

# Appendix 7

## Peatland Survey Report



# Hortland – Raised Bog Site Report

## General site and survey details

Site Name	Hortland Bog
WSI Site Code	GE_20
Area (ha) (high bog)	55
Original extent of bog (ha)	372
Grid Reference (IG)	N: 235290 ; E:279140
Designation	None
Townlands	Annaghmore and Gorteen
County	Kildare
Survey Date	12/12/2013
Weather conditions	Good
Surveyors	Barry O'Loughlin & Brendan Kirwan

## Summary results of survey – presence of EU Annex habitat types

Annex Habitat	Presence	Area (ha)
Active Raised Bog 7110	Yes	0.9
Degraded raised bog 7120	YES <sup>1</sup>	54.1
Bog Woodland 91D0	NO	NA
Depressions on peat substrates 7150	NO	NA

## Previous site information

The area was mapped as being outside of designated areas and un-surveyed by NPWS (2007)<sup>2</sup>. No information on any previous ecological surveys of the site were identified during a literature review. Furthermore, no previous baseline information was available following a review of the Map of Irish Wetlands ([www.wetlandsurveysireland.com](http://www.wetlandsurveysireland.com)).

## Description of habitats present on the high bog

The site comprises an intact section of raised bog habitat located on a flat low lying area surrounded by cutover bog and conifer forestry (see **Plate 1**). The dominant vegetation recorded throughout the site comprises *Calluna vulgaris*, *Eriophorum vaginatum*, *Trichophorum cespitosum*, and *Narthecium ossifragum*. Other abundant species include *Cladonia portentosa* and *Sphagnum* mosses.

The high bog supports two discrete areas of active peat forming communities in the south-western part of the bog (see **Figure 1**). Active areas contain sub-central ecotope dominated by *Sphagnum* mosses (see data relating to plot locations in **Appendix 2**). The sub-central ecotope (active peat forming areas) are typically dominated by *Eriophorum vaginatum* and *Rhynchospora alba* together with a good diversity of *Sphagnum* mosses including *Sphagnum magellanicum*, *Sphagnum papillosum*, *Sphagnum capillifolium*, *Sphagnum cuspidatum*, *Sphagnum subnitens* and *Sphagnum fallax*. Areas supporting this ecotope type comprise 50-60% *Sphagnum* moss cover (see **Plate 2**). Substrate is soft underfoot. The microtopography is relatively well developed and comprises low hummocks, *Sphagnum* lawns, and occasional pools. The formation of active peat forming areas is

<sup>1</sup> Hydrological investigations would be required to determine whether physical conditions at the site are capable of supporting Active Raised Bog. In the absence of such conditions the habitat would not conform to the Annex habitat 'Degraded raised bog capable of natural regeneration'. See NPWS (2014), National Raised Bog SAC Management Plan.

<sup>2</sup> NPWS (2007) The Status of EU Protected Habitats and Species in Ireland: backing Documents, Article 17 forms, Maps Volume 3. Conservation Status in Ireland of Habitats and Species listed in the European Council Directive on the Conservation of Habitats, Flora and Fauna 92/43/EEC. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government. Dublin.

likely to be attributed to secondary re-wetting of the high bog caused by subsidence due to drainage and peat extraction activities. In addition, the site supports three other ecotope types that conform to degraded raised bog (face bank, marginal and sub-marginal).

Conditions are progressively drier towards the edge of the bog, with sub-marginal and marginal ecotopes prominent. A map and associated target notes are presented in **Appendix 1**. Further more detailed information on the ecotopes recorded on the high bog is presented in **Appendix 2**. The site is of conservation value for the presence of the priority EU Annex I habitat 'Active raised bog 7110'.

Past drainage of the high bog is evident by the presence of functional drainage ditches in the southern part of the site (see **Figure 1**).

The southern margins of the high bog comprise actively cut face banks that are progressively intruding into the high bog. An extensive area of industrially cutaway bog adjoins the western part of the site. Active cutting is no longer occurring along northern and eastern margins (see **Figure 1**).

### **Description of marginal habitats surrounding high bog**

A large extensive area of cutaway bare peat occurs to the west of the high bog and includes a dense network of functional drainage ditches running east-west with associated culverts installed (see **Figure 1**). This area is intensively managed for industrial peat harvesting operations. Conifer forestry comprising Sitka Spruce (*Picea sitchensis*) bounds the eastern part of the site while an area of old cutover that has regenerated to wet heath occurs to the north. Active mechanical peat cutting is ongoing along the southern margin of the high bog (see **Figure 1**). *Sphagnum* mosses have successfully regenerated on cutover areas adjacent south of the high bog. Mosses recorded include *Sphagnum magellanicum*, *Sphagnum papillosum*, *Sphagnum capillifolium*, *Sphagnum cuspidatum*, and *Sphagnum fallax* (see **Plate 3**).

### **Summary evaluation of the site**

The bog is a remnant area of raised bog that has been severely impacted by long term peat extraction and associated drainage. The site continues to support a small area of active raised bog, a habitat that is rare throughout Ireland. The site is deemed to be of high conservation value due to the presence of 'Active Raised Bog (7110)', a priority habitat listed on Annex I of the EU Habitats Directive.

### **Sensitivity of site to wind farm development**

The raised bog habitat present within the site would be sensitive to habitat loss and disturbance should site infrastructure be located within the remaining area of high bog. Such development on the high bog would also be expected to have hydrological effects on the surrounding bog habitat.

The remnant raised bog is also susceptible to further drying out and degradation should drainage in surrounding areas affect the hydrological integrity of the high bog.

### **Potential impacts of proposed wind farm layout (24 February 2015)**

The avoidance of high bog ensures that no direct impacts (such as habitat loss or surface damage) will occur.

The potential for indirect impacts such as hydrological alteration is deemed to be low as all turbine locations and associated infrastructure are proposed to be located in areas well removed from the high bog. The hydrology the area surrounding the proposed turbine locations has also been heavily modified due to forestry and associated drainage. An assessment of potential impacts on the hydrology of the area is presented in the Hydrology chapter of the EIS (Chapter 9).

### **Plates 1-3**



**Plate 1:** The site occurs on a flat, low lying area of intact raised bog. The high bog comprises two discrete areas of active raised bog.





**Plate 2:** Sub-central ecotope is dominated by *Sphagnum* mosses (ca 50-60% cover) with *Eriophorum vaginatum* and *Rhynchospora alba*. The ecotope type conforms to the priority EU Annex I listed habitat 'active raised bogs 7110'.



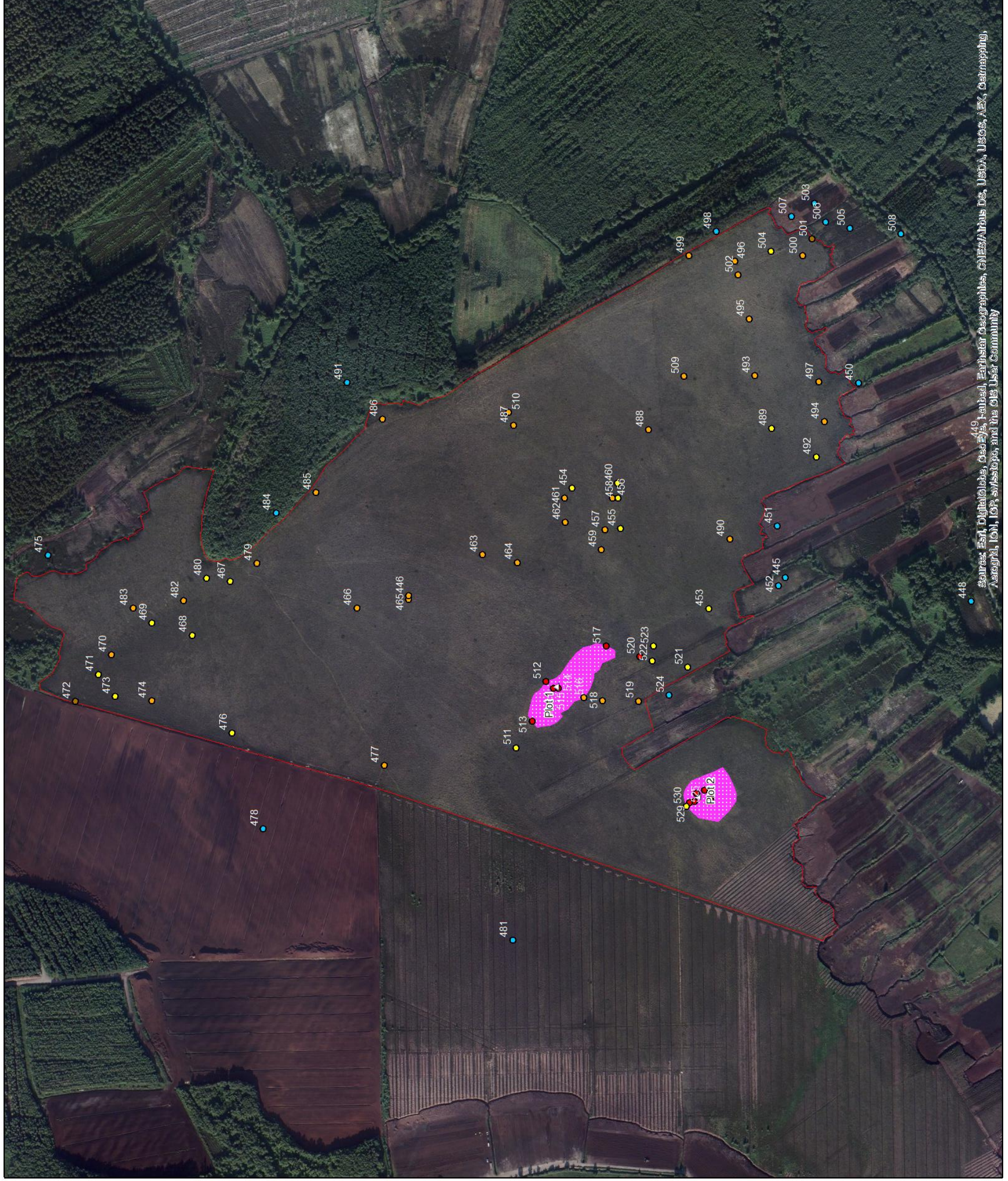
**Plate 3:** *Sphagnum* mosses have regenerated in a small section of cutover bog located south of the area of intact bog.

# **Appendix 1**

## **Site Map and Associated Target Notes**



Appendix 1 (Site map and associate target notes)



Source: Earth Digital@home, GeoEye, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, IS, Swisstopo, and the GIS User Community

**Legend**

-  High Bog Boundary
-  Active Raised Bog
-  Plot Location
-  Descriptive Note
-  Face bank
-  Marginal
-  Sub marginal
-  Sub central



Scale: 1:5,000  
 0 37.5 75 150 225 Meters



Date: 20/06/2014

Figure 1: Map showing the results of raised bog survey.



Table 1: Target notes recorded during field survey of Hortland Bog. See Figure 1 for corresponding location referred to by each note.

Note Number	Note Type	Bog Name	Bog Code	Note Text	Ecotope
445	Flora	Hortland	GE_20	This area of cutover bog comprises a good diversity of regenerating Sphagnum mosses and other bog plants	Descriptive Note
446	Flora	Hortland	GE_20	Sphagnum cover is ca 20% in this area with Sphagnum capillifolium and Sphagnum papillosum	Sub marginal
447	Plot Location	Hortland	GE_20	Plot 1	Plot Location
448	Habitat	Hortland	GE_20	This area comprises Birch Scrub dominated by Betula pubescens	Descriptive Note
449	Habitat	Hortland	GE_20	Area of cutover bog dominated by bare peat with some recolonising bog plants including Molinia caerulea, Eriophorum vaginatum and Calluna vulgaris. Other species typical of grassland such as Holcus lanatus, Cerastium fontanum, Juncus effusus also occur.	Descriptive Note
450	Management	Hortland	GE_20	Mechanical removal of peat from high bog. Plant machinery observed operating on site.	Descriptive Note
451	Habitat	Hortland	GE_20	Cutover bog. This area is heavily compacted due to plant machinery.	Descriptive Note
452	Habitat	Hortland	GE_20	Area of cutover bog with regenerating Sphagnum mosses including Sphagnum cuspidatum, Sphagnum magellanicum, Sphagnum fallax, Sphagnum capillifolium and Sphagnum papillosum. Other plant species include Eriophorum vaginatum and Calluna vulgaris	Descriptive Note
453	Ecotope	Hortland	GE_20	Marginal ecotope. Dominated by Eriophorum angustifolium, Trichophorum cespitosum and Calluna vulgaris. Other species include Cladonia portentosa, Erica tetralix and Eriophorum vaginatum. Rare occurrences of Sphagnum tenellum	Marginal
454	Ecotope	Hortland	GE_20	Marginal ecotope dominated by dense tussocks of Trichophorum cespitosum. Calluna vulgaris, Erica tetralix, Cladonia portentosa and Rhynchospora alba are abundant. Several algal pools occur throughout this area. Ground is firm underfoot	Marginal
455	Ecotope	Hortland	GE_20	Marginal ecotope dominated by Trichophorum cespitosum and Calluna vulgaris. Other species include Cladonia portentosa, Erica tetralix and Eriophorum vaginatum, Rhynchospora alba and Campylopus spp.	Marginal
456	Ecotope	Hortland	GE_20	Sub marginal ecotope with > 20% Sphagnum cover and includes Sphagnum cuspidatum. Dominated by Trichophorum cespitosum. Other species recorded include Eriophorum vaginatum, Eriophorum angustifolium, Rhynchospora alba and Calluna vulgaris.	Sub marginal
457	Ecotope	Hortland	GE_20	Marginal and sub marginal ecotope boundary. Sub marginal areas support ca 20-25% Sphagnum cover including Sphagnum papillosum, Sphagnum capillifolium and Sphagnum tenellum with rare occurrences of Sphagnum cuspidatum. Conditions are soft underfoot.	Sub marginal
458	Ecotope	Hortland	GE_20	Marginal ecotope. Area comprises <10% Sphagnum cover. This part of the high bog comprises Campylopus introflexus, Cladonia floerkeana and Cladonia portentosa. Sphagnum mosses include Sphagnum papillosum, Sphagnum tenellum and Sphagnum capillifolium.	Marginal
459	Ecotope	Hortland	GE_20		Sub marginal
460	Management	Hortland	GE_20	The site appears to have been affected by burning. There is evidence of erosion of the high bog through the formation of hag heads.	Marginal
461	Ecotope	Hortland	GE_20	Sub marginal and marginal ecotope boundary	Sub marginal
462	Ecotope	Hortland	GE_20		Sub marginal
463	Ecotope	Hortland	GE_20		Sub marginal
464	Ecotope	Hortland	GE_20		Sub marginal
465	Ecotope	Hortland	GE_20	Sub marginal ecotope (marginal to the north) dominated by Eriophorum vaginatum, Calluna vulgaris and Rhynchospora alba. Abundance of Cladonia portentosa, Eriophorum angustifolium and Erica tetralix.	Sub marginal
466	Management	Hortland	GE_20	Evidence of quad tracks across the high bog	Sub marginal
467	Ecotope	Hortland	GE_20	Transition from area of sub marginal ecotope to marginal ecotope. Ground conditions are firm underfoot. Sphagnum cover <10% in an area dominated by Trichophorum cespitosum, Calluna vulgaris and Cladonia portentosa. Noticeable decline Sphagnum cover.	Marginal
468	Fauna	Hortland	GE_20	Four snipe recorded in this area.	Marginal
469	Ecotope	Hortland	GE_20	Marginal ecotope dominated by Trichophorum cespitosum occurs to the east	Marginal
470	Ecotope	Hortland	GE_20	Marginal and sub marginal ecotope boundary.	Sub marginal
471	Ecotope	Hortland	GE_20	Marginal and sub marginal ecotope boundary	Marginal
472	Ecotope	Hortland	GE_20	Face bank ca 3m deep dominated by dense stands of Calluna vulgaris.	Face bank
473	Ecotope	Hortland	GE_20	This area is dominated by Calluna vulgaris and Narthecium ossifragum. Conditions are firm underfoot. Sphagnum cover is <5%.	Marginal
474	Ecotope	Hortland	GE_20	Sub marginal ecotope. Ground conditions are firm to soft underfoot. Sphagnum cover is ca 15% with Sphagnum papillosum, Sphagnum capillifolium and Sphagnum tenellum recorded. Calluna vulgaris and Narthecium ossifragum dominate.	Sub marginal
475	Habitat	Hortland	GE_20	This area of cutover bog is dominated by dense stands of Calluna vulgaris with Eriophorum vaginatum. The area appears to have been hand cut in the past however peat cutting has since been abandoned in modern times.	Descriptive Note
476	Ecotope	Hortland	GE_20	Ground conditions are firm underfoot. This area is dominated by Narthecium ossifragum and Calluna vulgaris. Sphagnum moss cover is <10%.	Marginal
477	Ecotope	Hortland	GE_20	Sphagnum cover is ca 15% in this area with Sphagnum tenellum, Sphagnum papillosum and some rare occurrences of Sphagnum magellanicum and Sphagnum cuspidatum. Conditions are firm to soft underfoot.	Sub marginal
478	Habitat	Hortland	GE_20	Large extensive area of cutover bog dominated by bare peat. A network of functional drainage ditches traverse the site.	Descriptive Note
479	Ecotope	Hortland	GE_20	Sub marginal and marginal ecotope boundary	Sub marginal
480	Ecotope	Hortland	GE_20		Marginal
481	Habitat	Hortland	GE_20	Cutover bog dominated by bare peat	Descriptive Note
482	Ecotope	Hortland	GE_20		Sub marginal
483	Ecotope	Hortland	GE_20	Sub marginal and marginal ecotope boundary	Sub marginal
484	Habitat	Hortland	GE_20	Small section of birch scrub ca 10m high dominated by Betula pubescens	Descriptive Note
485	Ecotope	Hortland	GE_20	Sub marginal and marginal ecotope boundary	Sub marginal
486	Ecotope	Hortland	GE_20	Sub marginal and marginal ecotope boundary	Sub marginal
487	Ecotope	Hortland	GE_20		Sub marginal
488	Ecotope	Hortland	GE_20		Sub marginal



Note Number	Note Type	Bog Name	Bog Code	Note Text	Ecotope
489	Ecotope	Hortland	GE_20		Marginal
490	Ecotope	Hortland	GE_20	Boundary between marginal and sub marginal ecotope.	Sub marginal
491	Habitat	Hortland	GE_20	Conifer plantation dominated by <i>Picea sitchensis</i> with occasional <i>Pinus sylvestris</i>	Descriptive Note
492	Ecotope	Hortland	GE_20	Marginal ecotope. Firm underfoot. Sphagnum cover ca <10%. Area dominated by <i>Trichophorum cespitosum</i> , <i>Calluna vulgaris</i> and <i>Cladonia portentosa</i> . Evidence of cracking recorded in proximity to the face bank.	Marginal
493	Ecotope	Hortland	GE_20	Sub-marginal ecotope with well developed Sphagnum hummock topography	Sub marginal
494	Ecotope	Hortland	GE_20	Sub marginal ecotope. Sphagnum cover is ca 20% with Sphagnum papillosum, Sphagnum tenellum and Sphagnum capillifolium. Firm underfoot in an area dominated by <i>Trichophorum cespitosum</i> and <i>Calluna vulgaris</i> . Other species include <i>Cladonia floerkeana</i>	Sub marginal
495	Ecotope	Hortland	GE_20		Sub marginal
496	Ecotope	Hortland	GE_20		Sub marginal
497	Ecotope	Hortland	GE_20	Boundary between marginal (outer margins) and sub marginal (to the bog centre) ecotope. <i>Carex panicea</i> and <i>Narthecium ossifragum</i> are abundant in this area.	Sub marginal
498	Habitat	Hortland	GE_20	Small linear section of cutover bog with regenerating Sphagnum mosses and bog plants with surface water including Sphagnum cuspidatum, Sphagnum papillosum, Sphagnum magellanicum and Sphagnum capillifolium. Other species include <i>Rhynchospora alba</i>	Descriptive Note
499	Ecotope	Hortland	GE_20	Sub marginal ecotope with greater than 20% Sphagnum moss cover.	Sub marginal
500	Ecotope	Hortland	GE_20	Sub marginal ecotope to the north of this point. Marginal ecotope occurs to the south. Marginal areas are very firm underfoot dominated by <i>Narthecium ossifragum</i> , <i>Calluna vulgaris</i> and <i>Cladonia portentosa</i> . Sub marginal dominated by <i>Rhynchospora alba</i> .	Sub marginal
501	Ecotope	Hortland	GE_20	Face bank ca 2.5m deep dominated by dense stands of <i>Calluna vulgaris</i> .	Face bank
502	Ecotope	Hortland	GE_20	Sub marginal ecotope with greater than 30% Sphagnum moss cover. Conditions are soft underfoot. The main plants include <i>Eriophorum vaginatum</i> , <i>Calluna vulgaris</i> and an abundance of <i>Erica tetralix</i> , <i>Cladonia portentosa</i> and <i>Eriophorum angustifolium</i> .	Sub marginal
503	Habitat	Hortland	GE_20	Area of cutover bog with bare peat and recolonising grassland species.	Descriptive Note
504	Ecotope	Hortland	GE_20		Marginal
505	Habitat	Hortland	GE_20	Area of cutover bog with recolonising bog plants including <i>Calluna vulgaris</i> . Peat extraction has ceased in this area with few regenerating Sphagnum mosses including Sphagnum capillifolium and Sphagnum tenellum.	Descriptive Note
506	Habitat	Hortland	GE_20	Area of cutover bog comprises dense stands of <i>Calluna vulgaris</i> with some regenerating Sphagnum mosses including Sphagnum cuspidatum. Other species present include <i>Rhynchospora alba</i> .	Descriptive Note
507	Habitat	Hortland	GE_20	Evidence of former mechanical peat extraction operations of the high bog.	Descriptive Note
508	Habitat	Hortland	GE_20	This area comprises birch scrub dominated by <i>Betula pubescens</i>	Descriptive Note
509	Ecotope	Hortland	GE_20	Sub marginal ecotope. Conditions are firm underfoot. Sphagnum cover is ca. 20%. Microtopography is well developed with hollows recorded in this area	Sub marginal
510	Ecotope	Hortland	GE_20	Sub marginal ecotope. Sphagnum cover is ca 40% and comprises Sphagnum papillosum, Sphagnum capillifolium and rare occurrences of Sphagnum magellanicum. Ground is firm underfoot. No hummocks or hollows were recorded.	Sub marginal
511	Ecotope	Hortland	GE_20	Marginal ecotope. Condition are firm underfoot with Sphagnum cover <5%. Dominated by <i>Eriophorum vaginatum</i> and <i>Calluna vulgaris</i> . <i>Cladonia portentosa</i> was also recorded	Marginal
512	Ecotope	Hortland	GE_20	Sub central ecotope boundary	Sub central
513	Ecotope	Hortland	GE_20	This area comprises ca 40% Sphagnum cover and includes Sphagnum cuspidatum, Sphagnum magellanicum, Sphagnum papillosum, Sphagnum capillifolium and Sphagnum fallax. Ground conditions are very soft underfoot.	Sub central
514	Ecotope	Hortland	GE_20	Area of sub central ecotope occurs in a large hollow possibly as a result of subsidence and secondary rewetting. The ecotope conforms to active raised bog capable of peat formation. Sphagnum moss cover ca 40-50% with <i>Eriophorum vaginatum</i>	Sub central
515	Ecotope	Hortland	GE_20	Sub central ecotope. Sphagnum cover ca 50-60% includes Sphagnum cuspidatum, Sphagnum magellanicum, Sphagnum capillifolium, Sphagnum papillosum and Sphagnum fallax. This area is dominated by Sphagnum mosses and <i>Eriophorum vaginatum</i> .	Sub central
516	Ecotope	Hortland	GE_20	Boundary of sub central ecotope.	Sub marginal
517	Ecotope	Hortland	GE_20	Sub central ecotope boundary. Located in depression likely to have arisen as a result of secondary rewetting of the high bog.	Sub central
518	Ecotope	Hortland	GE_20	Sphagnum cover ca 15%. Bog surface is very firm underfoot. Dominated by <i>Trichophorum cespitosum</i> and <i>Calluna vulgaris</i> .	Sub marginal
519	Hydrology	Hortland	GE_20	Functional drain runs north-south, ca 1m in depth.	Sub marginal
520	Ecotope	Hortland	GE_20		Sub central
521	Ecotope	Hortland	GE_20	Marginal ecotope. Conditions are firm underfoot. Dominated by <i>Trichophorum cespitosum</i> and <i>Calluna vulgaris</i> . Other species include <i>Cladonia portentosa</i> , <i>Eriophorum vaginatum</i> and <i>Cladonia floerkeana</i> . Rare occurrences of Sphagnum tenellum.	Marginal
522	Hydrology	Hortland	GE_20	Functional drainage ditch	Marginal
523	Ecotope	Hortland	GE_20		Marginal
524	Habitat	Hortland	GE_20	Cutover bog dominated by <i>Calluna vulgaris</i>	Descriptive Note
525	Ecotope	Hortland	GE_20	Sphagnum cover is ca 40-50% with Sphagnum cuspidatum, Sphagnum fallax, Sphagnum magellanicum, Sphagnum capillifolium, Sphagnum papillosum. Dominated by Sphagnum mosses and <i>Rhynchospora alba</i> . Conditions are soft underfoot	Sub central
526	Ecotope	Hortland	GE_20		Sub central
527	Ecotope	Hortland	GE_20	This area conforms to the EU Annex I listed habitat 'active raised bog (7110)'	Sub central
528	Plot Location	Hortland	GE_20	Plot 2	Plot Location
529	Ecotope	Hortland	GE_20	Sub central and marginal ecotope boundary	Sub central
530	Ecotope	Hortland	GE_20		Marginal
531	Hydrology	Hortland	GE_20	This area of sub central ecotope occurs in a large hollow possibly as a result of secondary wetting.	Sub central

## **Appendix 2**

### **Detailed Site Data**



# Green Element

## Raised Bog Survey 2013 - 2014

<b>Bog Name:</b>	Hortland	<b>Site Easting &amp; Northing:</b>	279140 235290
<b>Bog Code:</b>	20	<b>Site contains Raised Bog Habitat:</b>	YES
<b>County:</b>	Kildare	<b>Active Raised Bog 7110:</b>	YES
<b>Survey Date:</b>	12/12/2013	<b>Bog Woodland 91D0:</b>	NO
<b>Name of Surveyor/s:</b>	B. O'Loughlin & B. Kirwan	<b>Degraded raised bog 7120:</b>	YES
		<b>Depressions on peat substrates 7150:</b>	NO

Ecotope	Present/Absent	Comment
<b>Central:</b>	Absent	N/A
<b>Sub-Central:</b>	Present	Two discrete areas of sub-central ecotope occur in the south western part of the site. Both areas occur in a depression possibly as a result of subsidence which has led to secondary re-wetting of this area. The area is dominated by <i>Sphagnum</i> mosses and <i>Eriophorum vaginatum</i> and <i>Rhynchospora alba</i> . The plots conforms to community complex 10/9 and 10-4. The ground is very soft underfoot. Areas of active peat formation conforms to annex I EU habitat.
<b>Sub-Marginal:</b>	Present	Sub-marginal ecotope is widespread and dominates the site and conforms to community complex 10/9/7. This ecotope is soft underfoot and comprises hummocks and hollows dominated by <i>Sphagnum</i> moss (see target notes).
<b>Marginal:</b>	Present	This ecotope occurs along the outer margins of the high bog and is dominated by dense tussocks of <i>Trichophorum</i> . The ecotope conforms to community complex 9/7/6 and 7/6.
<b>Facebank:</b>	Present	Slumping and cracking occur along the facebank due to peat extraction operations. <i>Calluna vulgaris</i> and <i>Hypnum jutlandicum</i> is high at the bog edge.
<b>High Bog area (ha):</b>	54.10	<b>Area of Active Raised Bog (ha):</b> 0.9 <b>% ARB:</b> 1.66

### Site Description:

The site is located in a flat low lying area surrounded by bog woodland to the east and cutover bog to the north, west and south. The site is managed for commercial peat extraction and is heavily modified due to mechanical removal of peat. It is possible that two discrete areas along the southern margin of the site and the northern part of the site were managed for hand cutting of peat. *Sphagnum* moss and other bog plant communities have regenerated and recolonised in these cutover areas.

The site comprises four ecotope types including facebank, marginal, sub-marginal and sub-central. The marginal ecotope is dominated by dense tussocks of *Trichophorum cespitosum*. *Sphagnum* mosses cover less than 10% and comprise *Sphagnum tenellum* and *Sphagnum capillifolium*. The sub-marginal ecotope within the high bog is dominant and widespread across the site. This ecotope largely corresponds to 9/7/6 and 10/9/7 community type and comprises good examples of low hummocks and hollows. *Sphagnum* cover is circa 30% in these areas and the surface is soft underfoot.

The site comprises two active peat forming sub-central ecotope areas located in the southwestern part of the site. This ecotope is characterised by a dominance of *Sphagnum* mosses including *S. cuspidatum*, *S. capillifolium*, *S. magellanicum*, *S. papillosum*, *S. subnitens*, *S. fallax*, and *S. austinii* and is very soft underfoot. The sub-central ecotope conforms to community type 4/10 and 10/9. These areas occur in depressions likely to be the result of subsidence due to drainage and peat harvesting operations and are likely to have arisen from secondary re-wetting. The ecotopes are capable of peat formation and correspond to annex I priority habitat active raised bog 7110 listed on

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### Raised Bog Survey 2013 - 2014

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the EU habitats directive. The main threats to the site include burning, drainage and peat extraction operations.

**Landscape setting:**

The site is located in flat low lying landscape surrounded by conifer forestry and improved grassland managed for agriculture.



# Green Element

## Raised Bog Survey 2013 - 2014

Main Site Name: Hortland

Site Code: 20

Present/Absent	Comment
<b>Positive Bog Features</b>	
<b>High Bog Features</b>	
<b>Pool system:</b> Present	The site comprises a small number of pools in sub-central ecotope usually dominated by <i>Sphagnum</i> mosses including <i>S. cuspidatum</i> and <i>S. fallax</i> .
<b>Good Hummock Hollow topography:</b> Present	The site comprises good hummock hollow topography particularly in the sub-marginal ecotope of the high bog.
<b>High Bog Flush:</b> Absent	
<b>High Bog Woodland:</b> Absent	
<b>High Bog Swallow Hole System:</b> Absent	
<b>Other High Bog Feature:</b> Absent	
<b>Marginal Features</b>	
<b>Semi-natural Margin:</b> Absent	
<b>Positive High Bog Species</b>	
<b>Sphagnum fuscum</b> Absent	
<b>Sphagnum austinii</b> Present	<i>Sphagnum austinii</i> present in sub-central ecotope in southern part of the site.
<b>Sphagnum pulchrum</b> Absent	
<b>Sphagnum cuspidatum</b> Present	<i>Sphagnum cuspidatum</i> occurs in hollows and pools in wet areas particularly in sub-central ecotopes in the south western part of the site.
<b>Sphagnum denticulatum</b> Absent	
<b>Cladonia portentosa</b> Present	Abundance of <i>Cladonia portentosa</i> throughout the site.

### Noteworthy / Rare Species

The site supports two discrete sections of subcentral ecotope in the south western part of the site. The ecotope conforms to active raised bog priority annex I habitat listed under the EU habitats directive.

# Green Element

## Raised Bog Survey 2013 - 2014

Main Site Name: Hortland		Site Code: 20	
	Present/Absent	Impact	Comment
<b>Impact and Activities on High Bog</b>			
<b>Peat Extraction on High Bog Surface:</b>	YES	High	Active commercial peat extraction of high bog. Machinery operating on site. Much of the cutover area to the south and west has been largely affected by mechanical large scale peat cutting operations.
<b>Marginal Peat Extraction:</b>	YES	High Medium	Marginal peat extraction to the north, west and south. The northern part of the site appears to have been hand cut and peat cutting activity has been abandoned in this part of the site.
<b>Hand Cutting of Peat:</b>			Likely former hand cutting of peat in the northern part of the site. This activity has since been abandoned. The area is dominated by dense stands of <i>Calluna vulgaris</i> .
<b>Mechanical Removal of Peat:</b>	YES	High	Active commercial peat extraction of high bog. Machinery operating on site. Much of the cutover area to the south and west has been largely affected by mechanical large scale peat cutting operations to the south and west.
<b>Commercial Peat Extraction:</b>	YES	High	The site is heavily modified and managed for commercial peat harvesting particularly in the southern and western parts of the site. Mechanical machinery including diggers were observed on site.
<b>Domestic Peat Extraction:</b>	NO		Unknown
<b>Bog Burst:</b>	NO		
<b>Cracking or Peat Slumping at Edge of High Bog:</b>	YES	High	Cracking and slumping is evident especially on the southern and western margins of the high bog, occurring as far as 20-30 m in to the high bog.
<b>Forestry Planting on High Bog:</b>	NO		
<b>Forestry Felling on High Bog:</b>	NO		
<b>Invasive Species on High Bog:</b>	NO		
<b>Drainage on High Bog:</b>	YES	High	A series of drainage ditches traverse the western section of the high bog.
<b>Functional Drains on High Bog:</b>	YES	High	Functional drainage ditches occur on the high bog particularly along the high bog margins.
<b>Non-functional Drains on High Bog:</b>	NO		
<b>Reduced function Drains on High Bog:</b>	NO		
<b>Burning on High Bog:</b>	YES	Medium	Evidence of burning in the site. Recolonisers present including <i>Campylopus introflexus</i> and <i>Cladonia floerkeana</i> lichen.
<b>Fertilisation on High Bog:</b>	NO		



## Green Element

### Raised Bog Survey 2013 - 2014

**Dumping on High Bog:** NO

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**Grazing on High Bog:** NO

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**Paths tracks on High Bog:** YES Machinery access likely quads traversing high bog as indicated by tracks.

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**General Impacts and Activities Comment:**

The main impacts that affect the high bog include peat extraction, drainage and burning.

# Green Element

## Raised Bog Survey 2013 - 2014

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**Main Site Name:** Hortland **Site Code:** 20

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	Present/Absent & Grid Ref	Comment
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### Cutover Assessment

<b>Regenerating <i>Sphagnum</i> Areas Occur:</b>	Present	Regenerating <i>Sphagnum</i> including <i>S. cuspidatum</i> , <i>S. capillifolium</i> and <i>S. papillosum</i> on two discrete areas in the southern part of the site. These areas may have been traditionally hand cut in the past.
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<b>Active Peat Fields with Bare Peat:</b>	Present	An extensive area of bare peat occurs immediately west and south of the high bog. This area is heavily modified by peat extraction operations with intensive drainage network established in this area.
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<b>Cutover with Mix of Wet and Dry Bog Vegetation:</b>	Present	Established in two small sections in the southern part of the site comprises occasional <i>Sphagnum</i> mosses, while <i>Calluna</i> and <i>Eriophorum</i> spp dominate.
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<b>Cutover Recolonised mainly by Dry Vegetation:</b>	Present	Present in the northern part of the site with dominance of <i>Calluna vulgaris</i> . Dry bog communities including <i>Calluna</i> and <i>Eriophorum vaginatum</i> , <i>Narthecium</i> , <i>Trichophorum</i> , <i>Campylopus introflexus</i> , <i>Betula pubescens</i> and <i>Erica tetralix</i> establishing in the southern part of the site.
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**Cutover Recolonised mainly by Wet Vegetation:**

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**Cutover with Transition Mire / Fen Vegetation:**

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<b>Cutover Reclaimed to Grassland:</b>	Present	A small section of cutover bog has been reclaimed for improved grassland the south eastern part of the site.
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**Other Cutover Habitat Occurrence:**

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**Topography of Cutover Comment:**

Flat

**Drainage of Cutover Comment:**

Extensive and highly modified functional drainage network exists to the south and west of the site. A large functional drainage ditch surrounds the high bog.

**Comments on Restoration Potential of Cutover:**

Some of the areas where *Sphagnum* moss communities colonise are capable of restoration, however, these areas are largely confined to traditionally hand cut areas.

# Green Element

Raised Bog Survey 2013 - 2014

Plot Data

Hortland

**Bog Name:** Hortland  
**Bog Code:** 20  
**Plot Code Number:** 1  
**Plot Survey Date:** 12/12/2013  
**Plot Surveyor/s:** B. O'Loughlin & B. Kirwan

**Ecotope Type Present:** Sub Central Ecotope

**Community Complex:** Complex 10/9

**Plot Easting:**                      **Northing:**                      **Plot Photo. Numbers:** Bol Samsung, BK Nikon

**Ground Firmness:** Very Soft  
**Burning Evidence:** No burning  
**Algae in Hollows %:** no  
**Algae in Pools %:** no  
**Bare Peat %:** no  
**Calluna Height (cm + / - 5 cm):** 50-60  
**Cladonia Cover %:** 3  
**Macro-topography:** Depression  
**Pools Occurrence:** Present  
**Pools % Cover:** 20  
**Sphagnum % Cover:** 50  
**Narthecium % Cover:** no

**Micro-topography:**

Lawns and pools, low hummocks, lawns dominant and pools occasional.

**Tussocks Occurrence:** Present  
**Tussocks *Eriophorum vaginatum*:** Yes                      % cover 50  
**Tussocks *Trichophorum germanicum*:**                      % cover  
**Tussocks *Molinia caerulea*:**                      % cover  
**Tussocks Other:**                      % cover

**Plot Degradation or Regeneration Evidence:**

No

**Plot Noteworthy or Rare Species (Flora/Fauna):**

**Plot General Comments:**

The plot occurs in a depression possibly as a result of subsidence that has led to secondary re-wetting in this area. The area is dominated by *Sphagnum* mosses and *Eriophorum vaginatum*. The plot conforms to 10/9. The ground is very soft underfoot. Area of active peat formation conforms to annex I EU habitat.

**Plot Species Recorded:**

Present	Domin Cover Value
Andromeda polifolia	3
Calluna vulgaris	5
Cladonia portentosa	3

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## Green Element

**Raised Bog Survey 2013 - 2014**

**Plot Data**

**Hortland**

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Erica tetralix	4
Eriophorum angustifolium	3
Eriophorum vaginatum	7
Rhynchospora alba	3
Sphagnum capillifolium	3
Sphagnum cuspidatum	5
Sphagnum fallax	5
Sphagnum magellanicum	5
Sphagnum papillosum	5
Vaccinium oxycoccus	2
Odontoshisma sphagni	2



# Green Element

Raised Bog Survey 2013 - 2014

Plot Data

Hortland

**Bog Name:** Hortland  
**Bog Code:** 20  
**Plot Code Number:** 2  
**Plot Survey Date:** 12/12/2013  
**Plot Surveyor/s:** B. O'Loughlin & B. Kirwan

**Ecotope Type Present:** Sub Central Ecotope

**Community Complex:** Complex 10/4

**Plot Easting:**                      **Northing:**                      **Plot Photo. Numbers:** Bol Samsung, BK Nikon

**Ground Firmness:** Very Soft  
**Burning Evidence:** No burning  
**Algae in Hollows %:** no  
**Algae in Pools %:** no  
**Bare Peat %:** no  
**Calluna Height (cm + / - 5 cm):** 40  
**Cladonia Cover %:** 3  
**Macro-topography:** Depression  
**Pools Occurrence:** Absent  
**Pools % Cover:**  
**Sphagnum % Cover:** 60  
**Nartheicum % Cover:** no

**Micro-topography:**

Low hummocks and lawns, flat.

**Tussocks Occurrence:** Present  
**Tussocks *Eriophorum vaginatum*:** Yes                      % cover 25  
**Tussocks *Trichophorum germanicum*:**                      % cover  
**Tussocks *Molinia caerulea*:**                      % cover  
**Tussocks Other:**                      % cover

**Plot Degradation or Regeneration Evidence:**

No

**Plot Noteworthy or Rare Species (Flora/Fauna):**

**Plot General Comments:**

The plot occurs in a depression possibly as a result of subsidence that has led to secondary re-wetting in this area. The area is dominated by *Sphagnum* mosses and *Rhyncospora alba*. The plot conforms to 10/4. The ground is very soft underfoot. Area of active peat formation conforms to annex I EU habitat.

**Plot Species Recorded:**

Present	Domin Cover Value
Andromeda polifolia	3
Calluna vulgaris	5
Cladonia portentosa	3

---

## Green Element

**Raised Bog Survey 2013 - 2014**

**Plot Data**

**Hortland**

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<i>Erica tetralix</i>	5
<i>Eriophorum angustifolium</i>	3
<i>Eriophorum vaginatum</i>	6
<i>Narthecium ossifragum</i>	2
<i>Rhynchospora alba</i>	6
<i>Sphagnum capillifolium</i>	4
<i>Sphagnum cuspidatum</i>	5
<i>Sphagnum fallax</i>	4
<i>Sphagnum magellanicum</i>	5
<i>Sphagnum papillosum</i>	7
<i>Sphagnum subnitens</i>	3
<i>Vaccinium oxycoccus</i>	2
<i>Odontoschisma sphagni</i>	3

# Green Element

## Raised Bog Survey 2013 - 2014

<b>Bog Name:</b>	Hortland	<b>Site Easting &amp; Northing:</b>	279140 235290
<b>Bog Code:</b>	20	<b>Site contains Raised Bog Habitat:</b>	YES
<b>County:</b>	Kildare	<b>Active Raised Bog 7110:</b>	YES
<b>Survey Date:</b>	12/12/2013	<b>Bog Woodland 91D0:</b>	NO
<b>Name of Surveyor/s:</b>	B. O'Loughlin & B. Kirwan	<b>Degraded raised bog 7120:</b>	YES
		<b>Depressions on peat substrates 7150:</b>	NO

Ecotope	Present/Absent	Comment
<b>Central:</b>	Absent	N/A
<b>Sub-Central:</b>	Present	Two discrete areas of sub-central ecotope occur in the south western part of the site. Both areas occur in a depression possibly as a result of subsidence which has led to secondary re-wetting of this area. The area is dominated by <i>Sphagnum</i> mosses and <i>Eriophorum vaginatum</i> and <i>Rhynchospora alba</i> . The plots conforms to community complex 10/9 and 10-4. The ground is very soft underfoot. Areas of active peat formation conforms to annex I EU habitat.
<b>Sub-Marginal:</b>	Present	Sub-marginal ecotope is widespread and dominates the site and conforms to community complex 10/9/7. This ecotope is soft underfoot and comprises hummocks and hollows dominated by <i>Sphagnum</i> moss (see target notes).
<b>Marginal:</b>	Present	This ecotope occurs along the outer margins of the high bog and is dominated by dense tussocks of <i>Trichophorum</i> . The ecotope conforms to community complex 9/7/6 and 7/6.
<b>Facebank:</b>	Present	Slumping and cracking occur along the facebank due to peat extraction operations. <i>Calluna vulgaris</i> and <i>Hypnum jutlandicum</i> is high at the bog edge.
<b>High Bog area (ha):</b>	54.10	<b>Area of Active Raised Bog (ha):</b> 0.9 <b>% ARB:</b> 1.66

### Site Description:

The site is located in a flat low lying area surrounded by bog woodland to the east and cutover bog to the north, west and south. The site is managed for commercial peat extraction and is heavily modified due to mechanical removal of peat. It is possible that two discrete areas along the southern margin of the site and the northern part of the site were managed for hand cutting of peat. *Sphagnum* moss and other bog plant communities have regenerated and recolonised in these cutover areas.

The site comprises four ecotope types including facebank, marginal, sub-marginal and sub-central. The marginal ecotope is dominated by dense tussocks of *Trichophorum cespitosum*. *Sphagnum* mosses cover less than 10% and comprise *Sphagnum tenellum* and *Sphagnum capillifolium*. The sub-marginal ecotope within the high bog is dominant and widespread across the site. This ecotope largely corresponds to 9/7/6 and 10/9/7 community type and comprises good examples of low hummocks and hollows. *Sphagnum* cover is circa 30% in these areas and the surface is soft underfoot.

The site comprises two active peat forming sub-central ecotope areas located in the southwestern part of the site. This ecotope is characterised by a dominance of *Sphagnum* mosses including *S. cuspidatum*, *S. capillifolium*, *S. magellanicum*, *S. papillosum*, *S. subnitens*, *S. fallax*, and *S. austinii* and is very soft underfoot. The sub-central ecotope conforms to community type 4/10 and 10/9. These areas occur in depressions likely to be the result of subsidence due to drainage and peat harvesting operations and are likely to have arisen from secondary re-wetting. The ecotopes are capable of peat formation and correspond to annex I priority habitat active raised bog 7110 listed on

## Green Element

### Raised Bog Survey 2013 - 2014

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the EU habitats directive. The main threats to the site include burning, drainage and peat extraction operations.

**Landscape setting:**

The site is located in flat low lying landscape surrounded by conifer forestry and improved grassland managed for agriculture.



# Green Element

## Raised Bog Survey 2013 - 2014

Main Site Name: Hortland

Site Code: 20

Present/Absent	Comment
<b>Positive Bog Features</b>	
<b>High Bog Features</b>	
<b>Pool system:</b> Present	The site comprises a small number of pools in sub-central ecotope usually dominated by <i>Sphagnum</i> mosses including <i>S. cuspidatum</i> and <i>S. fallax</i> .
<b>Good Hummock Hollow topography:</b> Present	The site comprises good hummock hollow topography particularly in the sub-marginal ecotope of the high bog.
<b>High Bog Flush:</b> Absent	
<b>High Bog Woodland:</b> Absent	
<b>High Bog Swallow Hole System:</b> Absent	
<b>Other High Bog Feature:</b> Absent	
<b>Marginal Features</b>	
<b>Semi-natural Margin:</b> Absent	
<b>Positive High Bog Species</b>	
<b>Sphagnum fuscum</b> Absent	
<b>Sphagnum austinii</b> Present	<i>Sphagnum austinii</i> present in sub-central ecotope in southern part of the site.
<b>Sphagnum pulchrum</b> Absent	
<b>Sphagnum cuspidatum</b> Present	<i>Sphagnum cuspidatum</i> occurs in hollows and pools in wet areas particularly in sub-central ecotopes in the south western part of the site.
<b>Sphagnum denticulatum</b> Absent	
<b>Cladonia portentosa</b> Present	Abundance of <i>Cladonia portentosa</i> throughout the site.

### Noteworthy / Rare Species

The site supports two discrete sections of subcentral ecotope in the south western part of the site. The ecotope conforms to active raised bog priority annex I habitat listed under the EU habitats directive.

# Green Element

## Raised Bog Survey 2013 - 2014

Main Site Name: Hortland		Site Code: 20	
	Present/Absent	Impact	Comment
<b>Impact and Activities on High Bog</b>			
<b>Peat Extraction on High Bog Surface:</b>	YES	High	Active commercial peat extraction of high bog. Machinery operating on site. Much of the cutover area to the south and west has been largely affected by mechanical large scale peat cutting operations.
<b>Marginal Peat Extraction:</b>	YES	High Medium	Marginal peat extraction to the north, west and south. The northern part of the site appears to have been hand cut and peat cutting activity has been abandoned in this part of the site.
<b>Hand Cutting of Peat:</b>			Likely former hand cutting of peat in the northern part of the site. This activity has since been abandoned. The area is dominated by dense stands of <i>Calluna vulgaris</i> .
<b>Mechanical Removal of Peat:</b>	YES	High	Active commercial peat extraction of high bog. Machinery operating on site. Much of the cutover area to the south and west has been largely affected by mechanical large scale peat cutting operations to the south and west.
<b>Commercial Peat Extraction:</b>	YES	High	The site is heavily modified and managed for commercial peat harvesting particularly in the southern and western parts of the site. Mechanical machinery including diggers were observed on site.
<b>Domestic Peat Extraction:</b>	NO		Unknown
<b>Bog Burst:</b>	NO		
<b>Cracking or Peat Slumping at Edge of High Bog:</b>	YES	High	Cracking and slumping is evident especially on the southern and western margins of the high bog, occurring as far as 20-30 m in to the high bog.
<b>Forestry Planting on High Bog:</b>	NO		
<b>Forestry Felling on High Bog:</b>	NO		
<b>Invasive Species on High Bog:</b>	NO		
<b>Drainage on High Bog:</b>	YES	High	A series of drainage ditches traverse the western section of the high bog.
<b>Functional Drains on High Bog:</b>	YES	High	Functional drainage ditches occur on the high bog particularly along the high bog margins.
<b>Non-functional Drains on High Bog:</b>	NO		
<b>Reduced function Drains on High Bog:</b>	NO		
<b>Burning on High Bog:</b>	YES	Medium	Evidence of burning in the site. Recolonisers present including <i>Campylopus introflexus</i> and <i>Cladonia floerkeana</i> lichen.
<b>Fertilisation on High Bog:</b>	NO		

## Green Element

### Raised Bog Survey 2013 - 2014

**Dumping on High Bog:** NO

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**Grazing on High Bog:** NO

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**Paths tracks on High Bog:** YES Machinery access likely quads traversing high bog as indicated by tracks.

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**General Impacts and Activities Comment:**

The main impacts that affect the high bog include peat extraction, drainage and burning.

# Green Element

## Raised Bog Survey 2013 - 2014

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**Main Site Name:** Hortland **Site Code:** 20

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	Present/Absent & Grid Ref	Comment
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### Cutover Assessment

<b>Regenerating <i>Sphagnum</i> Areas Occur:</b>	Present	Regenerating <i>Sphagnum</i> including <i>S. cuspidatum</i> , <i>S. capillifolium</i> and <i>S. papillosum</i> on two discrete areas in the southern part of the site. These areas may have been traditionally hand cut in the past.
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<b>Active Peat Fields with Bare Peat:</b>	Present	An extensive area of bare peat occurs immediately west and south of the high bog. This area is heavily modified by peat extraction operations with intensive drainage network established in this area.
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<b>Cutover with Mix of Wet and Dry Bog Vegetation:</b>	Present	Established in two small sections in the southern part of the site comprises occasional <i>Sphagnum</i> mosses, while <i>Calluna</i> and <i>Eriophorum</i> spp dominate.
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<b>Cutover Recolonised mainly by Dry Vegetation:</b>	Present	Present in the northern part of the site with dominance of <i>Calluna vulgaris</i> . Dry bog communities including <i>Calluna</i> and <i>Eriophorum vaginatum</i> , <i>Narthecium</i> , <i>Trichophorum</i> , <i>Campylopus introflexus</i> , <i>Betula pubescens</i> and <i>Erica tetralix</i> establishing in the southern part of the site.
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**Cutover Recolonised mainly by Wet Vegetation:**

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**Cutover with Transition Mire / Fen Vegetation:**

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<b>Cutover Reclaimed to Grassland:</b>	Present	A small section of cutover bog has been reclaimed for improved grassland the south eastern part of the site.
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**Other Cutover Habitat Occurrence:**

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**Topography of Cutover Comment:**

Flat

**Drainage of Cutover Comment:**

Extensive and highly modified functional drainage network exists to the south and west of the site. A large functional drainage ditch surrounds the high bog.

**Comments on Restoration Potential of Cutover:**

Some of the areas where *Sphagnum* moss communities colonise are capable of restoration, however, these areas are largely confined to traditionally hand cut areas.



# Green Element

Raised Bog Survey 2013 - 2014

Plot Data

Hortland

**Bog Name:** Hortland  
**Bog Code:** 20  
**Plot Code Number:** 1  
**Plot Survey Date:** 12/12/2013  
**Plot Surveyor/s:** B. O'Loughlin & B. Kirwan

**Ecotope Type Present:** Sub Central Ecotope

**Community Complex:** Complex 10/9

**Plot Easting:**                      **Northing:**                      **Plot Photo. Numbers:** Bol Samsung, BK Nikon

**Ground Firmness:** Very Soft  
**Burning Evidence:** No burning  
**Algae in Hollows %:** NA  
**Algae in Pools %:** None  
**Bare Peat %:** NA  
**Calluna Height (cm + / - 5 cm):** 50-60  
**Cladonia Cover %:** 3  
**Macro-topography:** Depression  
**Pools Occurrence:** Present  
**Pools % Cover:** 20  
**Sphagnum % Cover:** 50  
**Narthecium % Cover:** NA

**Micro-topography:**

Lawns and pools, low hummocks, lawns dominant and pools occasional.

**Tussocks Occurrence:** Present  
**Tussocks *Eriophorum vaginatum*:** Yes                      % cover 50  
**Tussocks *Trichophorum germanicum*:**                      % cover  
**Tussocks *Molinia caerulea*:**                      % cover  
**Tussocks Other:**                      % cover

**Plot Degradation or Regeneration Evidence:**

No

**Plot Noteworthy or Rare Species (Flora/Fauna):**

**Plot General Comments:**

The plot occurs in a depression possibly as a result of subsidence that has led to secondary re-wetting in this area. The area is dominated by *Sphagnum* mosses and *Eriophorum vaginatum*. The plot conforms to 10/9. The ground is very soft underfoot. Area of active peat formation conforms to annex I EU habitat.

**Plot Species Recorded:**

Present	Domin Cover Value
Andromeda polifolia	3
Calluna vulgaris	5
Cladonia portentosa	3

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## Green Element

**Raised Bog Survey 2013 - 2014**

**Plot Data**

**Hortland**

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Erica tetralix	4
Eriophorum angustifolium	3
Eriophorum vaginatum	7
Rhynchospora alba	3
Sphagnum capillifolium	3
Sphagnum cuspidatum	5
Sphagnum fallax	5
Sphagnum magellanicum	5
Sphagnum papillosum	5
Vaccinium oxycoccus	2
Odontoshisma sphagni	2

# Green Element

Raised Bog Survey 2013 - 2014

Plot Data

Hortland

**Bog Name:** Hortland  
**Bog Code:** 20  
**Plot Code Number:** 2  
**Plot Survey Date:** 12/12/2013  
**Plot Surveyor/s:** B. O'Loughlin & B. Kirwan

**Ecotope Type Present:** Sub Central Ecotope

**Community Complex:** Complex 10/4

**Plot Easting:**                      **Northing:**                      **Plot Photo. Numbers:** Bol Samsung, BK Nikon

**Ground Firmness:** Very Soft  
**Burning Evidence:** No burning  
**Algae in Hollows %:** NA  
**Algae in Pools %:** NA  
**Bare Peat %:** NA  
**Calluna Height (cm + / - 5 cm):** 40  
**Cladonia Cover %:** 3  
**Macro-topography:** Depression  
**Pools Occurrence:** Absent  
**Pools % Cover:** NA  
**Sphagnum % Cover:** 60  
**Narthecium % Cover:** NA

**Micro-topography:**

Low hummocks and lawns, flat.

**Tussocks Occurrence:** Present

**Tussocks *Eriophorum vaginatum*:** Yes                      % cover 25

**Tussocks *Trichophorum germanicum*:**                      % cover

**Tussocks *Molinia caerulea*:**                      % cover

**Tussocks Other:**                      % cover

**Plot Degradation or Regeneration Evidence:**

No

**Plot Noteworthy or Rare Species (Flora/Fauna):**

**Plot General Comments:**

The plot occurs in a depression possibly as a result of subsidence that has led to secondary re-wetting in this area. The area is dominated by *Sphagnum* mosses and *Rhyncospora alba*. The plot conforms to 10/4. The ground is very soft underfoot. Area of active peat formation conforms to annex I EU habitat.

**Plot Species Recorded:**

Present	Domin Cover Value
Andromeda polifolia	3
Calluna vulgaris	5
Cladonia portentosa	3

---

## Green Element

**Raised Bog Survey 2013 - 2014**

**Plot Data**

**Hortland**

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<i>Erica tetralix</i>	5
<i>Eriophorum angustifolium</i>	3
<i>Eriophorum vaginatum</i>	6
<i>Narthecium ossifragum</i>	2
<i>Rhynchospora alba</i>	6
<i>Sphagnum capillifolium</i>	4
<i>Sphagnum cuspidatum</i>	5
<i>Sphagnum fallax</i>	4
<i>Sphagnum magellanicum</i>	5
<i>Sphagnum papillosum</i>	7
<i>Sphagnum subnitens</i>	3
<i>Vaccinium oxycoccus</i>	2
<i>Odontoschisma sphagni</i>	3

# Windmill Bog – Raised Bog Site Report

## General site and survey details

Site Name	Windmill Bog
WSI Site Code	GE_08
Area (ha) (high bog)	67
Original extent of bog (ha)	219
Grid Reference (IG)	N: 236984 ; E: 268403
Designation	None
Townlands	Ballinderry, Nurney, Williamstown, Freagh, Haggard and Knockcor
County	Kildare
Survey Date	12/12/2013
Weather conditions	Good
Surveyors	Barry O'Loughlin & Brendan Kirwan

## Summary results of survey – presence of EU Annex habitat types

Annex Habitat	Presence	Area (ha)
Active Raised Bog 7110	Yes	0.1
Degraded raised bog 7120	Yes <sup>1</sup>	66.9
Bog Woodland 91D0	NO	NA
Depressions on peat substrates 7150	NO	NA

## Previous site information

The area was not included in maps produced showing the extent of high bog in Ireland by the NPWS (2007)<sup>2</sup>. Carbury Bog Natural Heritage Area (NHA) (NPWS Site Code: 1388) is located adjacent to the south of the high bog. The NPWS site synopsis for Carbury Bog identifies raised bog as the main feature of conservation interest for the NHA. The site synopsis for the NHA describes the high bog located to the north-west (site under consideration) as active cutover bog and has been excluded from the NHA. The site is listed as Haggard Bog on the Map of Irish Wetlands ([www.wetlandsurveysireland.com](http://www.wetlandsurveysireland.com)).

## Description of habitats present on the high bog

The site comprises an intact section of raised bog habitat located on a flat, low lying area that slopes gently to the east (see **Figure 1, Appendix 1**). The dominant vegetation recorded throughout the site comprises *Calluna vulgaris*, *Eriophorum vaginatum*, and *Narthecium ossifragum*. Other frequently encountered species include *Cladonia portentosa* and *Sphagnum* mosses.

The high bog supports a small area (ca 0.1ha) of active peat forming communities in the north-eastern part of the site (see **Figure 1**). This active area support sub-central ecotope dominated by *Sphagnum* mosses and *Eriophorum vaginatum* (see data relating to plot locations in **Appendix 2**). There is a good cover of *Sphagnum* mosses (over 45%) including *Sphagnum magellanicum*, *Sphagnum papillosum*, *Sphagnum capillifolium*, *Sphagnum cuspidatum*, and *Sphagnum subnitens* (see **Plate 2**). Substrate conditions are soft underfoot. The microtopography is relatively well

<sup>1</sup> Hydrological investigations would be required to determine whether physical conditions at the site are capable of supporting Active Raised Bog. In the absence of such conditions the habitat would not conform to the Annex habitat 'Degraded raised bog capable of natural regeneration'. See NPWS (2014), National Raised Bog SAC Management Plan.

<sup>2</sup> NPWS (2007) The Status of EU Protected Habitats and Species in Ireland: backing Documents, Article 17 forms, Maps Volume 3. Conservation Status in Ireland of Habitats and Species listed in the European Council Directive on the Conservation of Habitats, Flora and Fauna 92/43/EEC. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government. Dublin.

developed with low hummocks. Conditions are progressively drier towards the edge of the bog, with marginal ecotope occurring throughout. A map and associated target notes are presented in **Appendix 1**. Further more detailed information on the ecotopes recorded on the high bog is presented in **Appendix 2**. The site is of conservation value for the presence of the priority EU Annex I habitat 'Active raised bog 7110'. In addition, the site supports three other ecotope types that conform to degraded raised bog (face bank, marginal, and sub-marginal).

Past drainage of the high bog is evident by the presence of functional drainage ditches along the eastern margin of the intact bog (see **Figure 1**). Recent site drainage works has resulted in the spreading of catotelm peat and surface scraghs over the high bog surface.

Actively cut face banks (cut for fuel) occur along the eastern boundary of the high bog which are progressively intruding into the high bog. An extensive peat mining operation adjoins the northern section of the high bog. Active cutting no longer occurs along the western margins of the high bog (see **Figure 1**).

### **Description of marginal habitats surrounding high bog**

An extensive area of industrially cutaway (operational) bog occurs to the north of the site and includes a network of drainage ditches running south-north with associated culverts installed. This area is intensively managed for industrial peat harvesting operations and is dominated by bare peat (see **Figure 1**). Regenerating bog woodland with *Betula pubescens* occurs on old cutover areas to the north-west / west of the high bog. An area of conifer plantation dominated by mix stands of *Pinus sylvestris* and *Picea sitchensis* occurs to the south. *Sphagnum* mosses including *Sphagnum papillosum*, *Sphagnum fallax*, *Sphagnum cuspidatum* and *Sphagnum palustre* are regenerating in old cutover areas to the west. Active mechanical peat cutting occurs to the east and bog plants including *Calluna vulgaris*, *Eriophorum vaginatum*, and *Molinia caerulea* have recolonised areas of bare peat.

### **Summary evaluation of the site**

The bog is a remnant area of raised bog that has been severely impacted by long term peat extraction and associated drainage. The site continues to support a small area of active raised bog, a habitat that is rare throughout Ireland. The site is deemed to be of high conservation value due to the presence of Active Raised Bog, a priority habitat listed on Annex I of the EU Habitats Directive. The site is also of value for range, being one of the most eastern examples of the habitat in Ireland and adjoins the designated Carbury Bog NHA to the south.

### **Sensitivity of site to wind farm development**

The raised bog habitat present within the site would be sensitive to habitat loss and disturbance should site infrastructure be located within the remaining area of high bog. Such development on the high bog would also be expected to have hydrological effects on the surrounding bog habitat.

The remnant raised bog is also susceptible to further drying out and degradation should drainage in surrounding areas affect the hydrological integrity of the high bog.

### **Potential impacts of proposed wind farm layout (24 February 2015)**

The avoidance of high bog ensures that no direct impacts (such as habitat loss or surface damage) will occur.

The potential for indirect impacts such as hydrological alteration is deemed to be low as all turbine locations and associated infrastructure are proposed to be located in areas removed from the high



bog (heavily modified cutaway peatland to the north). The hydrology of the area has been heavily modified due to drainage associated with the peat harvesting operation which surrounds the proposed wind farm infrastructure. An assessment of potential impacts on the hydrology of the area is presented in the Hydrology chapter of the EIS (Chapter 9).

## Plates 1-2



**Plate 1:** The site comprises an area of intact raised bog. The high bog comprises a small area of active raised bog (sub-central ecotope) in the north-eastern part of the high bog.



**Plate 2:** Sub-central ecotope with *Sphagnum* mosses (ca 45% cover) and *Eriophorum vaginatum*. The ecotope type conforms to the priority EU Annex I listed habitat 'active raised bogs 7110'.

# **Appendix 1**








## **Site Map and Associated Target Notes**



Appendix 1 (Site map and associate target notes)



**Legend**

-  High Bog Boundary
-  Active Raised Bog
-  Plot Location
-  Descriptive Note
-  Face bank
-  Marginal
-  Sub marginal
-  Sub central



Scale: 1:5,000  
 0 37.5 75 150 225 Meters



Date: 20/06/2014

Figure 1: Map showing the results of raised bog survey.

Sources: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroX, Geotrapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



Table 1: Target notes recorded during field survey of Windmill Bog. See Figure 1 for corresponding location referred to by each note.

Note Number	Note Type	Bog Name	Bog Code	Note Text	Ecotope
557	Habitat	Windmill	GE_08	Area of cutover bog managed for large scale industrial peat extraction operations. A large series of functional drainage ditches traverse this area. The cutover bog is dominated by bare peat.	Descriptive Note
558	Ecotope	Windmill	GE_08	Face bank, ca 3.5m deep. With drainage channel ca 2.5m wide and 3m deep.	Face bank
559	Habitat	Windmill	GE_08	Birch scrub dominated by stands of <i>Betula pubescens</i> ca 12-14m tall. Understorey comprises dense bracken and <i>Calluna vulgaris</i>	Descriptive Note
560	Ecotope	Windmill	GE_08	Sub marginal ecotope dominated by <i>Calluna vulgaris</i> and <i>Eriophorum vaginatum</i> . <i>Cladonia portentosa</i> , <i>Erica tetralix</i> and <i>Trichophorum cespitosum</i> are abundant. <i>Sphagnum</i> cover is ca 15% with <i>Sphagnum capillifolium</i> , <i>Sphagnum papillosum</i> and <i>Sphagnum tenellum</i> .	Sub marginal
561	Fauna	Windmill	GE_08	Snipe (3) recorded from this location	Sub central
562	Ecotope	Windmill	GE_08	Sub central ecotope. <i>Sphagnum</i> cover ca 40% includes <i>Sphagnum papillosum</i> , <i>Sphagnum capillifolium</i> , <i>Sphagnum cuspidatum</i> , <i>Sphagnum magellanicum</i> , <i>Sphagnum subnitens</i> and <i>Sphagnum fallax</i> . Dominated by <i>Sphagnum</i> mosses and <i>Eriophorum vaginatum</i> .	Sub central
563	Ecotope	Windmill	GE_08	Western extent of sub central ecotope.	Sub central
564	Plot Location	Windmill	GE_08	Plot 1	Plot Location
565	Ecotope	Windmill	GE_08	Sub marginal ecotope dominated by <i>Calluna vulgaris</i> and <i>Eriophorum vaginatum</i> . <i>Sphagnum</i> cover ca 20% with <i>Sphagnum papillosum</i> , <i>Sphagnum subnitens</i> , <i>Sphagnum capillifolium</i> and <i>Sphagnum tenellum</i> .	Sub marginal
566	Ecotope	Windmill	GE_08	Sub marginal ecotope. Plant and lichen species recorded include <i>Erica tetralix</i> , <i>Eriophorum angustifolium</i> , <i>Cladonia portentosa</i> and <i>Cladonia uncialis</i> .	Sub marginal
567	Fauna	Windmill	GE_08	Common frog recorded	Sub marginal
568	Hydrology	Windmill	GE_08	Western extent of functional drainage ditches	Sub marginal
569	Management	Windmill	GE_08	Surface damage caused by compaction due to plant machinery movements over the high bog.	Sub marginal
570	Ecotope	Windmill	GE_08	Marginal ecotope occurs to the south of this point, sub marginal to the north. Marginal areas are firm underfoot. <i>Sphagnum</i> cover is <5% and dominated by <i>Calluna vulgaris</i> , <i>Eriophorum vaginatum</i> and <i>Cladonia portentosa</i> .	Marginal
571	Habitat	Windmill	GE_08	Area of cutover bog has reverted to wet heath dominated by <i>Calluna vulgaris</i> with <i>Molinia caerulea</i> . <i>Sphagnum</i> mosses including <i>Sphagnum cuspidatum</i> , <i>Sphagnum palustre</i> , <i>Sphagnum fallax</i> and <i>Sphagnum papillosum</i> were recorded in amongst the ground layer.	Descriptive Note
572	Habitat	Windmill	GE_08	Conifer plantation dominated by mixed stands of <i>Pinus sylvestris</i> and <i>Picea sitchensis</i> .	Descriptive Note
573	Management	Windmill	GE_08	Evidence of compaction of high bog due to machinery crossings over the site.	Sub marginal
574	Ecotope	Windmill	GE_08	Sub marginal ecotope dominated by <i>Narthecium ossifragum</i> and <i>Calluna vulgaris</i> .	Sub marginal
575	Ecotope	Windmill	GE_08		Marginal
576	Ecotope	Windmill	GE_08		Marginal
577	Ecotope	Windmill	GE_08		Marginal
578	Hydrology	Windmill	GE_08	Functional drainage ditch	Marginal
579	Fauna	Windmill	GE_08	Two snipe recorded from this location	Sub marginal
580	Ecotope	Windmill	GE_08	Sub marginal ecotope dominated by <i>Calluna vulgaris</i> , <i>Eriophorum vaginatum</i> and <i>Narthecium ossifragum</i> . Conditions are soft underfoot. <i>Sphagnum</i> cover is ca 15-20% with <i>Sphagnum papillosum</i> , <i>Sphagnum tenellum</i> and <i>Sphagnum capillifolium</i> .	Sub marginal
581	Fauna	Windmill	GE_08	Snipe recorded at this location	Sub marginal
582	Fauna	Windmill	GE_08	Snipe recorded in this area.	Sub marginal
583	Ecotope	Windmill	GE_08	Area dominated by <i>Calluna vulgaris</i> and <i>Narthecium ossifragum</i> with an abundance of <i>Eriophorum vaginatum</i> , <i>Cladonia portentosa</i> and <i>Erica tetralix</i> . <i>Sphagnum</i> cover is ca 15% with <i>Sphagnum tenellum</i> , <i>Sphagnum capillifolium</i> and <i>Sphagnum papillosum</i>	Sub marginal
584	Management	Windmill	GE_08	Evidence of disturbance of the high bog at this location. Areas of bare peat with algal hollows.	Sub marginal
585	Ecotope	Windmill	GE_08		Marginal
586	Management	Windmill	GE_08	High bog is heavily disturbed in this area. Some minor planting (ca 10 trees) of Lodge pole Pine. Afforestation a threat to high bog. Exposed surface scraggs and catotelm peat spread over high bog	Sub marginal
587	Management	Windmill	GE_08	Trampling and compaction of surface bog due to heavy machinery accessing this part of the site.	Sub marginal
588	Ecotope	Windmill	GE_08	Area dominated by <i>Eriophorum vaginatum</i> and <i>Calluna vulgaris</i> . <i>Sphagnum</i> cover is ca 15% with <i>Sphagnum subnitens</i> , <i>Sphagnum tenellum</i> and <i>Sphagnum papillosum</i> . <i>Erica tetralix</i> and <i>Cladonia portentosa</i> are abundant. Ground conditions are firm to soft underfoot.	Sub marginal
589	Ecotope	Windmill	GE_08	Sub marginal ecotope dominated by <i>Eriophorum angustifolium</i> . <i>Calluna vulgaris</i> and <i>Erica tetralix</i> are abundant. <i>Sphagnum</i> cover is ca 15% with <i>Sphagnum capillifolium</i> , <i>Sphagnum papillosum</i> and <i>Sphagnum tenellum</i> .	Sub marginal
590	Habitat	Windmill	GE_08	Birch woodland occurs in cutover areas dominated by stands of <i>Betula pubescens</i> . Approximately 8-10m high.	Descriptive Note
591	Ecotope	Windmill	GE_08	Sub marginal ecotope dominated by <i>Narthecium ossifragum</i> and <i>Calluna vulgaris</i> .	Sub marginal
592	Ecotope	Windmill	GE_08	Marginal ecotope. Conditions are firm underfoot. Dominated by <i>Calluna vulgaris</i> and <i>Narthecium ossifragum</i> . <i>Sphagnum</i> cover is <5%. <i>Campylopus atrovirens</i> is the most abundant moss species present.	Marginal
593	Ecotope	Windmill	GE_08	Marginal ecotope dominated by <i>Trichophorum cespitosum</i> and <i>Narthecium ossifragum</i> .	Marginal
594	Ecotope	Windmill	GE_08		Marginal
595	Management	Windmill	GE_08	Evidence of machinery tracks recorded over the high bog. The area is disturbed due to compaction of the high bog.	Marginal
596	Management	Windmill	GE_08	This area appears to have been managed for traditional peat cutting in the past, however peat cutting has been abandoned in modern times. This area has reverted to Bog woodland dominated by <i>Betula pubescens</i> . Old turf banks recorded in this area.	Descriptive Note
597	Fauna	Windmill	GE_08	Snipe recorded on high bog	Marginal
598	Management	Windmill	GE_08	Functional drainage ditch installed on high bog. Small scale planting of Lodge pole pine at this location. Afforestation a threat to the high bog,	Sub marginal
599	Fauna	Windmill	GE_08	Hare recorded at this location	Sub marginal

Note Number	Note Type	Bog Name	Bog Code	Note Text	Ecotope
600	Management	Windmill	GE_08	Trampling and compaction of the high bog caused by plant machinery movements across the site.	Sub marginal
601	Hydrology	Windmill	GE_08	Recently excavated drainage ditches. Area is disturbed due to spreading of surface scraghs and catotelm peat on the high bog	Sub marginal
602	Hydrology	Windmill	GE_08	Functional drainage ditches in this area are ca 1.3m deep	Sub marginal
603	Habitat	Windmill	GE_08	Cutover bog reverting to wet heath.	Descriptive Note
604	Ecotope	Windmill	GE_08	Marginal ecotope firm underfoot with little or no Sphagnum cover.	Marginal
605	Flora	Windmill	GE_08	Rhododendron ponticom occurs at this location	Descriptive Note
606	Flora	Windmill	GE_08	Numerous stands of Rhododendron ponticom occur at this location	Marginal
607	Habitat	Windmill	GE_08	Area of cutover bog dominated by bare peat	Marginal
608	Habitat	Windmill	GE_08	Area of cutover bog dominated by Eriophorum vaginatum, Calluna vulgaris, Molinia caerulea and grassland species.	Descriptive Note
609	Ecotope	Windmill	GE_08	Sub central ecotope dominated by Sphagnum mosses and Eriophorum vaginatum. Conditions are very soft underfoot. This area conforms to the EU Annex I listed habitat 'active raised bogs (7110)'.	Sub central
610	Ecotope	Windmill	GE_08	Sub central ecotope boundary	Sub central
611	Ecotope	Windmill	GE_08	Sub central ecotope boundary	Sub central
612	Ecotope	Windmill	GE_08	Sub marginal and sub central ecotope boundary	Sub marginal
613	Ecotope	Windmill	GE_08		Sub marginal
614	Ecotope	Windmill	GE_08	Marginal ecotope. Dominated by Calluna vulgaris and Cladonia portentosa. Erica tetralix, Eriophorum vaginatum and Hypnum jutlandicum are abundant. Other species include Cladonia uncialis, Campylopus spp. and Cladonia floerkeana	Marginal
615	General	Windmill	GE_08	The high bog slopes to the north at this point	Marginal
616	Hydrology	Windmill	GE_08	Functional drainage ditch	Marginal
617	Ecotope	Windmill	GE_08	Marginal ecotope. Algal pools occur in this area	Marginal
618	Fauna	Windmill	GE_08	Snipe (3) recorded at this location	Sub marginal
619	Ecotope	Windmill	GE_08	Marginal ecotope boundary. Dominated by Calluna vulgaris, Narthecium ossifragum and Eriophorum vaginatum. Frequent occurrences of Cladonia portentosa, Erica tetralix, Trichophorum cespitosum and Eriophorum angustifolium.	Marginal
620	Flora	Windmill	GE_08	Mosses include Hypnum jutlandicum. Sphagnum cover is < 10%	Marginal
621	Habitat	Windmill	GE_08	Bog woodland dominated by Betula pubescens and occasional Pinus sylvestris. Tree stands are ca 8-15m high. The understory comprises dense bracken (Pteridium aquilinum) and Calluna vulgaris. Does not conform to 'Bog Woodland 91D0'.	Descriptive Note
622	Ecotope	Windmill	GE_08	Face bank ecotope dominated by dense stands of Calluna vulgaris together with Erica tetralix and Hypnum jutlandicum	Face bank
623	Fauna	Windmill	GE_08	Jay recorded from this area of bog woodland	Descriptive Note
624	Management	Windmill	GE_08	Small area of disturbed ground. Exposed catotelm peat and surface scraghs were recorded over high bog. Some compaction and trampling on high bog due to machinery movements across the high bog	Sub marginal
625	Ecotope	Windmill	GE_08		Sub marginal
626	Ecotope	Windmill	GE_08		Marginal
627	Site Description	Windmill	GE_08	The site slopes gently to the south at this location	Descriptive Note
628	Ecotope	Windmill	GE_08	Marginal ecotope dominated by Calluna vulgaris, Narthecium ossifragum and Cladonia portentosa. Erica tetralix and Eriophorum vaginatum are abundant. Sphagnum mosses include Sphagnum capillifolium and Sphagnum papillosum	Marginal
629	Flora	Windmill	GE_08	Stands of Pinus sylvestris becoming more frequent in this part of high bog	Marginal
630	Ecotope	Windmill	GE_08		Sub marginal
631	Designated Site	Windmill	GE_08	Carbury Bog NHA (NPWS Site Code: 1388). The site under consideration occurs outside the NHA	Descriptive Note
632	Flora	Windmill	GE_08	Sphagnum cover is <10% in marginal areas. Sphagnum capillifolium and Sphagnum tenellum were recorded from this area	Marginal
633	Hydrology	Windmill	GE_08	A series of functional drainage ditches occur along the eastern boundary of the high bog. Area is heavily disturbed due to spreading of surface scraghs and catotelm peat on high bog as a result of recently excavated functional drainage ditches	Marginal



## **Appendix 2**

### **Detailed Site Data**

# Green Element

## Raised Bog Survey 2013 - 2014

<b>Bog Name:</b>	Windmill	<b>Site Easting &amp; Northing:</b>	268403 236984
<b>Bog Code:</b>	8	<b>Site contains Raised Bog Habitat:</b>	YES
<b>County:</b>	Kildare	<b>Active Raised Bog 7110:</b>	YES
<b>Survey Date:</b>	12/12/2013	<b>Bog Woodland 91D0:</b>	NO
<b>Name of Surveyor/s:</b>	B. O'Loughlin & B. Kirwan	<b>Degraded raised bog 7120:</b>	YES
		<b>Depressions on peat substrates 7150:</b>	NO

Ecotope	Present/Absent	Comment
<b>Central:</b>	Absent	N/A
<b>Sub-Central:</b>	Present	Sub-central ecotope occurs in the northern part of the site. The area is dominated by <i>Sphagnum</i> mosses (>40%) and <i>Eriophorum vaginatum</i> . The plot conforms to community complex 10/9. The ground is very soft underfoot. Areas of active peat formation conforms to annex I EU habitat.
<b>Sub-Marginal:</b>	Present	Sub-marginal ecotope is dominant and widespread throughout the high bog. The ecotope on site conforms to community complex 9/7/6, 9/7/4, 7/6, 9/7, 9a.
<b>Marginal:</b>	Present	This ecotope occurs along the outer margins of the high bog and areas of drainage ditches and is dominated by <i>Calluna vulgaris</i> , <i>Narthecium ossifragum</i> and <i>Calluna vulgaris</i> . The ecotope conforms to community complex 9/7/6 and 7/6.
<b>Facebank:</b>	Present	The facebank occurs throughout high bog boundary and usually comprises dense stands of <i>Calluna vulgaris</i> and <i>Hypnum jutlandicum</i> .
<b>High Bog area (ha):</b>	66.90	<b>Area of Active Raised Bog (ha):</b> 0.1 <b>% ARB:</b> 0.15

### Site Description:

The site comprises a low dome of remnant high bog. The high bog can be divided into three discrete sections - the northern, central and southern. To west, the bog is surrounded by cutover bog (bog woodland comprising *Pinus sylvestris* and *Betula pubescens*). Agricultural grassland and active quarries surround this peatland site.

The site is intensively managed for peat extraction to produce compost peat for the horticultural industry. A highly modified drainage network occurs within a large extensive area of cutover bog to the north and east. The high bog has also been drained in recent years to facilitate this commercial practice. Functional drainage ditches circa 1 m to 1.5 m deep traverse the north eastern part of the site with surface water and culverts installed.

Four ecotope types are present (facebank, marginal, sub-marginal and sub-central). The sub-central area occurs in the northern part of the site and is dominated by *Sphagnum* mosses (>40% cover) and *Eriophorum vaginatum*. Ground conditions are soft underfoot with low hummocks and hollows. The ecotope type conforms to community complex 10/9 and the annex I habitat active raised bogs 7110. The sub-marginal ecotope type is widespread throughout the high bog and comprises low hummocks with few hollows recorded. The marginal ecotope occurs on the outer areas of the high bog. Old turf banks are present along the western and southern parts of the high bog. No recent cutting and these areas have regenerated with wet heath and bog woodland.

The main threats to the site include peat extraction, drainage, the introduction of invasive alien species (*Rhododendron ponticum*) and afforestation. The site is of importance for the presence of active raised bog 7110. Its location at the eastern extent of the range of the habitat is also of note.

### Landscape setting:

Low dome that adjoins Carbury Bog NHA (1388) to the south and industrially cut bog to the north.

# Green Element

## Raised Bog Survey 2013 - 2014

Main Site Name: Windmill

Site Code: 8

Present/Absent	Comment
<b>Positive Bog Features</b>	
<b>High Bog Features</b>	
<b>Pool system:</b>	
Absent	
<b>Good Hummock Hollow topography:</b>	
Absent	Occasional hummocks and hollows.
<b>High Bog Flush:</b>	
Absent	
<b>High Bog Woodland:</b>	Occurs in the immediate surroundings in cutover areas.
Absent	
<b>High Bog Swallow Hole System:</b>	
Absent	
<b>Other High Bog Feature:</b>	
Absent	
<b>Marginal Features</b>	
<b>Semi-natural Margin:</b>	
Absent	
<b>Positive High Bog Species</b>	
<b>Sphagnum fuscum</b>	
Absent	
<b>Sphagnum austinii</b>	
Absent	
<b>Sphagnum pulchrum</b>	
Absent	
<b>Sphagnum cuspidatum</b>	Occurs in hollows in sub-marginal ecotope and reduced functional drainage ditches and subcentral ecotope in the northern part of the site.
<b>Sphagnum denticulatum</b>	
Absent	
<b>Cladonia portentosa</b>	
Present	<i>Cladonia portentosa</i> is widespread throughout the site with different degrees of % cover.
<b>Noteworthy / Rare Species</b>	
Presence of active peat sub-central ecotope in northern part of site.	

# Green Element

## Raised Bog Survey 2013 - 2014

Main Site Name: Windmill		Site Code: 8	
	Present/Absent	Impact	Comment
<b>Impact and Activities on High Bog</b>			
<b>Peat Extraction on High Bog Surface:</b>	YES	High	Active commercial peat extraction of high bog. Machinery operating on site. An extensive area of the high bog to the south and east has been largely affected by mechanical large scale peat cutting. A peat harvesting plant occurs on
<b>Marginal Peat Extraction:</b>	YES	High	Marginal peat extraction on the northern and eastern parts of the site by mechanical machinery. Turf cutting along the southern and western parts of the high bog has been abandoned and it appears that this area was hand cut.
<b>Hand Cutting of Peat:</b>	YES	Medium	This traditional practice of peat cutting by hand has been abandoned along the southern and western parts of the site as indicated by old abandoned turf banks. The cutover area is colonised by regenerating cutover bog communities including established bog woodland, wet heath and dense bracken.
<b>Mechanical Removal of Peat:</b>	YES	High	Large scale intensive mechanical removal of peat from the high bog particularly in the northern and eastern parts of the high bog. Machinery including harvesters and diggers observed operating onsite.
<b>Commercial Peat Extraction:</b>	YES	High	The site is managed and highly modified for commercial use managed for compost peat to serve the horticultural industry. A peat extraction processing plant occurs on site. Large peat stockpiles observed on site.
<b>Domestic Peat Extraction:</b>	NO	Unknown	
<b>Bog Burst:</b>	NO		
<b>Cracking or Peat Slumping at Edge of High Bog:</b>	YES	Medium	High along the northern and eastern parts of the site where the high bog has been managed for large scale peat extraction activities.
<b>Forestry Planting on High Bog:</b>	YES	Low	Evidence of forestry planting of Lodgepole pine (circa 20 saplings) observed in northern part of site.
<b>Forestry Felling on High Bog:</b>	NO		
<b>Invasive Species on High Bog:</b>	YES	Medium	Potential threat of spread of <i>Rhododendron ponticum</i> recorded growing in adjacent area of bog woodland and cutover bog. Planting of Lodgepole pine.
<b>Drainage on High Bog:</b>	YES	High	Intensive drainage in the northern eastern part of site on high bog where a series of drainage ditches traverse the bog. The drains are functional and circa 1-1.5 m deep with surface water inflow from bog recorded. Excavated surface scraghs and catotelm peat have been spread in adjacent areas.
<b>Functional Drains on High</b>	YES	High	Intensive draining in the northern eastern part of site on

# Green Element

## Raised Bog Survey 2013 - 2014

**Bog:** high bog where a series of drainage ditches traverse the bog. The drains are functional and ca 1-1.5 m deep with surface water ingress recorded. Excavated surface scraghs and catotelm peat spread in adjacent areas. Other functional drainage ditches bound the high bog.

<b>Non-functional Drains on High Bog:</b>	YES	Low	Occasional non functional drainage ditches recorded on the high bog comprises established <i>Sphagnum</i> mosses including <i>Sphagnum capillifolium</i> , <i>S. papillosum</i> , <i>S. magellanicum</i> with <i>Eriophorum vaginatum</i> and <i>Calluna vulgaris</i> .
<b>Reduced function Drains on High Bog:</b>	YES	Low	Reduced functional drain recorded in the southern part of the site on high bog containing regenerating <i>Sphagnum</i> mosses including <i>S. cuspidatum</i> , <i>S. capillifolium</i> , <i>S. papillosum</i> and <i>S. tenellum</i> . Other species include <i>Hypnum jutlandicum</i> , occasional <i>Eriophorum vaginatum</i> .
<b>Burning on High Bog:</b>	NO		Large patches of <i>Cladonia portentosa</i> recorded in the central part of the site, indicating lack of recent fires.
<b>Fertilisation on High Bog:</b>	NO		
<b>Dumping on High Bog:</b>	NO		
<b>Grazing on High Bog:</b>	NO		
<b>Paths tracks on High Bog:</b>		Medium	Trampling and compaction of surface vegetation due to machinery accessing the site due to drainage works on site.

### General Impacts and Activities Comment:

The main threats that impact on the high bog include peat extraction, drainage, afforestation and the introduction of an alien species.

# Green Element

## Raised Bog Survey 2013 - 2014

Main Site Name: Windmill	Site Code: 8
Present/Absent & Grid Ref	Comment
<b>Cutover Assessment</b>	
<b>Regenerating <i>Sphagnum</i> Areas Occur:</b>	Present Regenerating <i>Sphagnum</i> was recorded in an area of cutover on the western and south eastern boundary of the site. Comprises <i>Sphagnum palustre</i> , <i>S. cuspidatum</i> , <i>S. fallax</i> and <i>S. papillosum</i> , <i>S. capillifolium</i> and <i>Sphagnum tenellum</i> with <i>Calluna vulgaris</i> and <i>Molinia caerulea</i> . These areas appear to be hand cut.
<b>Active Peat Fields with Bare Peat:</b>	Present Extensive areas of bare peat in the northern and eastern parts of the site. Highly intensive drainage network developed in these areas of cutover bog.
<b>Cutover with Mix of Wet and Dry Bog Vegetation:</b>	
<b>Cutover Recolonised mainly by Dry Vegetation:</b>	Present Dry heath occurs in the eastern part of the site dominated by <i>Eriophorum vaginatum</i> , <i>Calluna vulgaris</i> , <i>Narthecium ossifragum</i> and grasses.
<b>Cutover Recolonised mainly by Wet Vegetation:</b>	Present Recolonisation of wet bog vegetation occurs along the western boundary of the cutover / high bog interface and includes <i>Molinia caerulea</i> , <i>Calluna vulgaris</i> and <i>Sphagnum</i> mosses. This area has regenerated to wet heath.
<b>Cutover with Transition Mire / Fen Vegetation:</b>	
<b>Cutover Reclaimed to Grassland:</b>	
<b>Other Cutover Habitat Occurrence:</b>	
<b>Topography of Cutover Comment:</b> Flat	
<b>Drainage of Cutover Comment:</b> A series of functional drainage ditches traverse this habitat. Some reduced functional drainage ditches were also recorded.	
<b>Comments on Restoration Potential of Cutover:</b> Potential exists along the western boundary of the site.	

# Green Element

Raised Bog Survey 2013 - 2014

Plot Data

Windmill

**Bog Name:** Windmill  
**Bog Code:** 8  
**Plot Code Number:** 1  
**Plot Survey Date:** 12/12/2013  
**Plot Surveyor/s:** B. O'Loughlin & B. Kirwan

**Ecotope Type Present:** Sub Central Ecotope

**Community Complex:** Complex 10/9

**Plot Easting:**                      **Northing:**                      **Plot Photo. Numbers:** Bol ipad

**Ground Firmness:** Very Soft  
**Burning Evidence:** No burning  
**Algae in Hollows %:** no  
**Algae in Pools %:** no  
**Bare Peat %:** no  
**Calluna Height (cm + / - 5 cm):** 40  
**Cladonia Cover %:** 3  
**Macro-topography:** Gentle slope  
**Pools Occurrence:** Absent  
**Pools % Cover:** no  
**Sphagnum % Cover:** 45  
**Narthecium % Cover:** 2

**Micro-topography:**  
Low hummocks and lawns.

**Tussocks Occurrence:** Present  
**Tussocks *Eriophorum vaginatum*:** Yes                      % cover 55  
**Tussocks *Trichophorum germanicum*:** Yes                      % cover 10  
**Tussocks *Molinia caerulea*:**                      % cover  
**Tussocks Other:**                      % cover

**Plot Degradation or Regeneration Evidence:**

**Plot Noteworthy or Rare Species (Flora/Fauna):**

**Plot General Comments:**

**Plot Species Recorded:**

Present	Domin Cover Value
Andromeda polifolia	2
Calluna vulgaris	5
Cladonia portentosa	3
Erica tetralix	4
Eriophorum angustifolium	3
Eriophorum vaginatum	8
Narthecium ossifragum	3
Sphagnum capillifolium	4



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## Green Element

Raised Bog Survey 2013 - 2014	Plot Data	Windmill
Sphagnum cuspidatum	4	
Sphagnum fallax	4	
Sphagnum magellanicum	6	
Sphagnum papillosum	6	
Sphagnum subnitens	3	

# Green Element

## Raised Bog Survey 2013 - 2014

<b>Bog Name:</b>	Windmill	<b>Site Easting &amp; Northing:</b>	268403 236984
<b>Bog Code:</b>	8	<b>Site contains Raised Bog Habitat:</b>	YES
<b>County:</b>	Kildare	<b>Active Raised Bog 7110:</b>	YES
<b>Survey Date:</b>	12/12/2013	<b>Bog Woodland 91D0:</b>	NO
<b>Name of Surveyor/s:</b>	B. O'Loughlin & B. Kirwan	<b>Degraded raised bog 7120:</b>	YES
		<b>Depressions on peat substrates 7150:</b>	NO

Ecotope	Present/Absent	Comment
<b>Central:</b>	Absent	N/A
<b>Sub-Central:</b>	Present	Sub-central ecotope occurs in the northern part of the site. The area is dominated by <i>Sphagnum</i> mosses (>40%) and <i>Eriophorum vaginatum</i> . The plot conforms to community complex 10/9. The ground is very soft underfoot. Areas of active peat formation conforms to annex I EU habitat.
<b>Sub-Marginal:</b>	Present	Sub-marginal ecotope is dominant and widespread throughout the high bog. The ecotope on site conforms to community complex 9/7/6, 9/7/4, 7/6, 9/7, 9a.
<b>Marginal:</b>	Present	This ecotope occurs along the outer margins of the high bog and areas of drainage ditches and is dominated by <i>Calluna vulgaris</i> , <i>Narthecium ossifragum</i> and <i>Calluna vulgaris</i> . The ecotope conforms to community complex 9/7/6 and 7/6.
<b>Facebank:</b>	Present	The facebank occurs throughout high bog boundary and usually comprises dense stands of <i>Calluna vulgaris</i> and <i>Hypnum jutlandicum</i> .
<b>High Bog area (ha):</b>	66.90	<b>Area of Active Raised Bog (ha):</b> 0.1 <b>% ARB:</b> 0.15

### Site Description:

The site comprises a low dome of remnant high bog. The high bog can be divided into three discrete sections - the northern, central and southern. To west, the bog is surrounded by cutover bog (bog woodland comprising *Pinus sylvestris* and *Betula pubescens*). Agricultural grassland and active quarries surround this peatland site.

The site is intensively managed for peat extraction to produce compost peat for the horticultural industry. A highly modified drainage network occurs within a large extensive area of cutover bog to the north and east. The high bog has also been drained in recent years to facilitate this commercial practice. Functional drainage ditches circa 1 m to 1.5 m deep traverse the north eastern part of the site with surface water and culverts installed.

Four ecotope types are present (facebank, marginal, sub-marginal and sub-central). The sub-central area occurs in the northern part of the site and is dominated by *Sphagnum* mosses (>40% cover) and *Eriophorum vaginatum*. Ground conditions are soft underfoot with low hummocks and hollows. The ecotope type conforms to community complex 10/9 and the annex I habitat active raised bogs 7110. The sub-marginal ecotope type is widespread throughout the high bog and comprises low hummocks with few hollows recorded. The marginal ecotope occurs on the outer areas of the high bog. Old turf banks are present along the western and southern parts of the high bog. No recent cutting and these areas have regenerated with wet heath and bog woodland.

The main threats to the site include peat extraction, drainage, the introduction of invasive alien species (*Rhododendron ponticum*) and afforestation. The site is of importance for the presence of active raised bog 7110. Its location at the eastern extent of the range of the habitat is also of note.

### Landscape setting:

Low dome that adjoins Carbury Bog NHA (1388) to the south and industrially cut bog to the north.

# Green Element

## Raised Bog Survey 2013 - 2014

Main Site Name: Windmill

Site Code: 8

Present/Absent

Comment

### Positive Bog Features

#### High Bog Features

##### Pool system:

Absent

##### Good Hummock Hollow topography:

Absent Occasional hummocks and hollows.

##### High Bog Flush:

Absent

**High Bog Woodland:** Occurs in the immediate surroundings in cutover areas.

Absent

##### High Bog Swallow Hole System:

Absent

##### Other High Bog Feature:

Absent

#### Marginal Features

##### Semi-natural Margin:

Absent

### Positive High Bog Species

#### Sphagnum fuscum

Absent

#### Sphagnum austinii

Absent

#### Sphagnum pulchrum

Absent

#### Sphagnum cuspidatum

Occurs in hollows in sub-marginal ecotope and reduced functional drainage ditches and subcentral ecotope in the northern part of the site.

#### Sphagnum denticulatum

Absent

#### Cladonia portentosa

Present *Cladonia portentosa* is widespread throughout the site with different degrees of % cover.

### Noteworthy / Rare Species

Presence of active peat sub-central ecotope in northern part of site.

# Green Element

## Raised Bog Survey 2013 - 2014

Main Site Name: Windmill		Site Code: 8	
	Present/Absent	Impact	Comment
<b>Impact and Activities on High Bog</b>			
<b>Peat Extraction on High Bog Surface:</b>	YES	High	Active commercial peat extraction of high bog. Machinery operating on site. An extensive area of the high bog to the south and east has been largely affected by mechanical large scale peat cutting. A peat harvesting plant occurs on
<b>Marginal Peat Extraction:</b>	YES	High	Marginal peat extraction on the northern and eastern parts of the site by mechanical machinery. Turf cutting along the southern and western parts of the high bog has been abandoned and it appears that this area was hand cut.
<b>Hand Cutting of Peat:</b>	YES	Medium	This traditional practice of peat cutting by hand has been abandoned along the southern and western parts of the site as indicated by old abandoned turf banks. The cutover area is colonised by regenerating cutover bog communities including established bog woodland, wet heath and dense bracken.
<b>Mechanical Removal of Peat:</b>	YES	High	Large scale intensive mechanical removal of peat from the high bog particularly in the northern and eastern parts of the high bog. Machinery including harvesters and diggers observed operating onsite.
<b>Commercial Peat Extraction:</b>	YES	High	The site is managed and highly modified for commercial use managed for compost peat to serve the horticultural industry. A peat extraction processing plant occurs on site. Large peat stockpiles observed on site.
<b>Domestic Peat Extraction:</b>	NO	Unknown	
<b>Bog Burst:</b>	NO		
<b>Cracking or Peat Slumping at Edge of High Bog:</b>	YES	Medium	High along the northern and eastern parts of the site where the high bog has been managed for large scale peat extraction activities.
<b>Forestry Planting on High Bog:</b>	YES	Low	Evidence of forestry planting of Lodgepole pine (circa 20 saplings) observed in northern part of site.
<b>Forestry Felling on High Bog:</b>	NO		
<b>Invasive Species on High Bog:</b>	YES	Medium	Potential threat of spread of <i>Rhododendron ponticum</i> recorded growing in adjacent area of bog woodland and cutover bog. Planting of Lodgepole pine.
<b>Drainage on High Bog:</b>	YES	High	Intensive drainage in the northern eastern part of site on high bog where a series of drainage ditches traverse the bog. The drains are functional and circa 1-1.5 m deep with surface water inflow from bog recorded. Excavated surface scraghs and catotelm peat have been spread in adjacent areas.
<b>Functional Drains on High</b>	YES	High	Intensive draining in the northern eastern part of site on

# Green Element

## Raised Bog Survey 2013 - 2014

**Bog:** high bog where a series of drainage ditches traverse the bog. The drains are functional and ca 1-1.5 m deep with surface water ingress recorded. Excavated surface scraghs and catotelm peat spread in adjacent areas. Other functional drainage ditches bound the high bog.

<b>Non-functional Drains on High Bog:</b>	YES	Low	Occasional non functional drainage ditches recorded on the high bog comprises established <i>Sphagnum</i> mosses including <i>Sphagnum capillifolium</i> , <i>S. papillosum</i> , <i>S. magellanicum</i> with <i>Eriophorum vaginatum</i> and <i>Calluna vulgaris</i> .
<b>Reduced function Drains on High Bog:</b>	YES	Low	Reduced functional drain recorded in the southern part of the site on high bog containing regenerating <i>Sphagnum</i> mosses including <i>S. cuspidatum</i> , <i>S. capillifolium</i> , <i>S. papillosum</i> and <i>S. tenellum</i> . Other species include <i>Hypnum jutlandicum</i> , occasional <i>Eriophorum vaginatum</i> .
<b>Burning on High Bog:</b>	NO		Large patches of <i>Cladonia portentosa</i> recorded in the central part of the site, indicating lack of recent fires.
<b>Fertilisation on High Bog:</b>	NO		
<b>Dumping on High Bog:</b>	NO		
<b>Grazing on High Bog:</b>	NO		
<b>Paths tracks on High Bog:</b>		Medium	Trampling and compaction of surface vegetation due to machinery accessing the site due to drainage works on site.

### General Impacts and Activities Comment:

The main threats that impact on the high bog include peat extraction, drainage, afforestation and the introduction of an alien species.

# Green Element

## Raised Bog Survey 2013 - 2014

Main Site Name: Windmill	Site Code: 8
Present/Absent & Grid Ref	Comment
<b>Cutover Assessment</b>	
<b>Regenerating <i>Sphagnum</i> Areas Occur:</b>	Present Regenerating <i>Sphagnum</i> was recorded in an area of cutover on the western and south eastern boundary of the site. Comprises <i>Sphagnum palustre</i> , <i>S. cuspidatum</i> , <i>S. fallax</i> and <i>S. papillosum</i> , <i>S. capillifolium</i> and <i>Sphagnum tenellum</i> with <i>Calluna vulgaris</i> and <i>Molinia caerulea</i> . These areas appear to be hand cut.
<b>Active Peat Fields with Bare Peat:</b>	Present Extensive areas of bare peat in the northern and eastern parts of the site. Highly intensive drainage network developed in these areas of cutover bog.
<b>Cutover with Mix of Wet and Dry Bog Vegetation:</b>	
<b>Cutover Recolonised mainly by Dry Vegetation:</b>	Present Dry heath occurs in the eastern part of the site dominated by <i>Eriophorum vaginatum</i> , <i>Calluna vulgaris</i> , <i>Narthecium ossifragum</i> and grasses.
<b>Cutover Recolonised mainly by Wet Vegetation:</b>	Present Recolonisation of wet bog vegetation occurs along the western boundary of the cutover / high bog interface and includes <i>Molinia caerulea</i> , <i>Calluna vulgaris</i> and <i>Sphagnum</i> mosses. This area has regenerated to wet heath.
<b>Cutover with Transition Mire / Fen Vegetation:</b>	
<b>Cutover Reclaimed to Grassland:</b>	
<b>Other Cutover Habitat Occurrence:</b>	
<b>Topography of Cutover Comment:</b> Flat	
<b>Drainage of Cutover Comment:</b> A series of functional drainage ditches traverse this habitat. Some reduced functional drainage ditches were also recorded.	
<b>Comments on Restoration Potential of Cutover:</b> Potential exists along the western boundary of the site.	

# Green Element

Raised Bog Survey 2013 - 2014

Plot Data

Windmill

**Bog Name:** Windmill  
**Bog Code:** 8  
**Plot Code Number:** 1  
**Plot Survey Date:** 12/12/2013  
**Plot Surveyor/s:** B. O'Loughlin & B. Kirwan

**Ecotope Type Present:** Sub Central Ecotope

**Community Complex:** Complex 10/9

**Plot Easting:**                      **Northing:**                      **Plot Photo. Numbers:** Bol ipad

**Ground Firmness:** Very Soft  
**Burning Evidence:** No burning  
**Algae in Hollows %:** NA  
**Algae in Pools %:** NA  
**Bare Peat %:** NA  
**Calluna Height (cm + / - 5 cm):** 40  
**Cladonia Cover %:** 3  
**Macro-topography:** Gentle slope  
**Pools Occurrence:** Absent  
**Pools % Cover:** NA  
**Sphagnum % Cover:** 45  
**Narthecium % Cover:** 2

**Micro-topography:**  
Low hummocks and lawns.

**Tussocks Occurrence:** Present  
**Tussocks *Eriophorum vaginatum*:** Yes                      % cover 55  
**Tussocks *Trichophorum germanicum*:** Yes                      % cover 10  
**Tussocks *Molinia caerulea*:**                      % cover  
**Tussocks Other:**                      % cover

**Plot Degradation or Regeneration Evidence:**

**Plot Noteworthy or Rare Species (Flora/Fauna):**

**Plot General Comments:**

**Plot Species Recorded:**

Present	Domin Cover Value
Andromeda polifolia	2
Calluna vulgaris	5
Cladonia portentosa	3
Erica tetralix	4
Eriophorum angustifolium	3
Eriophorum vaginatum	8
Narthecium ossifragum	3
Sphagnum capillifolium	4

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## Green Element

Raised Bog Survey 2013 - 2014	Plot Data	Windmill
Sphagnum cuspidatum	4	
Sphagnum fallax	4	
Sphagnum magellanicum	6	
Sphagnum papillosum	6	
Sphagnum subnitens	3	