Pass	<7 passes = fail		
Betula pubescens >50% of canopy		Pass			
Dwarf shrub layer cover <50%		Pass	Result=9		
Calluna cover <40%		Pass			
% Sphagnum cover (pass = ≥25%)		Pass(40%)			
% Bryophyte cover (pass = ≥50%)		Pass(55%)			

Note: *Pinus sylvestris* 0%

Target tree species dbh	✓	Old trees & dead wood (any species)	Result
<i>Betula pubescens</i>		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	0	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	Fail
<i>Betula pubescens</i> regeneration	✓		
Pass = ≥1 sapling >1m in all stops	Pass		

Additional potential indicator species recorded in Stop 2:

Osmunda regalis

Myrica gale

Menyanthes trifoliata

Sphagnum squarrosum

Eriophorum vaginatum

Deadwood notes Stop 2:

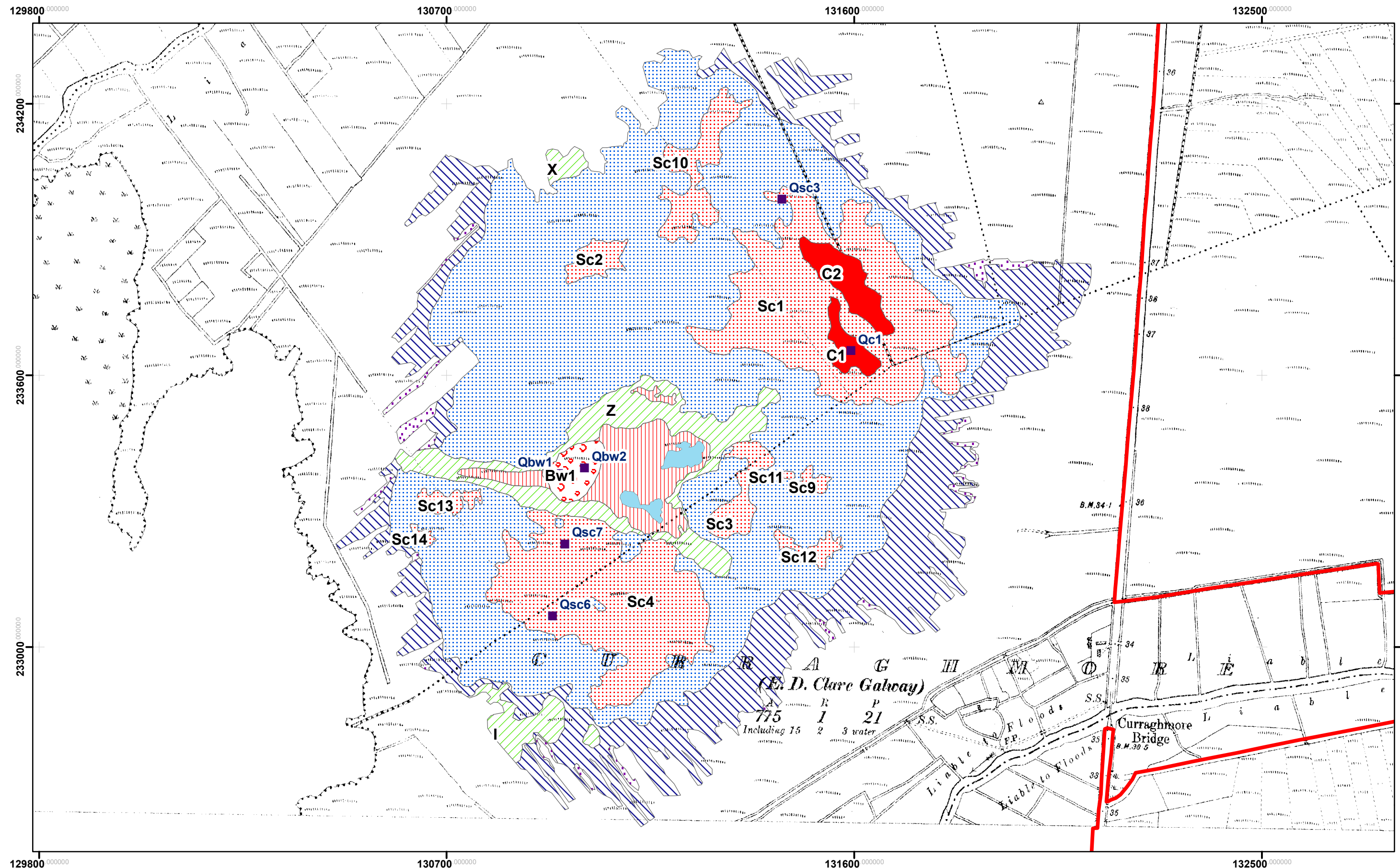
- Lots of dead branches on living trees & fallen fine woody debris

Comments on site:

Overall, the bog woodland on site is very wet and healthy. Consists of pure birch with no *Salix* species or other trees. Trees are typically small, but with a few >20 cm dbh. Deadwood is uncommon, however. Site is very exposed and standing deadwood is likely to quickly fall. Fallen deadwood is likely to be quickly engulfed by *Sphagnum*.

This site is of very high quality and should pass, in the opinion of the surveyors.

Appendix IV Survey maps



Raised Bog Monitoring & Assessment Survey 2013 **Map 1: Ecotopes Map and Quadrats**

Ordnance Survey Ireland Licence No EN 0059208
© Ordnance Survey Ireland / Government of Ireland
Ecology and Environmental Consultants Ireland Ltd.

Addergoole SAC (000297) **Co. Galway/ Co. Mayo**

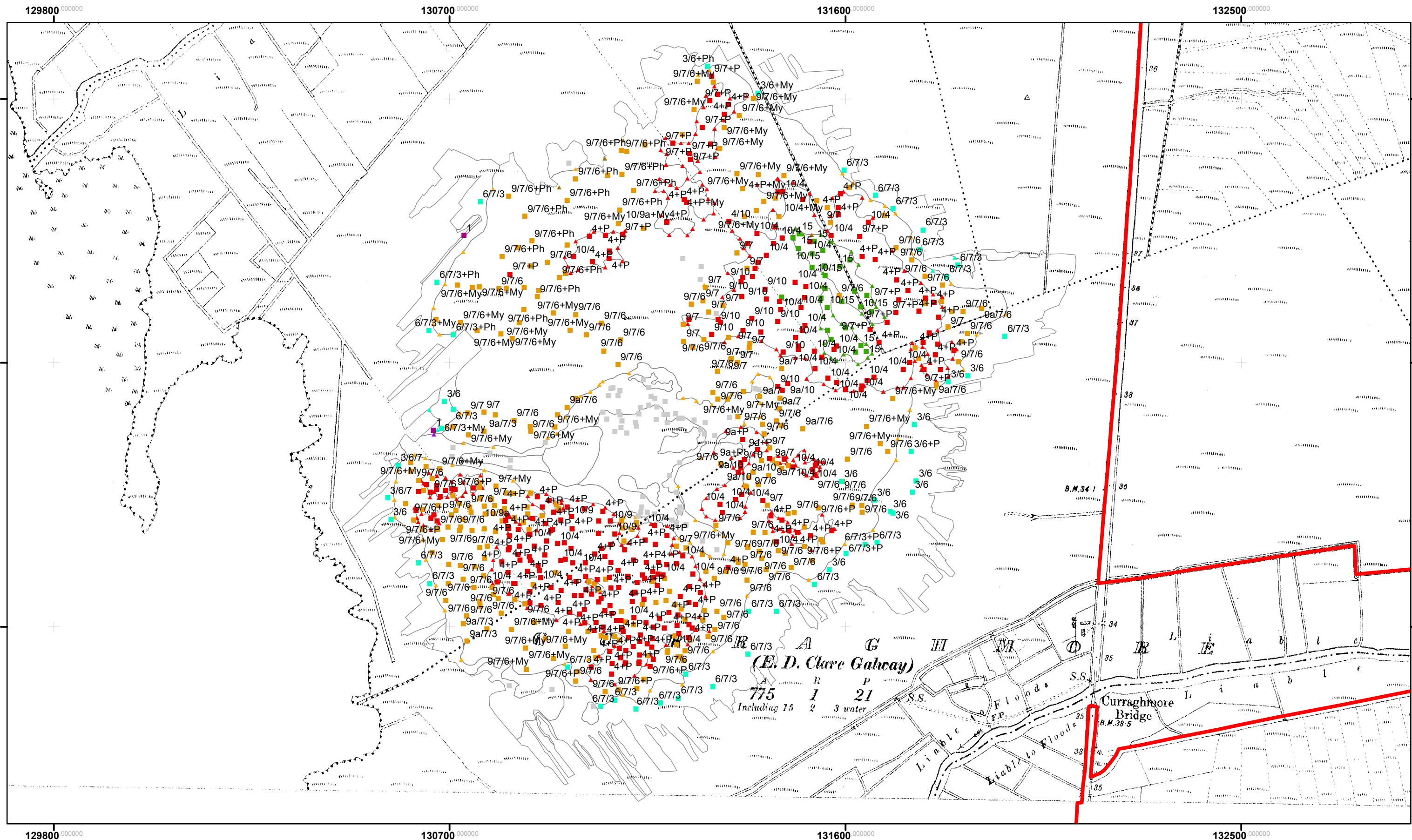
1:8,000

0 100 200 400 600 800 Meters



Legend

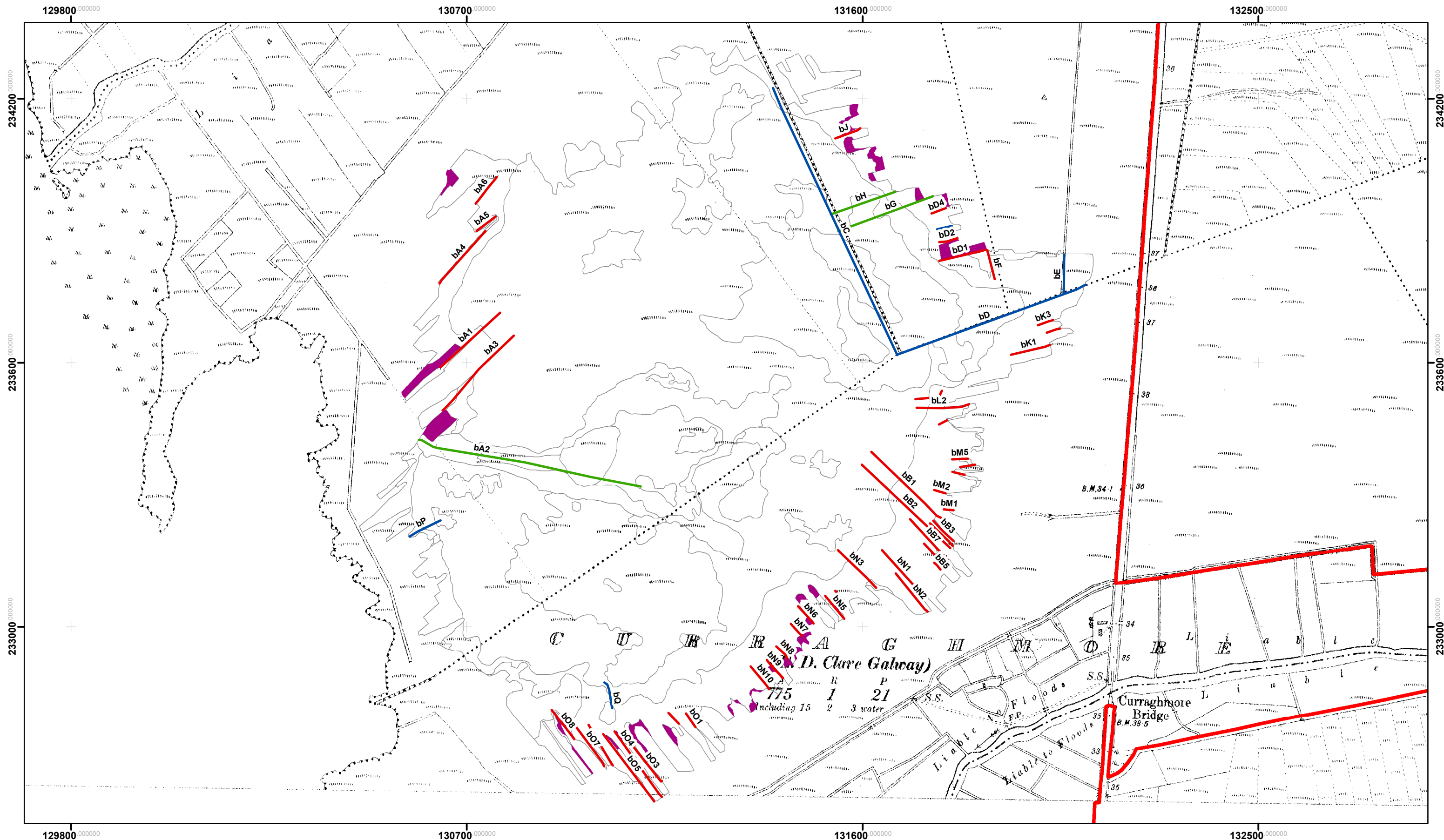
■ Quadrat	▨ Active Flush	▤ Face bank
Ecotope type	▩ Sub-marginal	■ Open water
■ Central	▨ Marginal	■ Conifer plantation
▨ Sub-central	▨ Inactive Flush	▨ Clear felled area
▨ Bog Woodland	▨ Woodland	■ SAC



Raised Bog Monitoring & Assessment Survey 2013
Map 2: Vegetation community complexes
Ordnance Survey Ireland Licence No EN 0059208
© Ordnance Survey Ireland / Government of Ireland
Ecology and Environmental Consultants Ireland Ltd.

Addergoole SAC (000297)
Co. Galway/ Co. Mayo
1:8,000
0 112.5 225 450 675 900 Meters

Legend	
Ecotope type	Boundary type
■ Central ecotope complex	■ Flush
■ Sub-central ecotope complex	■ SC/C
■ Sub-marginal ecotope complex	■ F/C
■ Marginal ecotope complex	■ SM/C
■ Face bank ecotope complex	■ M/C
▲ F/SC	▲ SM/SC
▲ SM/SC	▲ M/SC
▲ M/SC	▲ FB/SC
▲ FB/SC	▲ F/SM
▲ F/SM	▲ M/SM
▲ SM/FB	▲ F/M
▲ F/M	▲ M/FB
▲ M/FB	▲ F/FB
▲ F/FB	▲ Other
▲ Other	■ SAC



Raised Bog Monitoring & Assessment Survey 2013 **Map 3: Impacts (High bog drainage; Turf cutting; Fire events)**

Ordnance Survey Ireland Licence No EN 0059208
© Ordnance Survey Ireland / Government of Ireland

Ecology and Environmental Consultants Ireland Ltd.

Addergoole SAC (000297) **Co. Galway/ Co. Mayo**

1:8,000

0 105 210 420 630 840 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