RESTORING RAISED BOG IN IRELAND
Project Reference: LIFE04 NAT/IE/000121

A REPORT ON THE RESTORATION OF PROJECT SITE No. 11

CARN PARK BOG, Co. WESTMEATH

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Project Site No. 11 - Carn Park Bog, Co. Westmeath

1. Introduction

Grid Reference IN1246 4181	**Elevation (m)** 60	**Bedrock Geology** **Carboniferous Limestone**
SAC Name and Number Carn Park Bog cSAC (2336) **SAC Area (ha)** 205	**Project Area (ha)** 132.2	**Main Restoration Methods** Clear-fell mature conifer crop Fell to Waste young/ moribund conifers Block plantation drains with peat dams Block open bog drains with plastic dams Control natural regeneration Construct Boardwalk & Carpark Erect interpretive signage
Area of Conifer Cover (ha) 96.3	**Open Bog Area (ha)** 35.9	**Area of Birch Woodland (ha)** 0
Noteworthy habitats/plant/animal species present *Sphagnum pulcrum* has been recorded on this site		

General site description

Carn Park is a medium-sized raised bog which lies 8 km east of Athlone, Co. Westmeath. Much of the bog margins have been planted with conifers over the last couple of decades. The remaining intact bog vegetation is of good quality however extensive pool systems, which are generally indicative of high-quality raised bog ecosystems, do not occur. Much of the high bog has vegetation typical of the Midlands Raised Bog type. The vegetation consists of Ling Heather (*Calluna vulgaris*), Carnation Sedge (*Carex panicea*), and the lichen *Cladonia portentosa*. Cottongrasses (*Eriophorum vaginatum* and *E. angustifolium*) replace Carnation Sedge as co-dominants in the central areas. The surface is very wet with an undulating hummock/ hollow microtopography. Pools and some drains have become in-filled with bog mosses (*Sphagnum cuspidatum, S. magellanicum* and *S. capillifolium*), White-beaked Sedge (*Rhynchospora alba*) and Common Cottongrass (*Eriophorium angustifolium*). Bog mosses cover much of the open bog surface, forming hummocks of *Sphagnum papillosum* and the rarer *S. imbricatum* and *S. fuscum*. A noteworthy vegetation feature of the bog is the presence of a large population of the rare moss *Sphagnum pulchrum* which is a rather rare species in Ireland. Fir Clubmoss (*Huperzia selago*) is also found on the bog. In common with all raised bog sites in Ireland, most of the marginal areas of the site have been subject to peat-cutting in the past and this has resulted in the drying out of the adjacent high bog. However, the intensity of peat-cutting is generally low at this bog.

Project Site Description (Pre-restoration)

The project area consists of 96.3 hectares of conifer plantation, planted on high bog and cutover. In addition to the planted areas, Coillte owns strips of intact bog in the middle of the site, which total 35.9 ha. These strips are interspersed by intact bog strips owned by private individuals.

The site was surveyed in 2003, prior to restoration, which found that these conifers consisted largely of Lodgepole Pine (*Pinus contorta*) with some Scot's Pine (*Pinus sylvestris*) and in some areas the trees were at least 25 years old. Although the mature conifers formed a closed canopy, bog vegetation remained on the wet bog surface of the younger/ moribund plantations. In the northern half of the site a conifer plantation occupied an area which has the potential to form a wet lagg area once the trees were removed and drains blocked (Conaghan, 2003).

This relatively large bog is one of the most important project sites for restoration. The site contained a wide variety of tree ages and condition and thus is important from the point of view of restoration experimentation. There is a large area present where bog vegetation occurred under a conifer canopy. The wettest of these areas have good prospects of re-wetting to produce active raised bog again however dry areas will probably revert to birch scrub following the removal of young conifers, in spite of drain blocking. It is likely that lagg type conditions will develop in the northern section of the site where mineral ground and bog meet. There is good potential for the development of wet lagg woodland, after the main drains have been blocked and the young Sitka Spruce have been removed.

Restoration Actions

At this site the main restoration measures undertaken was the clear-felling and removal of the mature conifer crop, felling to waste of young/ moribund conifers, wind-rowing of the remaining brash and blocking of drains with peat dams. Follow-up work included the control of the natural regeneration of conifer seedlings and Rhododendron, which is a highly invasive species. As this site was selected as a Demonstration Site, a car park and boardwalk were also constructed and interpretative signage was erected.

2. Methods

Prior to the start of restoration activities at the site, the habitats and vegetation occurring was surveyed and described (Conaghan, 2003). During the initial restoration work of 2005, permanent quadrats were established on each of the vegetation types within the project site.

During the field survey, particular attention was paid to the possible occurrence of plant and animal species which are considered to be rare in both a national and local context with particular emphasis on animal species listed in Annex II of the E.U. Habitats Directive and plant species listed in the Irish Red Data Book for vascular plants (Curtis and McGough, 1988), the 1999 Flora Protection Order and Annex II of the E.U. Habitats Directive.

3. Site Photographs
During the initial fieldwork a number of colour photographs of the site and vegetation encountered were taken with a digital camera and a selection of these are presented in this report. These include photographs taken by the Project Ecologist in order to illustrate the vegetation descriptions and changes in the habitats/vegetation present over time.

4. Vegetation of Project Site
Prior to restoration work commencing, this site contained a wide range of conifer plantations, from areas planted as recently as 1996 to much older areas planted in 1978 (Conaghan, 2003). In the southern half of the site there were two large blocks of Lodgepole Pine plantations. The ground layer of these areas was carpeted by a thick layer of pine needles and the only vegetation cover was provided by a sparse cover mosses such as *Hypnum cupressiforme* and *Sphagnum capillifolium*. A substantial area of Lodgepole planted in 1978 had grown very poorly and retained a raised bog flora dominated by Ling Heather and *Sphagnum capillifolium*. Most of the remaining areas of conifer plantation had been planted within the last 15 years and had not achieved a closed canopy. As a result there was dried out bog vegetation present in most of these areas, dominated by either Ling Heather or Downy Birch. One recently planted block in the north of the site had a high cover of deciduous shrubs such as Grey Willow, Birch, Ash (*Fraxinus excelsior*) and Guelder Rose (*Viburnum opulus*) (Conaghan, 2003).

The vegetation which adjoins the planted areas of this bog comprises mainly damp to wet ombrotrophic bog which is dominated by Ling Heather (*Calluna vulgaris*), Hare's tail Cottongrass (*Eriophorum vaginatum*) and the lichen *Cladonia portentosa*. The *Sphagnum* cover in these areas is low, typically averaging between 10 and 30% cover. Wet areas containing pool systems are generally absent over most of the high bog surface. In marginal areas, such as to the north of the site, the bog vegetation is drier due to more intensive drainage effects and there is much invasion by pine (especially *Pinus contorta*) (Conaghan, 2003).

5. Changes in Overall Vegetation/Habitat Cover
Much of the site is now cleared of conifers and brash. The brash which remained after clear-felling was wind-rowed to allow bog vegetation to re-colonise exposed peat surface. The forestry drains were blocked with peat dams. The encroaching pine on the high bog was felled-to -waste and the open drains were blocked with plastic dams.

6. Vegetation Monitoring Quadrats
The vegetation changes which have taken place within the site over the period of the restoration project are shown by means of observed changes in permanent quadrats. Seven permanent quadrats were installed on this site, which were described and photographed to monitor changes in vegetation over time. In order to ensure the future position of quadrats the corners have been marked with short stakes and an 8-figure GPS reading was also recorded. Each 10m x10m quadrat, was photographed annually and vegetation tables are presented below.
Carn Park Quadrat 1: This quadrat is located at the northern margin of a failed plantation on the south-east margin of the high bog. Ling Heather, Hare's-tail Cottongrass

and *Sphagnum* moss dominate the open groundflora. With the felling of conifers, raised bog vegetation will recover and active raised bog habitat may be established if water-levels remain high.

Carn Park Quadrat 1

Area: 10 x 10m **Location:** 10m East W3 **Grid Ref:** IN1176 4130 **Altitude:** 69m
Bog Type: High Bog **Ecotope:** NA **Slope:** Slight **Aspect:** South
Landuse: Forestry **Management:** Fell to Waste

Date	**19/07/2005**	**19/07/2006**	**15/08/2007**	**23/07/2008**
Firmness	Soft	Soft	Soft	V. Soft
Drains	Yes	Yes	Yes	Yes
Canopy Cover %	30	0	0	0
Canopy Height	2m	0	0	0
Vegetation Cover %	100	100	80	80
Vegetation Height (cm)	20	40	50	50
Dwarf Shrub Cover %	60	70	45	45
Herb Cover %	37	15	30	35
Bryophyte Cover %	50	60	30	50
Sphagnum cover %	50	50	25	35
Open Water %	0	0	0	0
Brash cover %	0	15	20	15
Pine Needle cover %	0	0	0	5
Pine Needle Depth cm	0	0	0	1
Bare Peat %	0	0	0	0
Species number	**12**	**13**	**15**	**16**
Pinus contorta	30	0	1	0
Rhododendron ponticum		1	1	1
Molinia caerulea			5	5
Vaccinium myrtilus				5
Calluna vulgaris	*50*	65	40	35
Erica tetralix	*10*	5	5	5
Trichophorum caespitosum		1	1	
Eriophorium vaginatum	*30*	10	20	15
E. angustifolium			1	5
Andromeda polifolia	*5*	2		5
Drosera rotundifolia	*1*	1	2	2
Vaccinium oxxycoccos	*1*		2	2
Cladonia portentosa	*40*	20	20	20
C. uncilais	1			
C. pixidata	1			
Hypnum jutlandicum		10	5	10
Polytricum commune			5	5
S. auriculatum		30		
S. capillifolium	40	30	20	15
S. papillosum				
S. tenellum				
S. subnitens	10	15	5	15
S. magellanicum		5	5	5

Carn Park Q1, 2006

Carn Park Q1, 2008

Carn Park Quadrat 2 is located under closed canopy conifer plantation to the south-east of the high bog. The groundflora is sparse with some *Hypnum* moss and is mainly dominated by pine needles. With the felling to waste of conifers, bog vegetation of Ling Heather and Crossed-leaved Heath is becoming established. Over time if conditions remain wet, *Sphagnum* moss will also recolonise.

Carn Park Quadrat 2

Area: 10 x 10m **Location:** 30m West W3 **Grid Ref:** IN1170 4133 **Altitude:** 64m
Bog Type: High Bog **Ecotope:** NA **Slope:** Slight **Aspect:** South
Landuse: Forestry **Management:** Fell to Waste

Date	**19/07/2005**	**19/07/2006**	**15/08/2007**	**23/07/2008**
Firmness	Firm	Firm	Firm	Firm
Drains	Yes	Yes	Yes	Yes
Canopy Cover %	90	0	0	0
Vegetation Cover %	17	30	25	30
Vegetation Height (cm)	10	10	5	10
Dwarf Shrub Cover %	0	6	10	15
Herb Cover %	1	0	10	15
Bryophyte Cover %	11	25	25	35
Sphagnum cover %	1	15	15	15
Brash cover %	0	75	75	60
Pine Needle cover %	90	20	20	10
Pine Needle Depth cm	5	5	5	5
Species number	**5**	**10**	**14**	**20**
Pinus contorta	90	1	5	10
Quercus spp		1	1	1
Rubus spp			1	1
Molinia caerulea				1
***Pteridium* spp**				1
Epiolobium spp				1
Vaccinium myrtilus		5	5	2
Calluna vulgaris		1	5	10
Erica tetralix			5	3
Eriophorium vaginatum	1		2	1
E. angustifolium				1
Vaccinium oxycoccos				1
Cladonia portentosa	5	5	10	10
Campylopus atroverins			1	5
Hypnum jutlandicum	10	10	10	10
Polytricum commune				5
Sphagnum recurvum	1	3	3	
S. capillifolium		5	5	5
S. subnitens		5	2	5
S. magellanicum		2	5	3
S. pulcrum				2

Carn Park Q2, 2006

Carn Park Q2, 2008

Carn Park Quadrat 3 is located on closed canopy conifer plantation to the south-west of the high bog. The groundflora consisted of Bramble and Willow-herb with abundant *Hypnum* moss. With the clear-felling of conifers and blocking of drains Bramble and Willow-herb cover increased, but Ling Heather and *Sphagnum* moss also became established. Over time if water-levels remain high raised bog vegetation will occur.

Carn Park Quadrat 3

Area: 10 x 10m **Location:** 20m East W12 **Grid Ref:** IN0190 4156 **Altitude:** 54m
Bog Type: High Bog **Ecotope:** NA **Slope:** Slight **Aspect:** South
Landuse: Forestry **Management:** Clearfell

Date	**11/08/2005**	**19/07/2006**	**15/08/2007**	**23/07/2008**
Firmness	Dry	V Dry	Soft	Soft
Drains	Yes	Yes/blocked	Yes/Blocked	Yes/Blocked
Canopy Cover %	70%	0	0	0
Canopy Height		0	0	0
Vegetation Cover %	80%	50	60	60
Vegetation Height (cm)		5	50	50
Dwarf Shrub Cover %	0%	1	20	25
Herb Cover %	15%	6	20	35
Bryophyte Cover %	80%	45	50	60
Sphagnum cover %	1%	0	0	15
Open Water %	0%	0	5	0
Brash cover %	20%	30	30	20
Pine Needle cover %	10%	15	10	5
Pine Needle Depth cm	5	5	5	5
Bare Peat %	0%	0	5	5
Species number	**9**	**8**	**13**	**16**
Pinus contorta	70%	1	1	1
Betula pubescens			1	1
Rubus spp	5%	1	5	10
Holcus lanatus		1		
***Agrostis* spp**		1		1
***Pteridium* spp**		1	1	1
Epiolobium spp	5%		10	20
Vaccinium myrtilus				1
Myrica gale				
Calluna vulgaris		2	15	20
Erica tetralix			5	5
Carex panicea			1	
Eriophorium vaginatum			1	2
E. angustifolium				1
Campylopus atroverins	2%		5	10
C. introflexus				
Hypnum cupressiforme	10%			
Hypnum jutlandicum	60%	45	40	30
Polytricum commune	7%		5	5
Sphagnum recurvum	1%			5
S. capillifolium				
S. subnitens				10
S. magellanicum				

Carn Park Quadrat 3, 2006

Carn Park Quadrat 3, 2008

Carn Park Quadrat 4 is located in a young conifer plantation on cutover bog to the north-east of the site. The groundflora is dominated by Ling Heather with abundant *Hypnum* moss. With the felling to waste of conifers and blocking of drains, wet birch woodland with a groundflora of raised bog vegetation will become established on this bog margin.

Carn Park Quadrat 4

Area: 10 x 10m **Location:** 150m North W9 **Grid Ref:** IN1232 4149 **Altitude:** 60m
Bog Type: Cutover **Ecotope:** NA **Slope:** Slight **Aspect:** East
Landuse: Forestry **Management:** Fell to Waste

Date	**11/08/2005**	**20/07/2006**	**15/08/2007**	**23/07/2008**
Firmness	Firm	V Dry	Firm	Firm
Drains	Yes	Yes/blocked	Yes/blocked	Yes/blocked
Canopy Cover %	35%	10	10	10
Canopy Height	2	0.5	1	2
Vegetation Cover %	90%	90	75	80
Vegetation Height (cm)	100	50	80	50
Dwarf Shrub Cover %	80%	50	70	65
Herb Cover %	8%	5	5	15
Bryophyte Cover %	70%	45	55	45
Sphagnum cover %	10%	5	10	5
Open Water %	0%	0	5	5
Brash cover %	5%	40	20	10
Pine Needle cover %	0%	0	5	5
Pine Needle Depth cm	0	0	1	1
Bare Peat %	5%	10	0	5
Species number	**13**	**10**	**14**	**12**
Pinus contorta	30%	2	2	5
Betula pubescens	5%	7	7	15
Sorbus	1%	1	1	1
Rhododendron ponticum	1%	1	1	1
Rubus spp				1
Molinia caerulea		1	1	
***Pteridium* spp**	5	2	1	1
Epiolobium spp	1%	1	2	2
Vaccinium myrtilus	5%	10	10	10
Calluna vulgaris	74	40	60	60
Erica tetralix	1			
Rhyncospora alba	2			
Pleurosium purpurea		1		
Cladonia portentosa	1		5	5
Hypnum cupressiforme	10%		5	
Hypnum jutlandicum	50%	40	40	40
Sphagnum recurvum	10%	5	5	5
S. magellanicum			5	

Carn Park Quadrat 4, 2005

Carn Park Quadrat 4, 2008

Carn Park Quadrat 5 is located on open high bog to the east of the raised bog. The vegetation is dominated by raised bog habitat of Ling Heather, Cross-leaved Heath, Hare's-tail Cotton-grass and Carnation Sedge with abundant *Sphagnum* moss. With the restoration measures on adjacent plantations, this raised bog habitat will be protected from further water-loss and over time may regenerate into active raised bog.

Carn Park Quadrat 5

Area: 10 x 10m **Location:** 50m West W10 **Grid Ref:** IN1062 4147 **Altitude:** 68m
Bog Type: High Bog **Ecotope:** Sub-marginal **Slope:** Slight **Aspect:** East
Landuse: Unplanted **Management:** Non-intervention **Drains:** No

Date	11/08/2005	20/07/2006	15/08/2007	23/07/2008
Grid Ref	IN1206 4147	IN1206 4147	IN1206 4147	IN 1206 4147
Firmness	Very soft	Soft	Very soft	Very soft
Canopy Cover %	0%	0	0	0
Vegetation Cover %	100%	100	100	100
Vegetation Height (cm)		30	20	30
Dwarf Shrub Cover %	40%	45	40	40
Herb Cover %	60%	55	55	60
Bryophyte Cover %	57%	50	55	45
Sphagnum cover %	57%	50	50	45
Open Water %	0%	0	0	0
Bare Peat %		0	0	0
Species number	**15**	**13**	**14**	**15**
Pinus contorta		1		
Molinia caerulea				1
Calluna vulgaris	30	30	30	30
Erica tetralix	10	15	10	10
Narthecium ossifragum	10	5	5	5
Carex panicea	10	10	10	10
Trichophorum caespitosum	5	5	5	5
Eriophorium vaginatum	30	30	35	30
Rhyncospora alba				1
Andromeda polifolia	2	2	1	1
Drosera rotundifolia	5	3	1	5
Cladonia portentosa	30	30	30	30
C. uncilais	5			
Hypnum jutlandicum			5	
S. capillifolium	40	20	10	15
S. subnitens	10	10	10	10
S. magellanicum		10	15	15
S. fuscum	2	10	10	5

Carn Park Quadrat 5, 2005

Carn Park Quadrat 5, 2008

Carn Park Quadrat 6 is located on open high bog to the north of the raised bog. The vegetation is dominated by raised bog habitat of Ling Heather, Bog Asphodel, Hare's-tail Cotton-grass and Carnation Sedge with *Sphagnum* moss. With the restoration measures on adjacent plantations, this raised bog habitat will be protected from further water-loss and over time may regenerate into active raised bog.

Carn Park Quadrat 6

Area: 10 x 10m **Location:** 80m West W7 **Grid Ref:** IN1170 4170 **Altitude:** 61m
Bog Type: High Bog **Ecotope:** Sub-marginal **Slope:** Slight **Aspect:** North
Landuse: Unplanted **Management:** Non-intervention **Drains:** No

Date	**11/08/2005**	**20/07/2006**	**15/08/2007**	**23/07/2008**
Firmness	Soft	Dry	Soft	Soft
Canopy Cover %	0	0	0	0
Canopy Height	0	0	0	0
Vegetation Cover %	100%	95	100	100
Vegetation Height (cm)	30	30	30	30
Dwarf Shrub Cover %	30%	40	40	40
Herb Cover %	70%	55	60	60
Bryophyte Cover %	30%	30	35	40
Sphagnum cover %	20%	20	30	30
Open Water %	0%	0	0	0
Bare Peat %	0%	5	0	0
Species number	**12**	**12**	**15**	**14**
Pinus contorta			1	
Vaccinium myrtilus			10	
Calluna vulgaris	25%	30	30	30
Erica tetralix	5%	10		10
Narthecium ossifragum	50%	40	40	35
Carex panicea	5%	10	5	5
Trichophorum caespitosum	5%	2	5	5
Eriophorium vaginatum	10%	3	5	10
Rhyncospora alba				2
Andromeda polifolia	1%		1	
Drosera rotundifolia	1%	1	1	3
Cladonia portentosa	10%	20	20	20
C. introflexus			5	10
S. capillifolium	15%	10	10	15
S. papillosum				1
S. subnitens	5%	5	5	10
S. magellanicum		5	5	5

Carn Park Quadrat 6, 2005

Carn Park Quadrat 6, 2008

Carn Park Quadrat 7 is located on quaking high bog to the centre of the raised bog. The vegetation is dominated by raised bog habitat of Ling Heather, Crossed-leaved Heath, Hare's-tail Cotton-grass and Carnation Sedge with abundant *Sphagnum* moss. With the restoration measures on adjacent plantations, this active raised bog habitat will be protected from further water-loss.

Carn Park Quadrat 7

Area: 10 x 10m **Location:** 20m North W11 **Grid Ref:** IN1142 4161 **Altitude:** 68m
Bog Type: High Bog **Ecotope:** Sub-central **Slope:** None **Aspect:** NA
Landuse: Unplanted **Management:** Non-intervention **Drains:** No

Date	**11/08/2005**	**19/07/2006**	**15/08/2007**	**23/07/2008**
Firmness	Very Soft	V Soft	Very Soft	V. Soft/ Quaking
Canopy Cover %	0	0	0	0
Vegetation Cover %	100	99	100	100
Vegetation Height (cm)		20	20	20
Dwarf Shrub Cover %	40	45	40	30
Herb Cover %	50	54	60	70
Bryophyte Cover %	66	60	65	65
Sphagnum cover %	66	60	65	65
Open Water %	0	0	0	0
Brash cover %	0	0	0	0
Pine Needle cover %	0	0	0	0
Bare Peat %	0	1	0	0
Species number	**15**	**18**	**16**	**19**
Calluna vulgaris	30	25	25	20
Erica tetralix	10	20	15	10
Menyanthes trifoliata	5	5	5	5
Narthecium ossifragum	10	5	5	10
Carex panicea	20		10	5
Trichophorum caespitosum		5		
Eriophorium vaginatum	20	15	25	40
E. angustifolium				2
Rhyncospora alba	5	5	10	5
Andromeda polifolia	1	1		1
Drosera rotundifolia	5	2	3	2
Vaccinium oxycoccos			2	1
Cladonia portentosa	10	10	10	20
C. uncilais	5			5
S. capillifolium	50	30	25	20
S. subnitens	10	10	5	10
S. magellanicum		10	20	5
S. imbricatum	5	5	5	10
S. pulcrum		1	5	10
S. fuscum	1	5	5	5

Carn Park Quadrat 7, 2005

Carn Park Quadrat 7, 2008

7. Changes in Water-levels

Prior to restoration, Walrags were installed in the conifer plantation and adjoining open bog, to record any changes in water-levels, due to tree removal and drain blocking. Water-levels were found to be up to **60**cm below the surface under mature conifer plantations, but remained close to the surface on the open bog. With the removal of conifers and drain-blocking, there was a significant rise in the water-table within the project site. Extensive areas of open water were created at the lagg zone to the north and cutover bog to the south and the water-table remains close to the bog surface throughout most of the year.

Raised water-levels on Lagg zone at Carn Park after drain-blocking

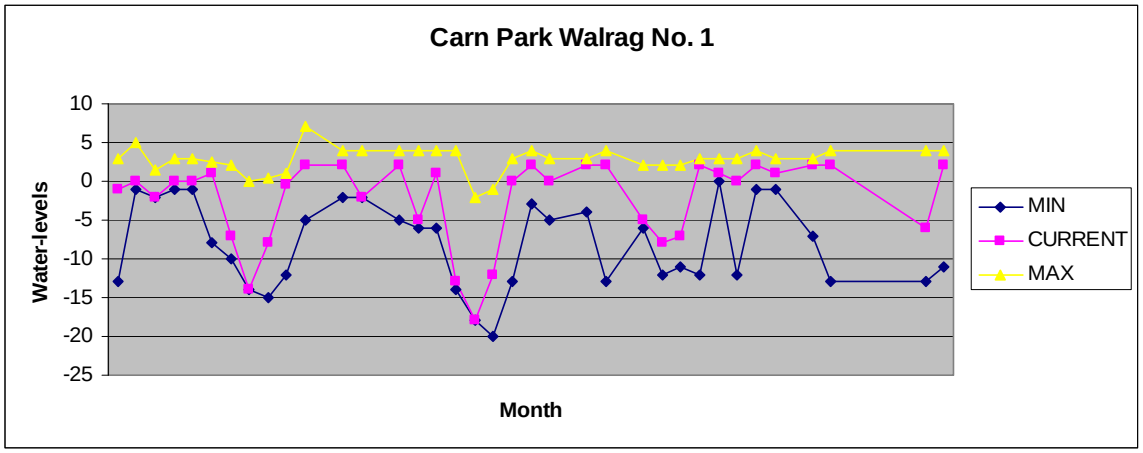
Raised water-levels on cutover bog at Carn Park after drain-blocking

8. Hydrological Monitoring (Walrag) Graphs

During the clear-felling operation, twelve Walrags were installed on this site to record the changes in water-levels. The rise in water-levels is clearly seen in the following graphs.

Carn Park Bog Walrag 1: Open High Bog

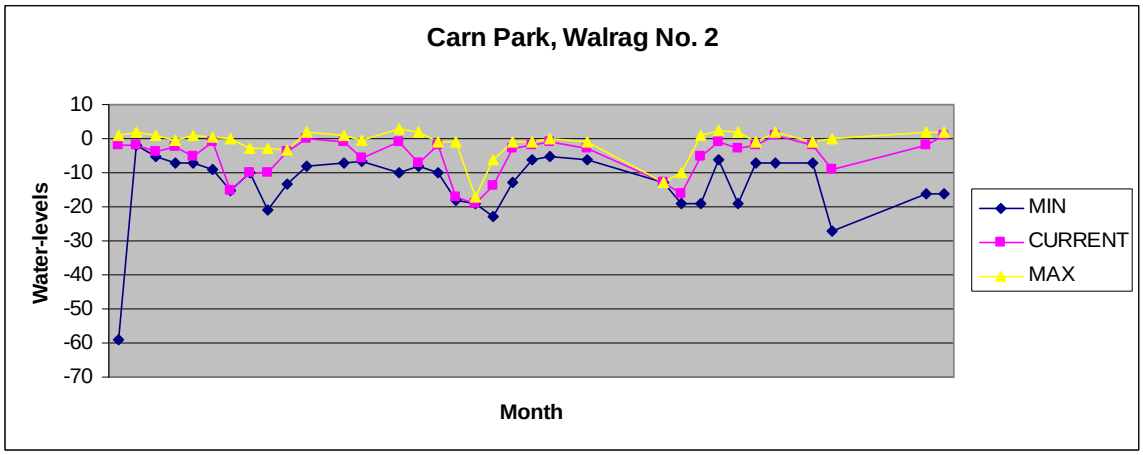
(Water-levels remain within 10cm of bog surface post restoration*, decline n summer months)



May 2005 *** Fell to Waste** May 2006 ***Drain-blocking** May 2007 Aug 2008

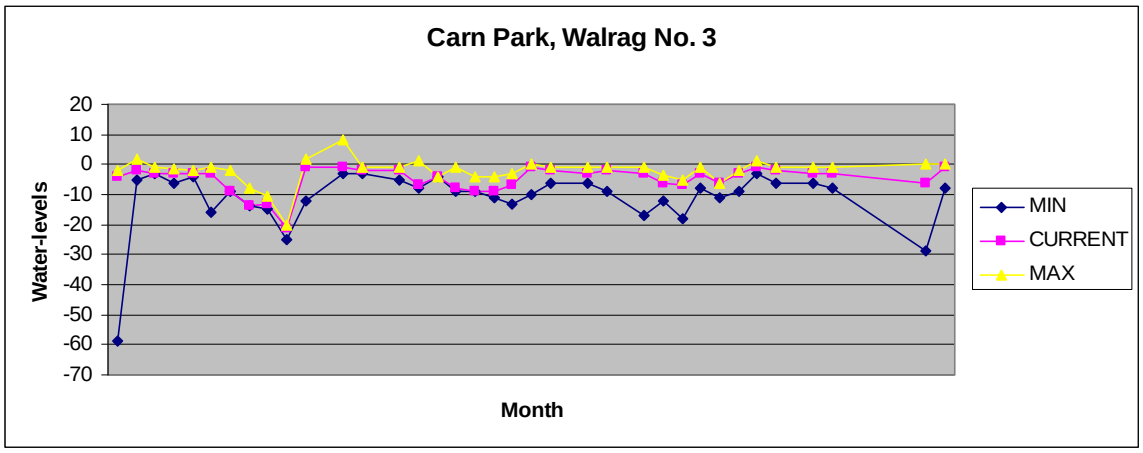
Carn Park Bog Walrag 2: Firebreak Adjacent to Conifer Plantation

(Water-levels remain within 10cm of bog surface post restoration*, decline n summer months)



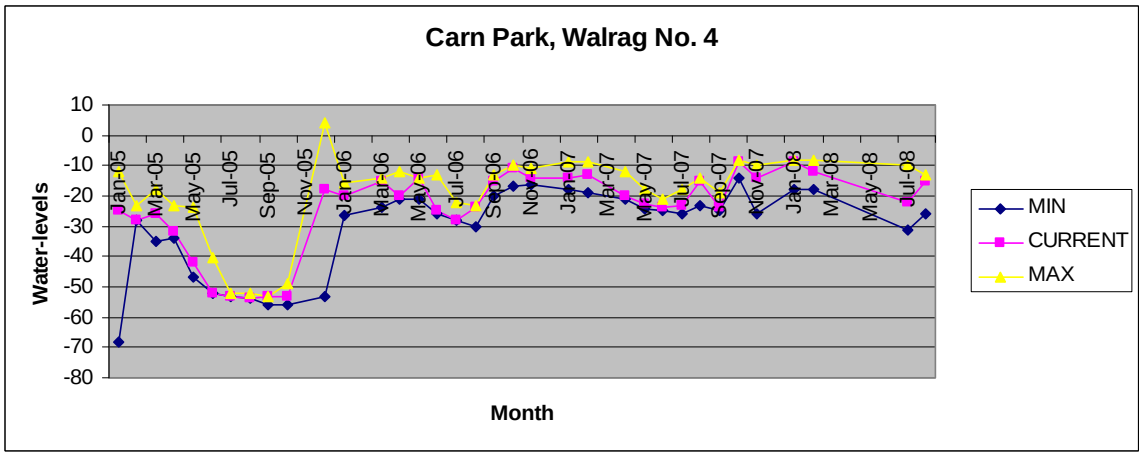
May 2005 *** Fell to Waste** May 2006 ***Drain-blocking** May 2007 Aug 2008

Carn Park Bog Walrag 3: Fell to Waste on High Bog
(Water-levels remain within 10cm of bog surface post restoration*, decline n summer months)



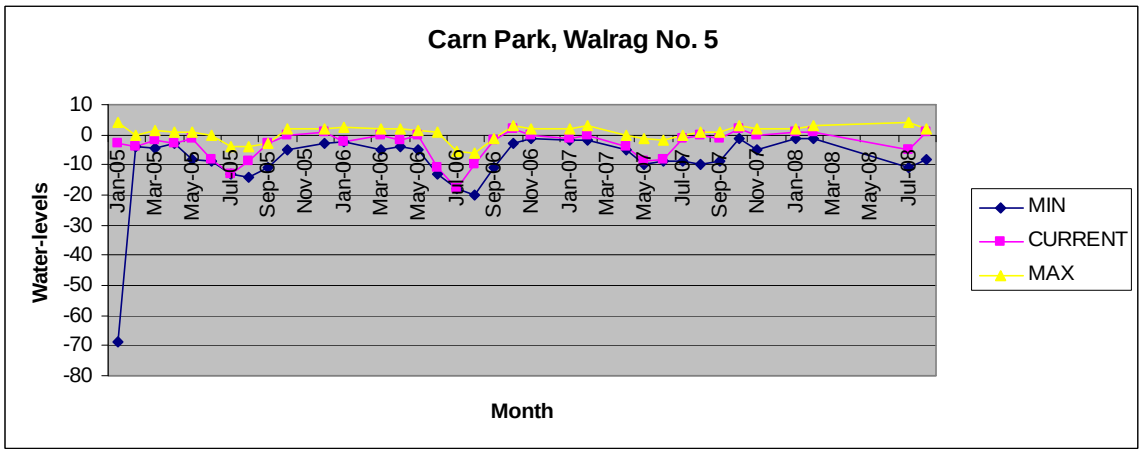
May 2005 *** Fell to Waste** May 2006 ***Drain-blocking** May 2007 Aug 2008

Carn Park Bog Walrag 4: Clearfell Conifer Plantation on High Bog
(Water-levels increase sharply to within 20cm of bog surface post restoration*)



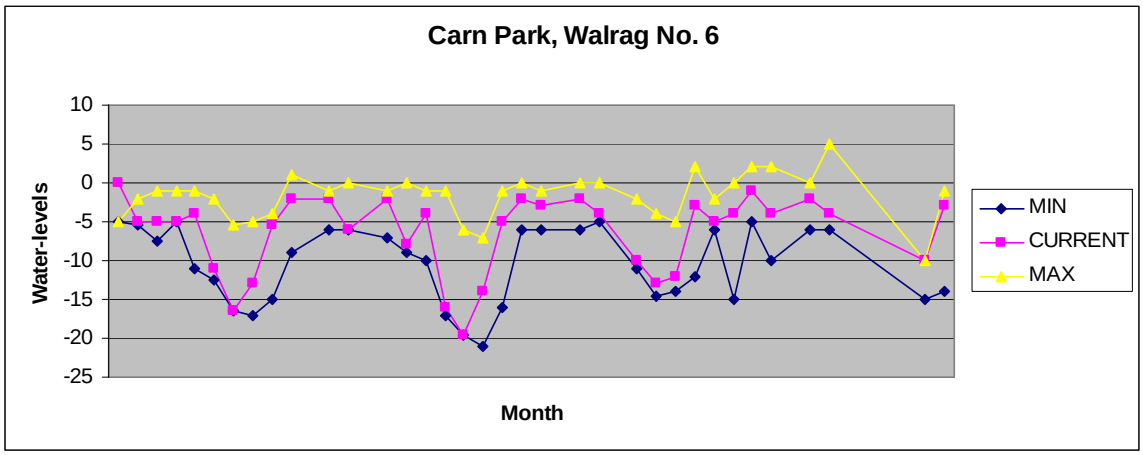
May 2005 *** Fell to Waste** May 2006 ***Drain-blocking** May 2007 Aug 2008

Carn Park Bog Walrag 5: Active Raised Bog
(Water-levels remain within 10cm of bog surface post restoration* on adjacent plantations, slight decline during summer months)



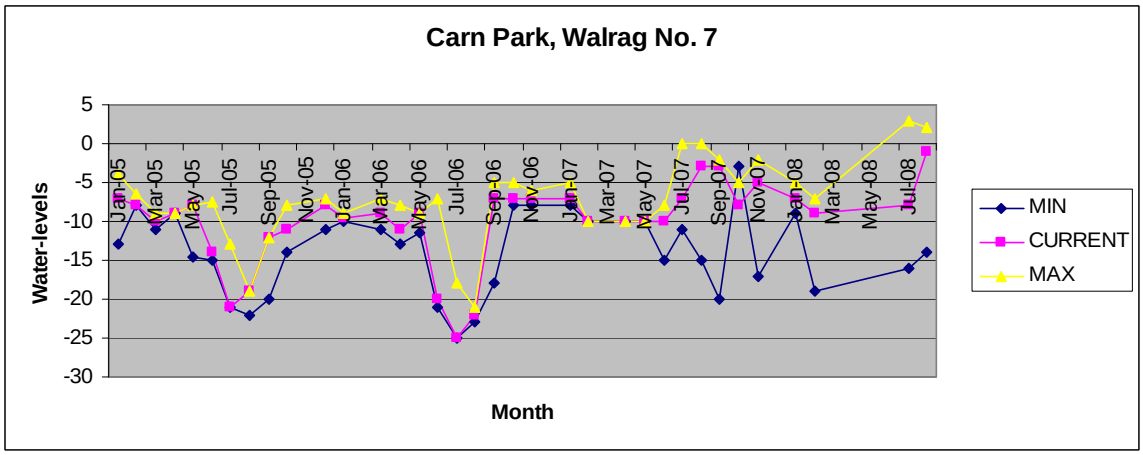
May 2005 *** Fell to Waste** May 2006 ***Drain-blocking** May 2007 Aug 2008

Carn Park Bog Walrag 6: Active High Bog (Water-levels variable, but remain within 10cm of bog surface post restoration* on adjacent plantations. Slight decline during summer months remains)



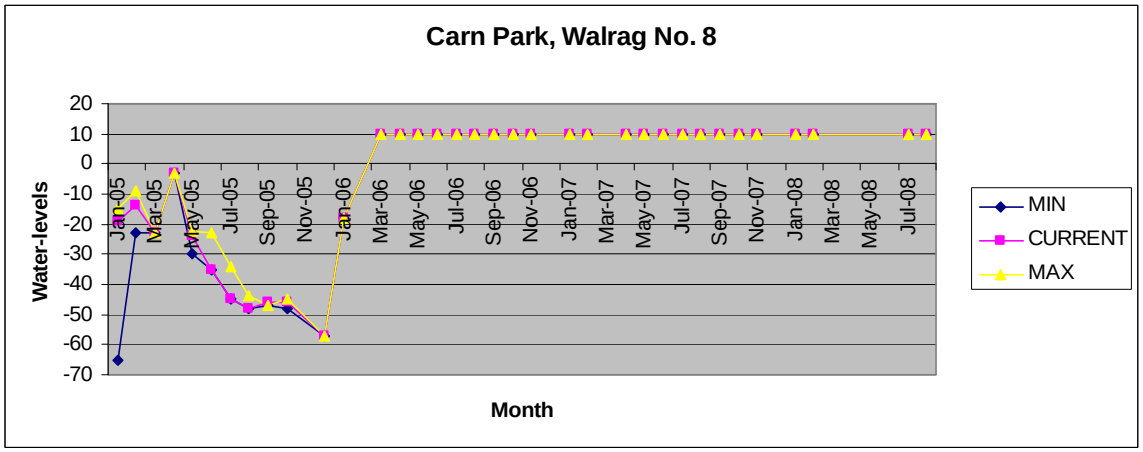
May 2005 *** Fell to Waste** May 2006 ***Drain-blocking** May 2007 Aug 2008

Carn Park Bog Walrag 7: Open High Bog Margin (Water-levels variable, but mainly remain within 10cm of bog surface post restoration* on adjacent plantations. Slight decline during summer months)



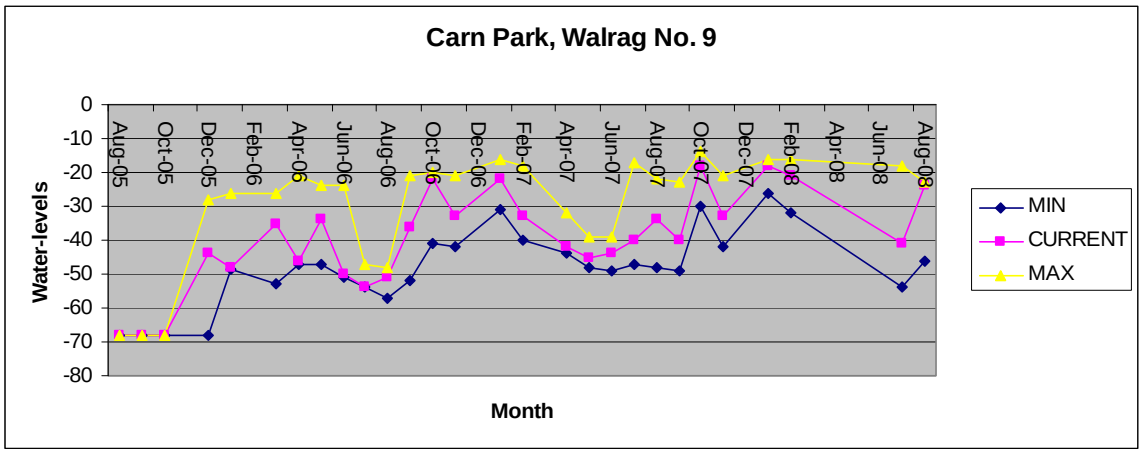
Jan 2005 *** Fell to Waste** May 2006 ***Drain-blocking** May 2007 Jul 2008

Carn Park Bog Walrag 8: Fell to Waste on Cutover Bog (Water-levels have risen sharply to 10cm above the bog surface post restoration*, due to flooding of the Lagg Zone)



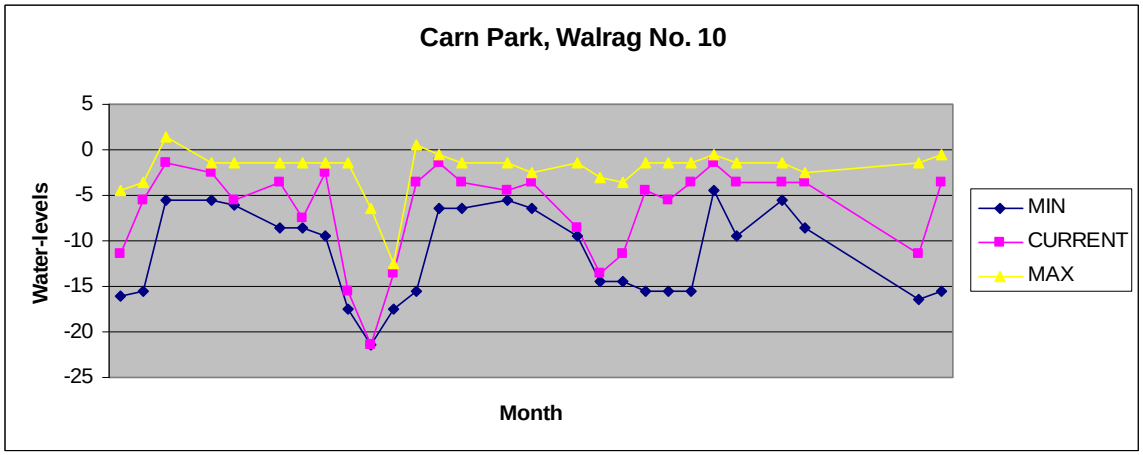
Jan 2005 *** Fell to Waste** May 2006 ***Drain-blocking** May 2007 Jul 2008

Carn Park Bog Walrag 9: Fell to Waste on Cutover Bog
(Water-levels remain below 10cm of bog surface post restoration*, due to shallow peat depth)



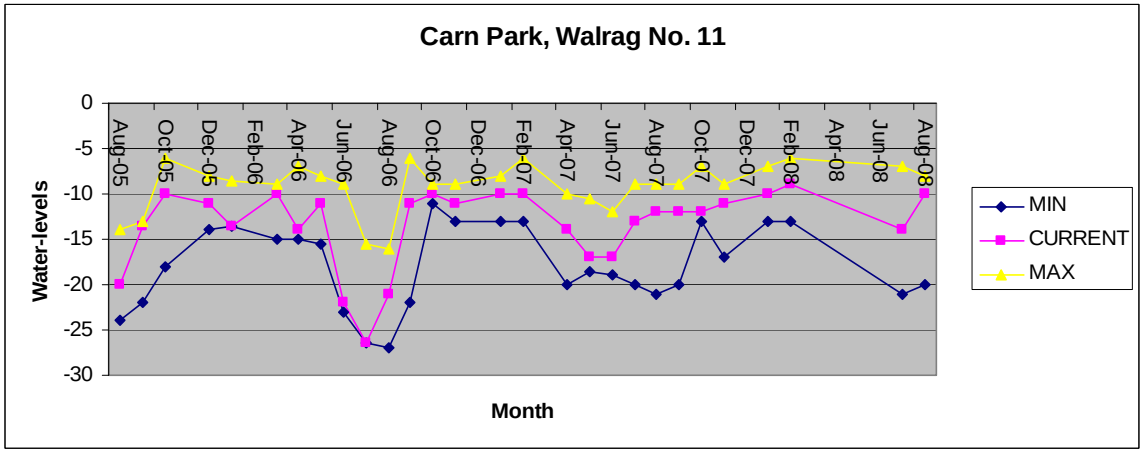
Aug 2005 *** Fell to Waste** Aug 2006 ***Drain-blocking** Aug 2007 Aug 2008

Carn Park Bog Walrag 10: Open High Bog (Water-levels remain with 10cm of bog surface post restoration* on adjacent plantations. Slight decline during summer months)



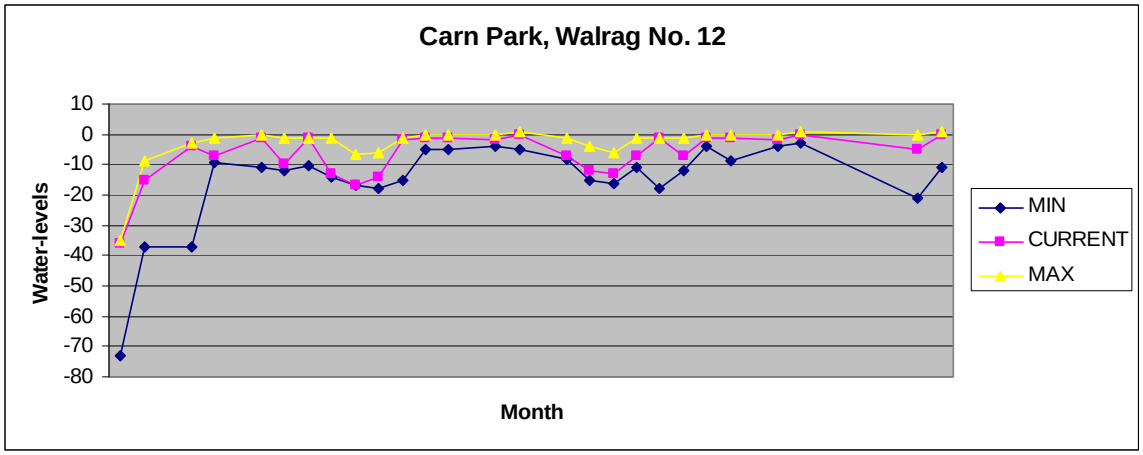
May 2005 *** Fell to Waste** May 2006 ***Drain-blocking** May 2007 Aug 2008

Carn Park Bog Walrag 11: Active Raised Bog (Water-levels have risen to within 10cm of bog surface post restoration*, but decline in summer months remain)



Aug 2005 *** Fell to Waste** Aug 2006 ***Drain-blocking** Aug 2007 Aug 2008

Carn Park Bog Walrag 12: Clear-fell on High Bog (Water-levels have risen to within 10cm of bog surface post restoration*, slight decline in summer months remains)



Sept 2005 *** Fell to Waste** May 2006 ***Drain-blocking** May 2007 Aug 2008

9. Conclusion

This site is ideally suited to being a demonstration site due to the proximity of Athlone town and also the diverse range of habitat types and restoration measures used within the site. The erection of the boardwalk and signage has been welcomed by the local community and adds to its educational potential.

Overall this site has good restoration potential, with extensive areas of active raised bog and water-levels have risen within the plantations. The wet clear-felled conifer plantations on the high bog may develop into active raised bog habitat. The flooded cutover to the north of the bog will develop into lagg zone.

10. References

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Curtis, T.G.F. & McGough, H.N. (1988). *The Irish Red Data Book. 1: Vascular Plants.* The Stationery Office, Dublin.