



Interreg Care-Peat

Deliverable I4.2.1

Jointly Refined Restoration Plan for Cloncrow Bog

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Introduction

General information

Deliverable number	I4.2.1
Deliverable name	Jointly Refined Restoration Plan for Cloncrow Bog
Deadline deliverable	September 2019
Status	Completed
Remarks, changes,...	This final version encompasses changes to the plan related to an unsuccessful land purchase, and consultations and recommendations with project partners and external expertise.

Summary of activities

Information on the pilot sites and restoration plan was transferred by NUI to partner MMU (D.T3.1.1) has been discussed during the partner meeting in September 2019 in a workshop (D.T3.1.2) as part of the open (public) session of the meeting. The restoration plan was further discussed with the partners in January 2020 (telecons) and February 2020 (PCG meeting).

Sub-partner NPWS has gained significant benefits from taking part in this workshop (and also from attending the start conference in June 2019). This has resulted in considering additional measures into the restoration activities at the pilot site. This now adds approximately 4 ha of new works to the project. This report presents the final considerations and plans resulting from these consultations.

Chapter 1: Pilot Site Current Status

1.1: Introduction

The site consists of a raised bog which has developed in a basin. The bog has good hummock/hollow microtopography, pools, quaking areas, a swallow hole, a small flush and forestry on high bog. The cutover supports humid grassland, improved grassland, small areas of Downy Birch (*Betula pubescens*) woodland and scrub, and forestry. The site is designated as a Natural Heritage Area (NHA) which consists of c.200ha. The Care Peat pilot consists of 33ha which will undergo drain blocking (Figure 1).

1.1.1: Position in the Landscape

Cloncrow Bog is situated within the midlands region of Ireland which is the primary area for raised bog formation. Current landuses on the site comprise afforestation on both the high bog and the cutover. Previous turf-cutting in the east of the site has recently ceased entirely. Areas of cutover have been reclaimed for agricultural purposes around the site. The grassland is used for grazing. Damaging activities associated with these landuses include drainage, burning of the high bog as well as drainage within the conifer plantation. These are all activities that have resulted in loss of habitat (Figures 1 & 2).

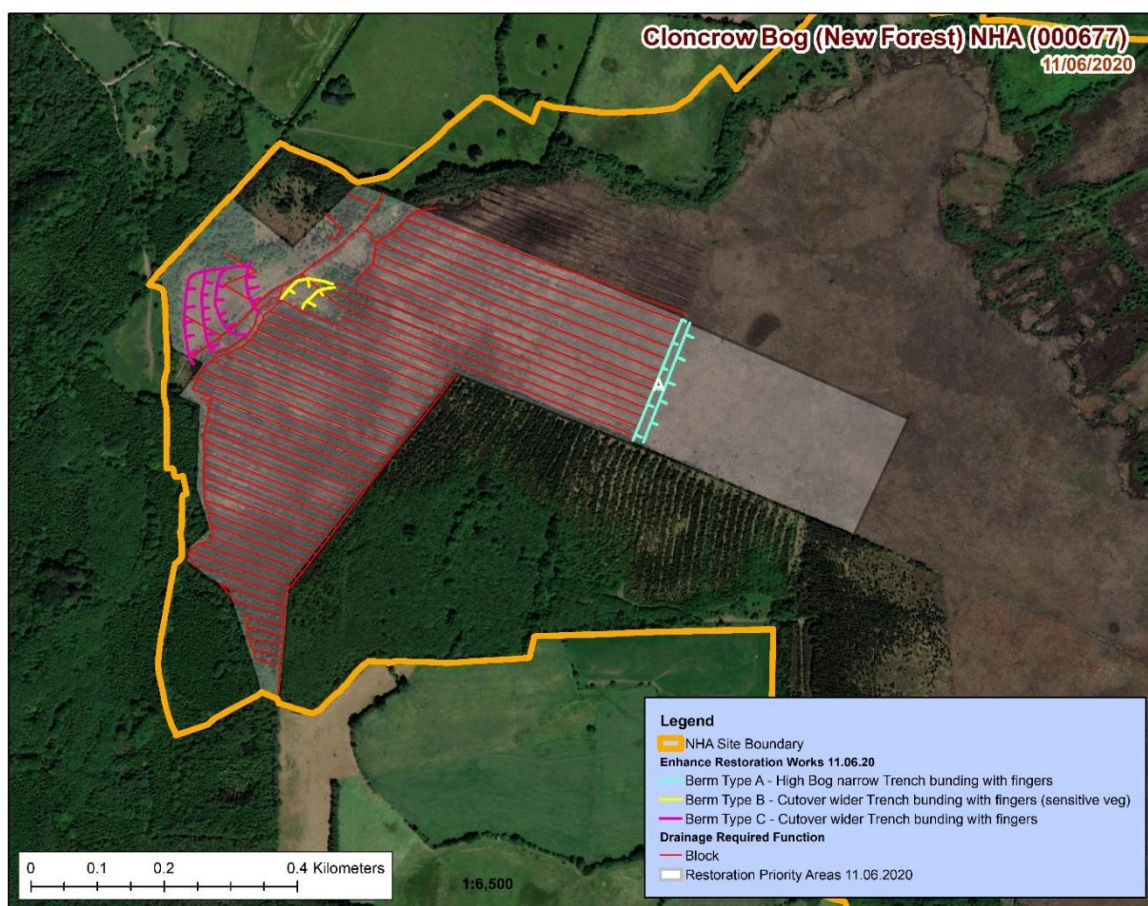


Figure 1 – Cloncrow Bog. Natural Heritage Area boundary (orange), with pilot area (opaque).

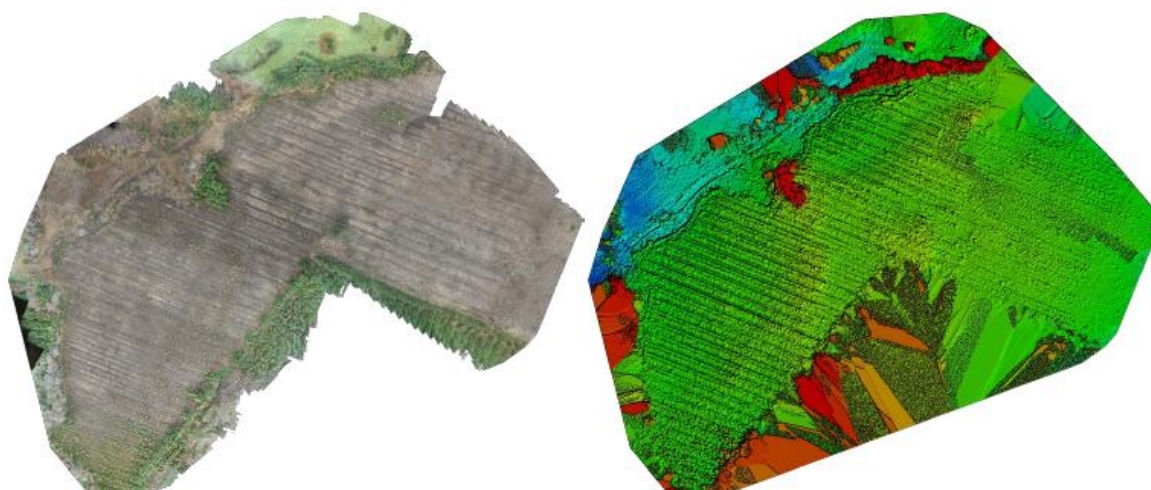


Figure 2 – Orthomosaic (L) and digital surface model (R) of pilot area of Cloncrow Bog

1.1.2: Land Ownership

The NPWS is one of several landowners on the site and are a sub-partner on the project. The state forestry company (Coillte) also owns a portion of the site in the southern end of the NHA, while the remaining sections are comprised of degraded cut over bog in multiple private landownership. An area to the south-east of the site is unregistered and efforts are being made to determine land ownership title. The NPWS has previously been negotiating with landowners for purchase of the lands to the northwest of the site.

1.1.3: Land Management

Management of the site owned by NPWS is managed by them. This involves the development of a restoration plan and ecological surveys to map and monitor the condition and future prospects of the site as required in Article 17 of the Habitats Directive for a Natural Heritage Area.

1.2: Existing Environmental Conditions

1.2.1: Existing Conditions and Impacts

The site is located in the midland regains thus the primary impacts to the site are primarily physical degradation. N deposition from surrounding intensive agricultural activity can cause pollution effects on adjacent bogs but this issue has yet been recorded at Cloncrow Bog.

Current landuses on the site comprise afforestation on both the high bog and the cutover. Former peat-cutting has entirely ceased at the site as a result of its designation as an NHA. Areas of cutover have been reclaimed for agricultural purposes around the site. The grassland is used for grazing. Damaging activities associated with these landuses include drainage and burning of the high bog. The entire high bog was active peat forming and thus supported Active Raised Bog (7110 EU Habitats Directive code) at some stage before cutting and drainage was initiated centuries ago. In addition, all natural lagg zones surrounding the bog have been lost. Currently the presence of Degraded Raised Bog (7120 EU code), which is capable of regeneration to Active Raised Bog, indicate both that the bog is currently degraded and that there is a possibility to restore the conservation condition of the site (i.e. restore Active Raised Bog).

1.2.2: Site Hydrology and Topography

The site is situated in a depression, thus its former topography is a dome shaped raised bog. However this site has unique topographic fluctuations with undulating surface topography (Figure 2).

Significant water loss occurring via the drainage ditches at the site. Thus drain blocking is the most effective aid to rewetting. The site has a very high potential for rewetting.

A LiDAR flight has been provided by a private consultant (Figure 3). Drone flights were flown (Figure 2) in October. Groundwater monitoring is currently being completed along a transect from high bog to cutover bog measuring water level in stilling wells at hourly intervals.

1.2.3: Site Habitat

Much of the high bog has vegetation typical of a Midlands Raised Bog and supports such species as Ling Heather (*Calluna vulgaris*), Common Cottongrass (*Eriophorum angustifolium*), White Beak-sedge (*Rhynchospora alba*), Bog Asphodel (*Narthecium ossifragum*) and a range of bog mosses including *Sphagnum austinii*, *S. pulchrum*, *S. beothuk*, and *S. cuspidatum*. Midland Raised Bog indicator species include Bog-rosemary (*Andromeda polifolia*) and Cranberry (*Vaccinium oxycoccos*).

The northern half of the bog is firm, dry and with very poor hummock/hollow microtopography, while in the southern and eastern sections the bog is wetter and spongy with good hummock/hollow microtopography, pools, inter-connecting pools, quaking areas and a flush. Active Raised Bog (7110) is only currently found on the southern and eastern section of the high bog. Active Raised Bog is characterised by high *Sphagnum* cover (up 90-100% in places) and thus is still forming peat. Here, the pools and hollows are filled with the aquatic bog moss *Sphagnum cuspidatum*, White Beak-sedge, Common Cottongrass and Bog Asphodel. The hummocks are composed of the bog mosses *Sphagnum beothuk*, *S. austinni*, *S. papillosum* and *S. capillifolium*. The tops of the hummocks support Ling Heather, Common Cottongrass, the moss *Hypnum jutlandicum* and lichens (*Cladonia* spp.) The bog moss *Sphagnum pulchrum* has been recorded in the far east of the site. In 2018 An ecological survey has been conducted in 2018 (Figure 4).

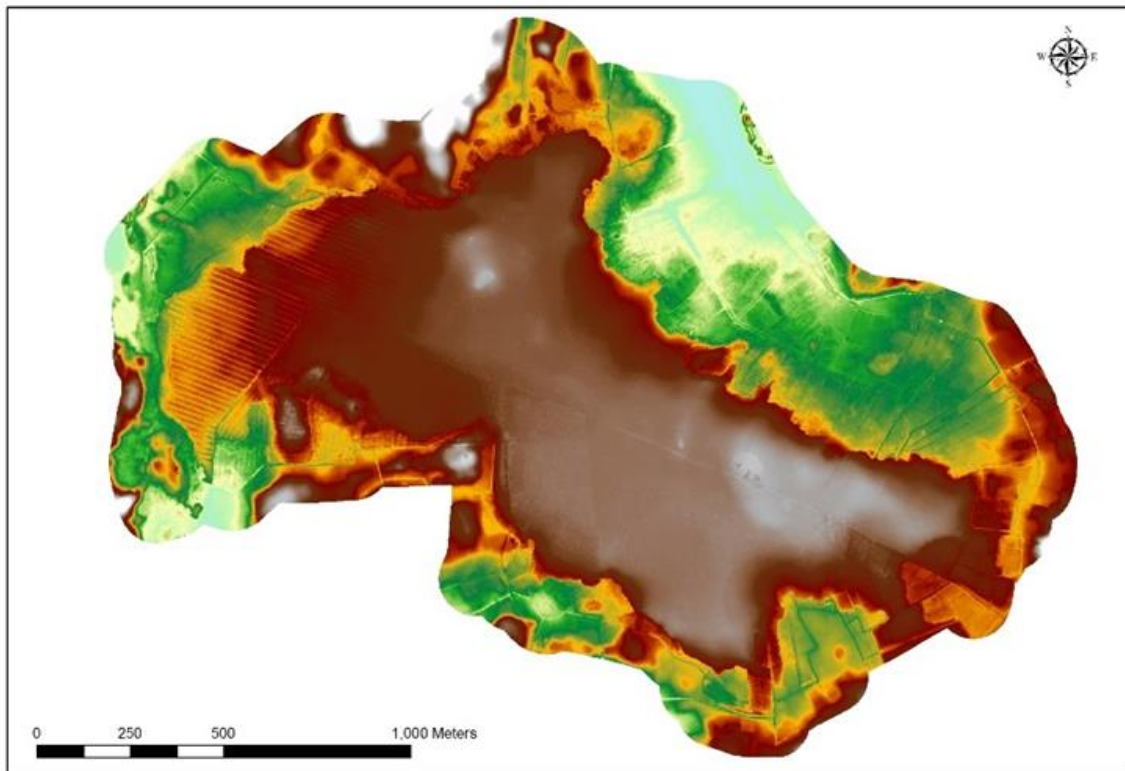


Figure 3 – LiDAR imagery of Cloncrow Bog. (Source RPS Consultants).



Figure 4 – 2018 Ecological Survey of Cloncrow Bog.

The NPWS has completed ecotope surveys as part of Article 17 reporting that is part of a larger Raised Bog Monitoring and Assessment program. Active Raised Bog is divided into community complexes which are characterised by vegetation communities and these complexes are then amalgamated into ecotopes with different physical characteristics using the approach outlined by Kelly and Schouten (2002). Monitoring quadrats have been also recorded. The size of quadrats was 4m x 4m for Active and Degraded Raised Bog and 10m x 10m for Bog Woodland.

Areas of Degraded Raised Bog (Figure 6) are modelled based on LIDAR surveys (Figure 3).

1.2.4: Peat Status

The peat within the project area is relatively intact but has suffered drainage and drying as a result of the ditches. Heather (*C. vulgaris*) has taken over in the drained areas of the bog and sphagnum development is impeded due to the impaired eco-hydrological status of the project area.

At piezometer installations in 2019 we encountered peat depths ranging from 3.35 to 8.4m with the deepest portion at in the undrained high bog area.

Chapter 2: Restoration Plan and Activities

2.1: Restoration Objectives: Stage 1 – Drain Blocking

In the Autumn of 2020 we plan to block the existing drain network (Figure 1) with earthen dams at a ratio of 1 dam for every 10cm rise in elevation. This will be completed by diggers and will result in some exposed areas of bare peat. These will then form experimental areas from which we will use sphagnum transfer from the adjacent raised bog area. Works are estimated to begin in Autumn 2020 to block drains (Figures 1, 5).

Table 1 - Restoration Works, drain blocking and bunding at pilot site.

Dam Type	Dam Length (m)
Length of drains to be blocked with peat dams (metres)	15,107
Berm Type A - High Bog narrow Trench bunding with fingers (m)	497
Berm Type B - Cutover wider Trench bunding with fingers (sensitive veg) (m)	195
Berm Type C - Cutover wider Trench bunding with fingers (m)	792



Figure 5 – Proposed locations of dams for Cloncrow Bog restorations.

2.2: Restoration Objectives: Stage 2 – Vegetation Restoration

In the short term we expect a reduction in *Calluna* species as the water table rises. In the long term we expect typical raised bog vegetation such as Common Cottongrass (*Eriophorum angustifolium*), White Beak-sedge (*Rhynchospora alba*), Bog Asphodel (*Narthecium ossifragum*) and a range of bog mosses (*Sphagnum* spp.). Active Raised Bog (7110) is expected to develop in a medium to long term (> 6 years) within parts of the high bog. Works within the western cutover area are likely to result initially in the establishment of other peat forming habitats (e.g. Poor fen, Transition mires, etc) and the development of Active Raised Bog (7110) over a long period of time (> 30 years). Wet Woodlands are also likely to develop in sections of the cutover.

We will monitor vegetation structure post- restoration works and in bare areas, we plan to perform sphagnum transfer from the high bog to the bare areas with the help of the local citizen action group (ETHOS) and the IPCC another sub-partner on the project. We will monitor vegetation structure post- restoration works and in bare areas, we plan to perform sphagnum transfer from the high bog to the bare areas

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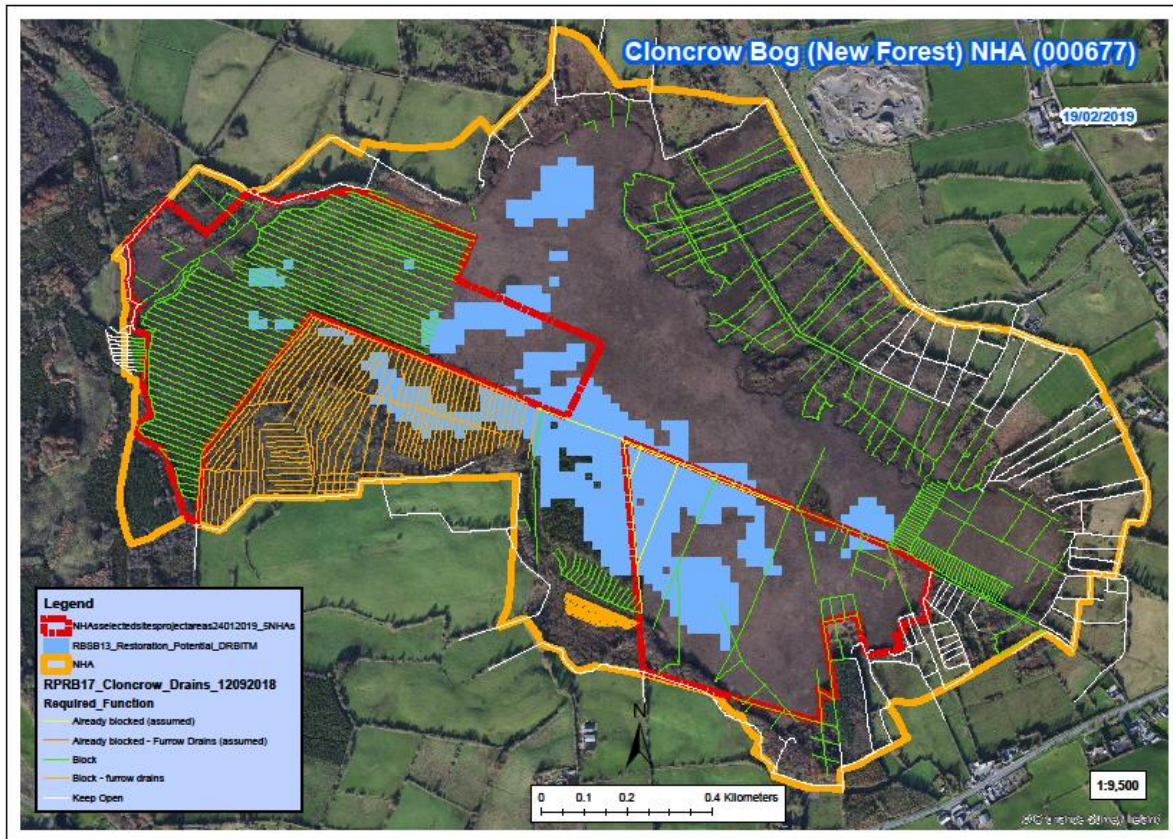


Figure 6 – Restoration Potential. Areas marked in Blue are high probability areas for active bog formation as demarcated by modelling techniques based on LIDAR surveys. NB: This figure shows previous restoration activities, a new version will be provided in a restoration update deliverable.

2.2.1: Restoration Objectives: Site Monitoring

The site is monitored currently (June-October) with three environmental monitoring stations along a gradient from high bog to cutover bog. These stations include soil temperature, soil moisture (both at 10cm) and one unit has PAR and air temperature. We also monitor water level at each of five shallow stilling wells. In November 2019 we installed a flume (to measure water discharge), precipitation recorder in conjunction with air and PAR sensors. We will install two additional stilling wells in the southern section of the pilot in 2020 (Figure 7, 8).

To comply with WPs 1 and 3 and to assist in WP2, we are collecting environmental data to feed into the carbon toolkit (WPT1) and to inform management best practices (WPT3). Table 2 summarises the environmental data collection at the pilot site.

Table 2. Environmental Data collection.

Type	Number	Description	Frequency
Hydrology	7	Piezometer well clusters (one shallow (~2m) and one to bottom of peat (2-8m))	N/A
	7	Water level loggers	1 hour
Temperature	1	Air temperature	15min sample 1hr average
	3	Soil Temperature (10cm)	1 hr
Precipitation	1	Tipping bucket logger	15min sample 1hr average
Moisture	4	Soil moisture sensors (10cm)	1hr intervals
Light	1	PAR sensor	15min sample 1hr average

Cutover detail vegetation surveys will take place in June 2020. These surveys will also include the establishment of monitoring transects both on the high bog and cutover.



Figure 7 – Site monitoring. Locations with green asterisk are piezometer locations. Locations with red circle are yet to be installed. Blue triangle is a flume to monitor surface water discharge. Yellow polygons represent predicted bog forming areas.



Figure 8 – Pilot monitoring equipment installations. Image on left is a flume, installed by the NPWS in Autumn 2019 and image to the right is one of three environmental monitoring stations..