

SHANAKYLE BOG RESTORATION AND HABITAT ENHANCEMENT PROJECT EIP: FINAL REPORT



MAY 2023

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Executive Summary

Shanakyle Bog Restoration and Habitat Enhancement EIP is an agri-environmental project that is funded by the Department of Agriculture, Food and the Marine's (DAFM) locally led EIP scheme under the Rural Development Programme. The project was awarded funding in May 2021 to carry out rewetting and restoration of 30 acres of raised and cutover bog; manage 10 acres of grassland for wildflower meadow creation; create a wildlife pond and stone hibernaculum for smooth newt; install over 30 bird nest boxes for endangered and threatened species for specialist groups; install over 20 bat roost boxes on mature oak treelines and bog woodland; survey, treat and implement an eradication programme for scheduled and high impact invasive species (Rhododendron, Himalayan Balsam and Giant Hogweed); install wildlife signage; and create of a nature trail. Baseline ecological and hydrological surveys were conducted in the summer months of 2021. This included a raised bog ecotope and cutover survey of the peatland habitats; and a multi-disciplinary walkover survey to identify, map and document habitats, flora and fauna. Two reports were prepared to capture these findings; *Habitat Management and Enhancement Programme for a Proposed Peatland Restoration and Habitat Enhancement Project at Shanakyle, Parteen, County Clare and Raised Bog Ecotope*; and *Peatland Restoration: Raised Bog Ecotope and Cutover Habitat Survey of Shanakyle Bog, Co. Clare*. An Appropriate Assessment Screening Report to assess potential effects on European Sites was also prepared. Following baseline surveys, Shanakyle Bog was found to support three Annex I peatland habitats of conservation interest listed on the EU Habitats Directive including 'active raised bog (7110)'; 'degraded raised bogs still capable of natural regeneration (7120)' and 'Depressions on peat substrates of the *Rhynchosporion* (7150)'. In addition, the project area supports five red-listed bird species of conservation concern in Ireland (Barn owl, kestrel, snipe, woodcock and meadow pipit) and seven species of bat (soprano pipistrelle, common pipistrelle, leisler's bat, natterer's bat, whiskered bat and brown long-eared bat).

Shanakyle Bog Restoration Group has hosted several events following completion of the work including a bog walk and talk event during National Heritage Week and won the County Clare Heritage Week Event Award for the event 'Walk & Talk on Shanakyle Bog' awarded by the Heritage Council for this undertaking, with over ninety other events that took place in Clare during National Heritage Week 2022. All project milestones and deliverables were completed within the allocated time and within budget to deliver the first raised bog restoration project in County Clare and the provision of ecosystem goods and services in the locality. This is a flagship project which has set a precedent for nature conservation and peatland restoration in County Clare and nearby County Limerick. The project has inspired several local interest groups who have visited Shanakyle Bog; and have now gone on to embark on their own peatland restoration projects in Counties Offaly, Clare and Galway. The project has also been shortlisted as a finalist in the category 'Best Practice Small Scale Nature Conservation' at the CIEEM (Chartered Institute of Ecology and Environmental Management) awards in the UK.

This report describes the baseline data, the Key Performance Indicators (KPIs) to measure project success, implementation and results, a financial report and project dissemination. The report also describes the financial and ecological benefits of project with an emphasis on ecosystem services and the operational approach taken to setup a company, prepare project initiation documentation and dealing with financial institutions. The report also provides details on lessons learned and how to improve a similar project in the future that could be applied to a similar organisation who wish to embark on a nature conservation project. The project highlights alternative landuse management measures farmers can undertake to enhance their lands for biodiversity. The project has raised awareness both locally and nationally in terms of the biodiversity benefits of peatland rewetting and habitat enhancement to local interest groups. Shanakyle Bog Restoration and Habitat Enhancement EIP has set a precedent to deliver the first raised bog restoration and rewetting project in County Clare.

Section 1 Project Description

Shanakyle Bog Restoration and Habitat Enhancement Project is a locally led European Innovation Partnership (EIP) administered by Shanakyle Bog Restoration Group, which was founded by project leads Catherine Ní Ciardha and Barry O’Loughlin. The project is located near the village of Parteen, County Clare, approximately 5 km north-east of Limerick City (refer to Figure 1.1 and Figure 1.2). The project is funded by the Department of Agriculture, Food and the Marine’s (DAFM) locally led EIP scheme under the Rural Development Programme and involved the restoration and rewetting of 30 acres of raised bog; creation of a wildlife pond; installation of bat roost boxes and bird nest boxes for protected and endangered species; managing 10 acres of grassland for wildflower meadow to link in with the ‘All Ireland Pollinator Plan’; creation of a nature trail; eradication of scheduled invasive species and installation of wildlife signage. The project focuses to promote biodiversity and climate action through collaboration with the local farming community, nature conservation groups, project partners and third level educational institutions. A key objective is to enhance the habitats of Shanakyle Bog and environs for biodiversity. The project was filmed over a year from August 2021 to July 2022 and a short video was produced by a digital marketing company.

The project will provide ecosystem services including climate resilience to enable the peatland system to function as a net carbon sink once more, as opposed to a carbon source. The regenerating Sphagnum mosses will sequester atmospheric carbon back into the underlying peat and also retain carbon stocks deep within the soil profile and reduce carbon dioxide (CO₂) and methane (CH₄) emissions. The rewetting work aims to create a reconfigured wetland habitat which will promote the transition of degraded raised bog vegetation communities to active raised bog (peat forming) in the long-term and the establishment of the EU priority Annex I listed habitat ‘active raised bog (7110)’. The benefits of eradicating scheduled invasive species removes threats and pressures that could otherwise disrupt natural functions and processes of peatland habitats of conservation interest. The blocked drains will improve water quality on a local scale and reduce stormwater run-off from the bog and increase water storage capacity achieved through the installation of peat dams and bunds. The wildflower meadow and the wildlife pond will improve pollinator diversity and density. Pollinators maintain the natural balance of the food chain and promote food security. The project aims to serve as an educational resource for research, local interest groups and the farming community; and provide a wildlife refuge for protected and endangered species of conservation concern.



Figure 1.1: Shanakyle Bog is located near Parteen, Co. Clare and approximately 5 km north-east of Limerick city



Figure 1.2: Shanakyle Bog is approximately 30 ha (over 70 acres) in extent and comprises the habitats; raised bog, cutover bog, bog woodland, scrub and dense bracken.

1.1 Statement of Authority

This report was prepared by Mr Barry O'Loughlin, BSc, MSc, MCIEEM with input provided by Ms Catherine Ní Ciardha, project leads of Shanakyle Bog Restoration and Habitat Enhancement EIP. Shanakyle Bog Restoration Group was founded by the project leads and a project proposal to avail of funding from the locally led EIP scheme under the Rural Development Programme was submitted in March 2021 and subsequently approved in May 2021. The project leads have overseen all aspects of the EIP from project inception to completion.

1.2 Objectives

A key objective of the project involved conducting baseline ecological and hydrological investigations and to implement practical management measures aimed at conserving, managing and enhancing the biodiversity potential of the study area. In addition, the project aims to provide educational and interpretative facilities for the local community and academics from third level institutions.

Baseline desktop and field investigations aimed to provide:

- An appraisal of the habitats, flora and fauna of the project site incorporating desk studies and field studies and evaluating the conservation value of the habitats and species present onsite.
- Consult with key stakeholder groups including statutory and non-statutory environmental organisations, local interest groups, adjoining landowners and the wider community.
- Conduct hydrological modelling and reporting deliverables to inform peatland restoration and rewetting measures (targeted drain blocking).
- Outline key ecological constraints, and propose suitable management measures to rewet peatland habitats and provide habitat enhancement measures for species of ecological interest.
- Identify threats and pressures and prescribe targeted management measures to safeguard habitats of conservation interest.
- Prepare reporting deliverables including a Raised Bog Ecotope and Cutover Habitat Survey report; Habitat Management and Enhancement Programme; and Appropriate Assessment documentation and submit reports to the project sponsor and key stakeholders;
- Commission a consultant to prepare an Invasive Species Management Plan,
- Outline monitoring measures to be implemented throughout all phases of the project

Following collation of baseline data, the project placed an emphasis on the following targeted management and enhancement measures:

- Carry out peatland restoration and rewetting of 30 acres of raised and cutover bog incorporating targeted drain blocking using peat dams and contour bunding) to encourage the colonisation of Sphagnum mosses, active raised bog and improve the condition and habitat quality of degraded raised bog and adjoining cutover bog to serve as a functioning peatland system and carbon sink.
- Create a pond (15 m x 12 m) for wildlife in grassland habitat in the southern section of the project site.
- Manage 10 acres of grassland for wildflower meadow creation to link in with the 'All Ireland Pollinator Plan' to enhance local biodiversity.

- Carry out a dedicated programme of work to treat and eradicate scheduled (invasive species listed on the "Third Schedule" of Regulation 49 of the European Communities (Birds and Natural Habitat) Regulations 2011 (as amended)) and incorporate biosecurity measures.
- Install bat roost boxes and bird nest boxes for endangered and protected species.
- Clear access path of windblown trees and overgrown gorse which will serve as a nature trail to facilitate guided bog walks and talks. Install wildlife signage and lectern.

Section 2 Baseline Data

This section of the report describes the baseline data in relation to habitats, flora and fauna of the project site. Ecological and hydrological investigations were carried out from June to September 2021. The information collated was used to inform peatland rewetting of raised bog habitats and habitat enhancement measures. Two reports; *Peatland Restoration: Raised Bog Ecotope and Cutover Habitat Survey of Shanakyle Bog, County Clare* (O’Loughlin, 2022) and *Habitat Management and Enhancement Programme for a Proposed Peatland Restoration and Habitat Enhancement Project at Shanakyle, Parteen, County Clare* were compiled to provide baseline information on Shanakyle Bog and are available to view from the project website <https://shanakylebogrestoration.ie/>.

2.1 Conservation Status of Raised Bogs

Article 11 of the EU Habitats Directive requires each member state to undertake surveillance of the conservation status of the natural habitats and species in the Annexes and Article 17 of the Directive; and to report to the European Commission every six years on the status and on the implementation of the measures taken under the Directive. Monitoring of conservation status is not restricted to Natura 2000 sites and data needs to be collated both in and outside of the Natura 2000 network to accurately determine conservation status. The most recent EU Habitat Directive Article 17 Conservation Status Assessment Report (NPWS, 2019) assesses the conservation status for the EU Annex I priority habitat ‘active raised bog (active) (7110)’ as ‘bad’ and overall trend as ‘deteriorating’ due to ongoing declines associated with peat extraction and drainage. The overall conservation status of ‘degraded raised bog (7120)’ is assessed as ‘bad’ and overall trend as ‘deteriorating’. ‘*Rhynchosporion* depressions (7150)’ are assessed as ‘bad’ and overall trend as ‘deteriorating’; while ‘Bog Woodland (91D0)’ is assessed as ‘favourable’ and overall trend as ‘stable’ (NPWS, 2019). Shanakyle Bog was not assessed as part of the ‘National Raised Bog SAC Management Plan’ (DCHG, 2017) or ‘Review of Raised Bog Natural Heritage Area Network’ (DAHG, 2014). The bog has no statutory designation for nature conservation.

2.2 Raised Bog Ecotope and Cutover Habitat Survey

In order to inform restoration and rewetting of Shanakyle Bog, a baseline raised bog ecotope and cutover habitat survey was carried out in 2021 which aimed to map, classify and document the different peatland vegetation communities present on the high bog and cutover bog. A report *Peatland Restoration: Raised Bog Ecotope and Cutover Habitat Survey of Shanakyle Bog, County Clare* (O’Loughlin, 2022) was prepared and is available to view from the project website <https://shanakylebogrestoration.ie/>. The raised bog ecotope survey followed methodology developed by Fernandez *et al.*, (2014) and the cutover habitat survey and classification followed methodology developed by Smith & Crowley (2020). The study aimed to identify peat forming vegetation communities on the high bog; and separately the cutover bog. An ecotope supports a particular vegetation community arising from vegetation succession developing under a characteristic hydrological regime (Regan *et al.*, 2013). Vegetation surveys were conducted during summer months of 2021 which is the optimal time of year to carry out habitat surveys when plant species are readily identifiable. The high bog was severely damaged due to historic practices associated with domestic turf cutting and drainage; and the acrotelm (living surface layer of the bog) was stripped over forty to fifty years previous. There are five ecotope categories when assessing vegetation communities on the high bog. The degraded raised bog (DRB) component of the high bog comprises facebank; marginal and sub-marginal ecotope; while active raised bog (ARB) component constitutes two categories; ‘sub-central’ and ‘central’ ecotopes (peat forming ecotope groups where Sphagnum cover is typically >40%). The cutover peatland assessment divided the cutover into four broad categories; ‘High Sphagnum Group’ (HS) (>40% Sphagnum cover); ‘Moderate Sphagnum Group’ (MS) (Sphagnum cover ranging from 11–40%); ‘Low Sphagnum Group’ (LS) (Sphagnum cover 10% or less); and ‘Bare Peat’ (BP)

(habitats with 10% or more cover of bare peat). Vegetation relevés were employed to determine sub-habitat types. Following the classification of cutover Sphagnum group categories, an emphasis was placed on cutover areas that conform to the High Sphagnum Group category (defined by a cover of Sphagnum mosses that is greater than 40%) with a view to identifying linkages with the Annex I habitat ‘active raised bog (7110)’ using positive indicator species employed by Smith & Crowley (2020).

The study found that the high bog remnants did not support any peat forming ARB ecotope community complexes (i.e. sub-central and central ecotopes). Overall, Sphagnum cover was <10% and the high bog continued to be affected by former drainage and peat extraction operations. The high bog has a surface slope in excess of 1%, which was identified as a constraint in terms of rewetting through natural processes (i.e. breakdown in the local drainage network over time). Consequently, the bog has not undergone any form of secondary rewetting and most of the original features of the bog such as hollows, pools, flats and lawns have disappeared or have been severely altered. Therefore, the entire high bog constitutes DRB and accounts for approximately 4.7 ha. The site supports two ecotope community complexes that conform to degraded raised bog; facebank ecotope and marginal ecotope (O’Loughlin, 2022) (refer to Figure 2.1). The bog vegetation has fully colonised on disturbed areas since domestic turf cutting ceased forty years previous; however, the recovery and succession of Sphagnum mosses are not well developed with some drains on the high bog still semi-functional (reduced functional drainage systems). The raised bog ecotope surveys did not detect any peat forming habitats (i.e. sub-central and central ecotope community complexes) which are representative of active raised bog (ARB) habitat. The high bog was found to conform to degraded raised bog and corresponds to the Annex I habitat; ‘degraded raised bogs still capable of natural regeneration (7120)’; however, considered to be capable of natural regeneration of active raised bog subject to targeted intervention measures incorporating rewetting techniques.

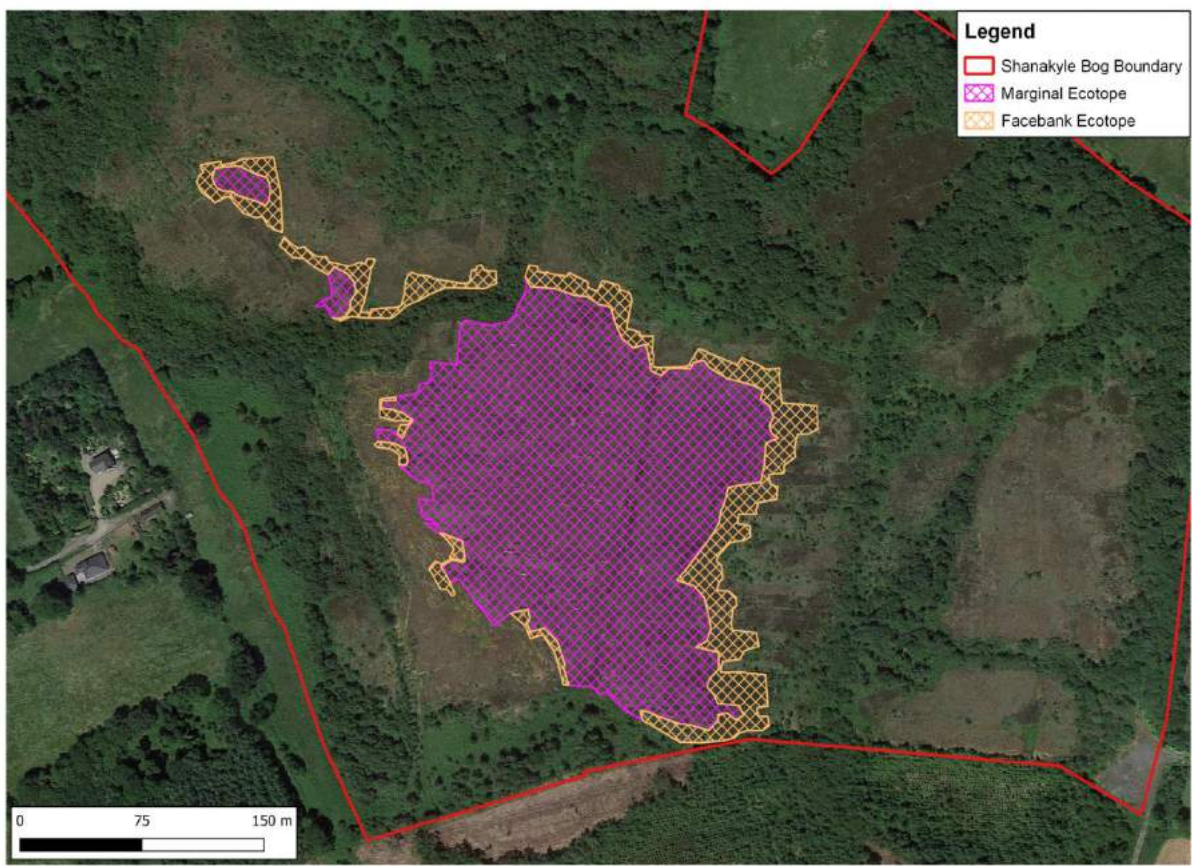


Figure 2.1: Raised bog ecotope map of Shanakyle Bog (high bog) comprising DRB ecotopes.

In terms of the cutover, no areas of bare peat were recorded and all areas had fully colonised with vegetation or in some cases had transitioned from cutover bog to secondary habitat types comprising scrub, bog woodland and dense bracken. largely attributed functional drainage ditches and timescale since domestic peat extraction operations ceased over forty years previous (refer to Figure 2.3). Of the 7.7 ha of cutover bog mapped and surveyed, approximately 2.8 ha is classed within the LS Group category (refer to Figure 2.2). A review of Ordnance Survey Ireland (OSI) historical aerial base maps highlights the rapid succession of birch dominated woodland, scrub and dense bracken on cutover bog over the previous twenty years. The 2000 aerial base map reveals that the total area of cutover bog was estimated to be 16.7 ha. This represents an estimated 9 ha decrease of potential peat forming habitat within a twenty year timeframe. The LS Group category is disappearing to give way to other secondary regenerating habitats. This highlights the requirement for targeted intervention measures to rewet peatlands at the early stages following the cessation of peat extraction operations (O'Loughlin, 2022). The succession and encroachment of *Pteridium aquilinum*, *Betula pubescens* and *Ulex europaeus* was noted in the LS Group habitat types 'Calluna vulgaris cutover bog (LS1)' and 'Molinia caerulea cutover bog (LS3)'. Drainage ditches are still functional and Sphagnum moss cover is <10% (O'Loughlin, 2022). The cutover topography is relatively flat and it is considered that targeted intervention measures to rewet the bog could prevent further drainage of the LS Group category and control any further encroachment of birch woodland, scrub and dense bracken by raising water levels within the bog.

Of the 7.7 ha of cutover bog mapped and surveyed, approximately 2.6 ha is classed within the MS Group category (refer to Figure 2.2). The habitats in this group have generally had sufficient time to develop relatively stable vegetation, and conditions are wet enough for moderate levels of Sphagnum regeneration (Smith & Crowley, 2020). The MS group is especially well represented at the north-western and eastern section of Shanakyle Bog. Drainage ditches have started to infill with Sphagnum mosses and bog vegetation (e.g. *Sphagnum cuspidatum*, *S. papillosum*, *Drosera rotundifolia*, *Eriophorum angustifolium* and *Rhynchospora alba*). Functional drainage ditches have transitioned to reduced functional drainage systems. Hummocks of *Sphagnum rubellum* have since re-established in areas classed within the MS group. It should be noted that scrub (WS1) and dense bracken (HD1) have been recorded along the margins of this Sphagnum group. The scheduled invasive plant species *Rhododendron ponticom* occurs in the north-western section of the cutover albeit with low infestation levels recorded.

Of the 7.7 ha of cutover bog mapped and surveyed, approximately 2.3 ha is classed within the HS Group category (refer to Figure 2.2). This Sphagnum group is especially well represented along the western, north-western and eastern section of Shanakyle Bog complex. The main drain along the western boundary of the bog has been blocked for over forty years, when domestic peat extraction ceased. It is considered that this was blocked where an existing track bisects the western section of the bog; combined with a natural breakdown in the local drainage network over time rendering former functional drains to reduced-functional drainage systems (O'Loughlin, 2022). As a result, water levels were raised along the entire western section of the cutover adjoining the high bog. Consequently, the cutover has undergone secondary rewetting and has developed Sphagnum lawns and hummocks with pools present also. This area comprises favourable topographical conditions (flat surface) for peat formation and water levels are within 10 cm of the bog surface. The cutover also contains positive indicator species characteristic of 'active raised bog (7110)'.

Although the overall size of cutover bog is small in extent (7.7 ha), a figure of 2.3 ha classed within the HS Group category is significant when taking into consideration the geographic range of ARB in County Clare, % of peat forming active raised bog (7110) habitat remaining in Ireland (<1%), carbon sink function and overall size of Shanakyle Bog (30.8 ha). The distribution of HS Groups located in the western, north-western and

eastern section of the cutover reflects the magnitude of vegetation recovery over the previous forty years since domestic peat extraction operations ceased (O’Loughlin, 2022). This has added significance where the number of positive indicator species meets the criteria to conform to the EU Annex I habitat ‘active raised bog (7110)’ (O’Loughlin, 2022). There was some regeneration of *Sphagnum austinii* hummocks on the western and north-western section of the cutover, a high quality indicator species of ARB. Of the 2.3 ha of HS Group identified and mapped, it is estimated that 1.1 ha is considered to correspond to the EU priority listed habitat ‘active raised bog (7110)’ (O’Loughlin, 2022).

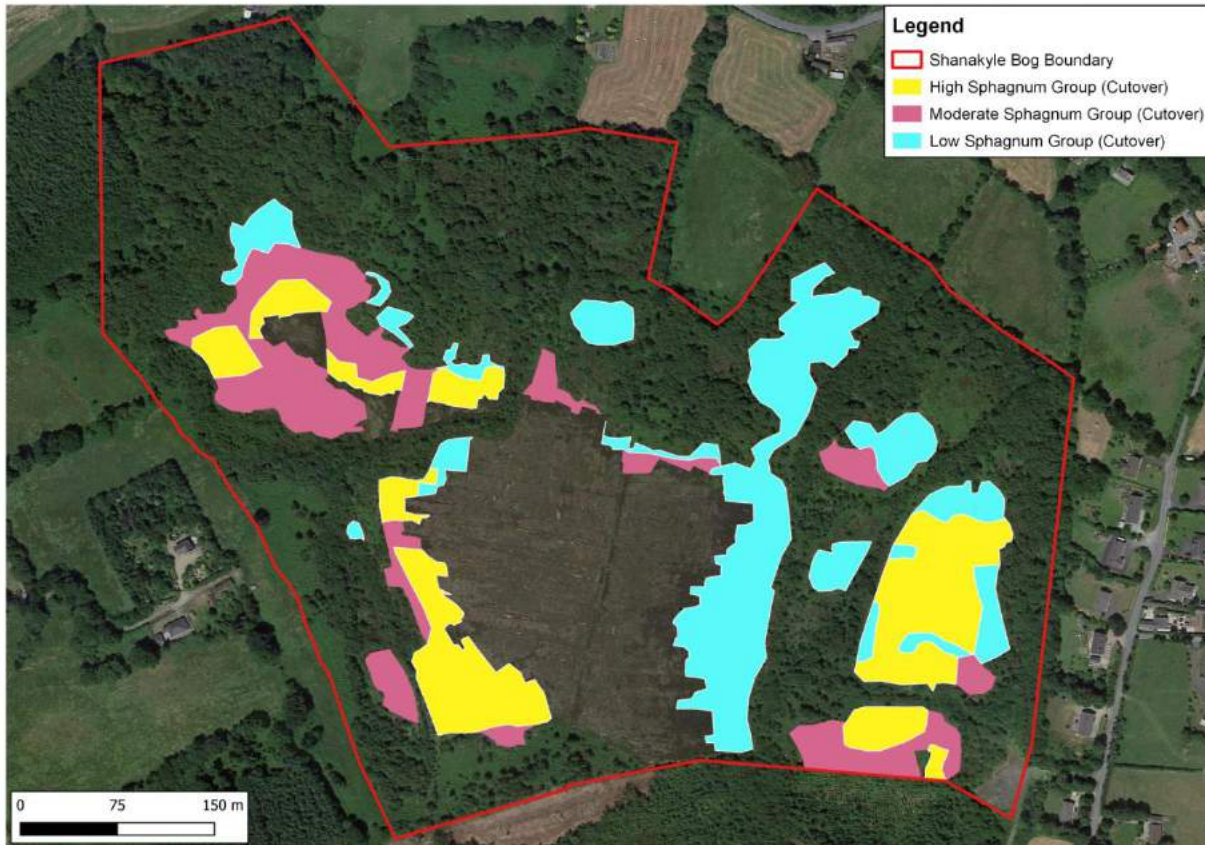


Figure 2.2: Mapped *Sphagnum* Group categories (High, Moderate and Low) on cutover bog.

In contrast, the survey found that a significant proportion of cutover bog (9 ha) has been lost due to pressures associated with drainage and the succession of other habitat types such as bog woodland, scrub and dense bracken at the expense of Low Sphagnum Group categories on the cutover. A review of Ordnance Survey Ireland (OSI) historical aerial base maps reveals that the succession of birch woodland, dense bracken and scrub has accelerated rapidly over a twenty year timeframe (O’Loughlin, 2022). The loss of cutover bog is attributed to functional drainage systems within Low Sphagnum Groups which removes water from the bog; and oxidises and increases the dry matter content of peat (O’Loughlin, 2022). This trend highlights the requirement for peatland restoration planning at the early stages following the cessation of peat extraction operations. Rewetting of peatland habitats was targeted at the western section of Shanakyle Bog initially with 30 acres (12.1 ha) of raised bog earmarked for targeted drain blocking.



Figure 2.3: Habitat map of the entire Shanakyle Bog complex (Fossitt, 2000).

2.3 Rewetting: Hydrological Studies and Project Design

The mapping of High Sphagnum Groups during the summer months of 2021 aimed to highlight sensitive peatland habitats (i.e. regenerating active raised bog (7110) associated with High Sphagnum Groups on cutover) and this information was used to inform project constraints and restoration planning (e.g. machinery access, devising routes, avoiding sensitive ecological habitats). A consultant was commissioned by Shanakyle Bog Restoration Group to carry out a hydrological survey of the bog that consisted of mapping surface drainage features onsite. Consultation was conducted with statutory and non-statutory organisations and adjoining landowners throughout all phases of the project.

A 2 m Digital Surface Model (DTM) derived from Lidar was provided to Shanakyle Bog Restoration Group by Clare County Council’s Heritage Officer. Lidar is used to create high-resolution models of ground elevation. In the case of Shanakyle Bog, it illustrates the relatively steep slopes across the high bog (>1%) (dry conditions) with gentle slopes on the western cutover where Sphagnum is actively growing. Hydrological investigations were carried out in July 2021. The focus of field investigations aimed to refine the mapping of drainage features throughout the site as well as to consider the most appropriate restoration measures. Lidar contours revealed that the high bog has a surface slope in excess of 1%, which was a constraint in terms of rewetting the bog using peat dams alone for ARB development. However, there are several cuttings (cut out depressions) on the bog acrotelm which if banded, could act as topographic depressions enabling suitable hydrological conditions for ARB to establish.

In summary, rewetting of peatland habitats involved the following:

- Blocking of key marginal drains, including heavily infilled drain along the western boundary to support stable and high summer water levels across a wider area of the cutover bog.

- Blocking of drainage features on the high bog with peat dams
- Construction of a series of high bog bunds (shallow bunds 250-300mm high) to rewet sections of the high bog (these include ‘finger bunds’ where the individual bund length exceeds 15m).
- Construction of a series of cutover bunds, with the aim to retaining water at a maximum depth of 200mm on the cutover. Bunds with a finished height of 500-600mm equipped with overflow pipes to regulate water levels.

Methodology for peatland restoration follows Mackin *et al.*, (2017) and McDonagh (1996). A combination of peat dams and peat bunds were installed on 3 ha of high bog. Peat dams were installed within the main drainage channel along the western boundary of the bog to ensure reduced functional drainage systems were managed as non-functional drainage systems and to block preferential flow paths associated with drainage ditches. This work aims to protect and enhance High Sphagnum Groups that regenerated over a forty year period located on the western section of the bog where ‘active raised bog (7110)’ has been confirmed. A network of peat bunds and dams were installed on 9 ha of cutover bog on the north-western and western section of Shanakyle Bog. The bunds are divided into compartments to hold surface water on cutover areas. Overflow pipes were installed on peat bunds to regulate surface water at optimal levels for Sphagnum development. Surface water overflows were diverted through the pipes from one compartment to another in accordance with the fall in slope before discharging towards the main outfall. The project design has taken into consideration seasonal constraints such as fluctuations in the water table during winter and summer months; and constraints in relation to potential disturbance of sensitive peat forming habitats such as active raised bog. Seasonal fluctuations should not exceed 20 cm, and water levels should be within 10 cm of the surface, except for very short periods of time (Kelly & Schouten, 2002). It is expected that the work on the cutover will result in the transformation of Moderate and Low Sphagnum Groups to High Sphagnum Groups in the medium to long-term; and the creation of favourable baseline conditions for active raised bog to establish. Figure 2.4 illustrates the project design and locations of peat dams and bunds in areas of raised bog and cutover bog.

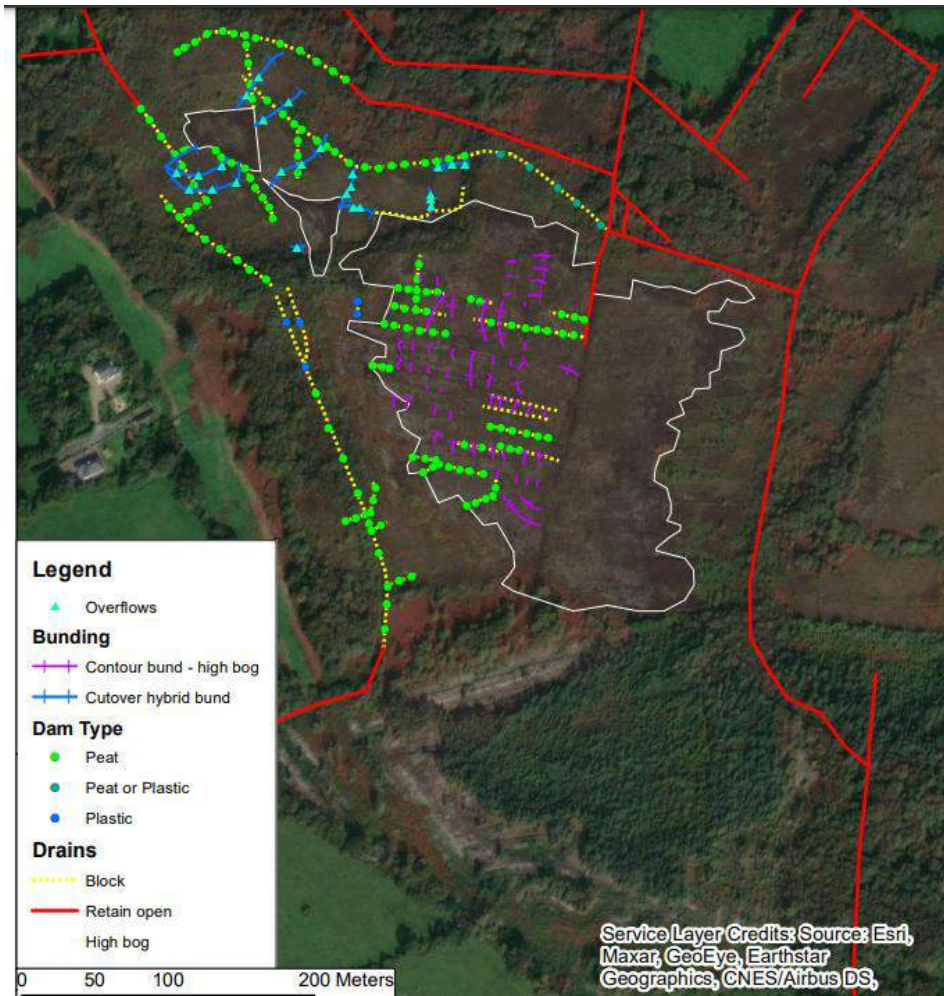


Figure 2.4 Peatland restoration project design for the western side of Shanakyle Bog

2.4 Ecological Baseline Data: Habitats, Flora and Fauna

The primary objective of the Habitat Management and Enhancement Programme report is to document and evaluate the biodiversity of the project site including habitats, flora and fauna; and following collation of baseline information, to provide practical management measures aimed at conserving, managing and enhancing the biodiversity potential of the project site. In addition, the project aims to provide educational and interpretative facilities for the local community and academics from third level institutions (including the nearby University of Limerick). A report *Habitat Management and Enhancement Programme for a Proposed Peatland Restoration and Habitat Enhancement Project at Shanakyle, Parteen, County Clare* (O’Loughlin, 2021) was prepared and is available to view from the project website <https://shanakylebogrestoration.ie/>. For the purposes of the project, the project area is defined as the western section of Shanakyle Bog and adjoining grasslands (refer to Figure 2.5) and is approximately 40 acres (16 ha) in extent.

2.4.1 Habitats and Flora

Habitats were classified in accordance with the Heritage Council’s classification system, *A Guide to Habitats in Ireland* (Fossitt, 2000). Habitats were mapped in accordance with Smith *et al.*, (2011). Field surveys were carried out during the optimal time of year (growing season; April to September 2021) when plant species were identifiable in the field. The surveys took cognisance of protected species, species of conservation concern, invasive species; and the information gained from baseline surveys was used to ascribe a value to habitat features, and to direct restoration and enhancement work to maximise the benefits of the project site for

biodiversity. A habitat map of the project site and area earmarked for restoration and enhancement work is presented in Figure 2.5 and summarised in Table 2.1.

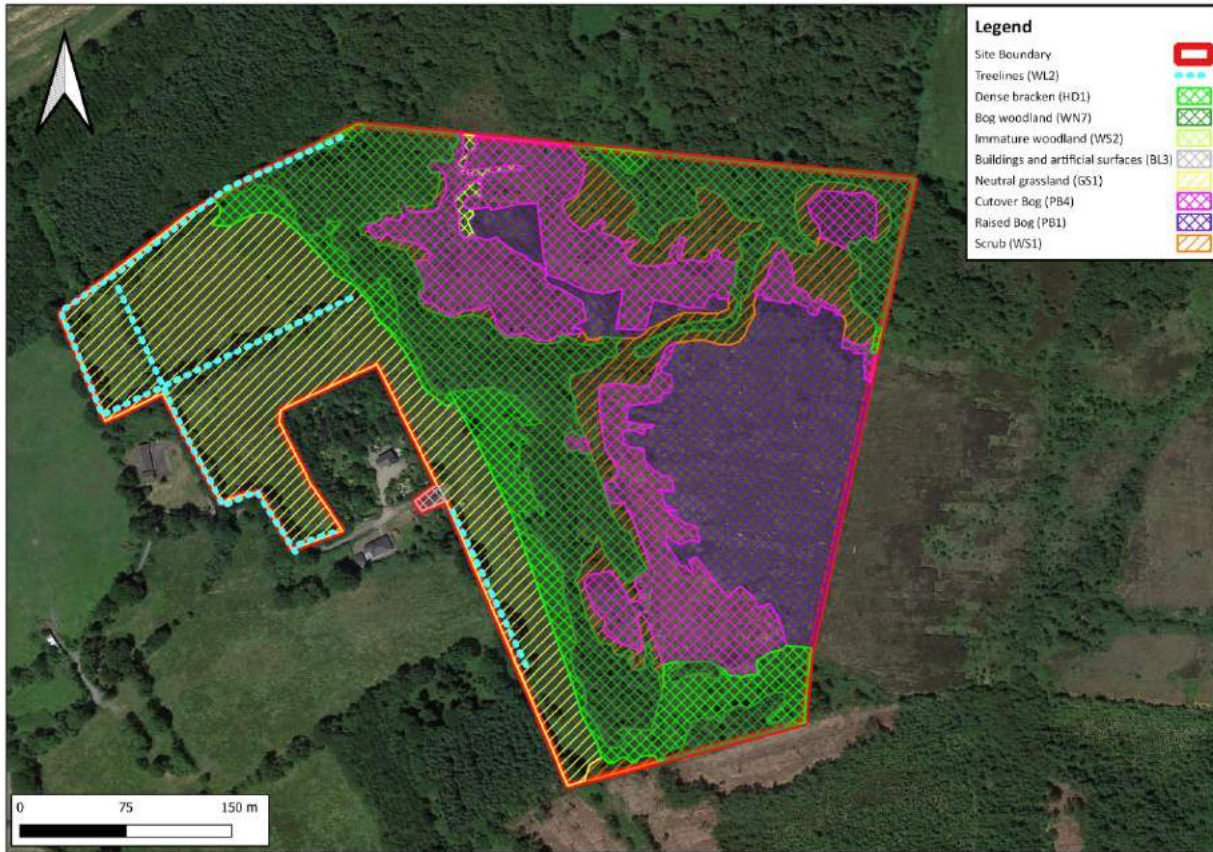


Figure 2.5 Habitat map of the project site.

Table 2.1 Summary of habitats recorded within the project site at Shanakyle, Co. Clare

Category (Fossitt Level 1)	Habitat Category (Fossitt Level 3)	Fossitt Habitat Code	Annex I habitat (EU Habitats Directive) within the Project Site	Evaluation (NRA, 2009)
Peatland	Raised bog	PB1	Degraded raised bogs still capable of natural regeneration (7120)	National importance
	Cutover bog	PB4	Active raised bogs (7110) Depressions on peat substrates of the <i>Rhynchosporion</i> (7150)	International and national importance
Woodland and scrub	Bog woodland	WN7	No linkage to Annex I habitats identified	County Importance
	Immature woodland	WS2	Habitat has no linkage to Annex I habitats	Local Importance (Higher Value)
	Scrub	WS1	No linkage to Annex I habitats identified	Local Importance (Higher Value)
	Treelines	WL2	Habitat has no linkage to Annex I habitats	Local Importance (Higher Value)

Category (Fossitt Level 1)	Habitat Category (Fossitt Level 3)	Fossitt Code	Habitat	Annex I habitat (EU Habitats Directive) within the Project Site	Evaluation (NRA, 2009)
Heath and dense bracken	Dense bracken	HD1		Habitat has no linkage to Annex I habitats	Local Importance (Lower Value)
Grassland	Neutral grassland	GS1		No linkage to Annex I habitats identified	Local Importance (Higher Value)
Watercourses	Drainage Ditches	FW4		Habitat has no linkage to Annex I habitats	Local Importance (Lower Value)
Cultivated and built land	Buildings and artificial surfaces	BL3		Habitat has no linkage to Annex I habitats	Local Importance (Higher Value)

The habitats of the project site comprise raised bog (PB1), cutover bog (PB4), bog woodland (WN7), immature woodland (WS2), scrub (WS1), neutral grassland (GS1), dense bracken (HD1), treelines (WL2), drainage ditches (FW4) and buildings and artificial surfaces (BL3) (refer to Table 2.1 and Figure 2.5). In the case of peatlands, linkages were identified with respect to three EU Annex I habitats; ‘active raised bog (7110)’; ‘Degraded raised bogs still capable of natural regeneration (7120)’; and ‘Depressions on peat substrates of the *Rhynchosporion* (7150)’. There were no protected plants including plants listed under the Flora Protection Order identified within the project site or immediate surrounding environs during field surveys. Furthermore, there were no red-listed plants i.e. Critically Endangered, Endangered, Vulnerable or Near Threatened status (Wyse Jackson *et al.*, 2016) recorded. The lichen *Cladonia portentosa* (reindeer lichen) and Sphagnum mosses were recorded on raised and cutover bog and are listed on Annex V of the EU Habitats Directive.

Neutral grassland (GS1) onsite is managed for low intensity livestock grazing (ponies) with low nutrient input (no fertiliser application). This habitat is approximately 4 ha in extent (refer to Figure 2.5) and comprises graminoids such as sweet vernal grass *Anthoxanthum odoratum*, Yorkshire fog *Holcus lanatus*, cock’s foot *Dactylis glomerata*, false oat-grass *Arrhenatherum elatius*, meadow grass *Poa* sp. and crested Dog’s-tail *Cynosurus cristatus*. The grassland comprises a good diversity of broadleaved herbs / flowering plants including lesser stitchwort *Stellaria graminea*, red bartsia *Odontites vernus*, meadowsweet *Filipendula ulmaria*, creeping buttercup *Ranunculus repens*, meadow buttercup *Ranunculus acris*, common spotted orchid *Dactylorhiza fuschii*, white clover *Trifolium repens*, red clover *Trifolium pratense*, ox-eye Daisy *Leucanthemum vulgare*, common bird’s-foot trefoil *Lotus corniculatus*, water-mint *Mentha aquatic* (rare occurrence), eyebright *Euphrasia officinalis*, common field-speedwell *Veronica persica*, tormentil *Potentilla erecta*, cleavers *Galium aparine*, silverweed *Potentilla anserine*, common knapweed *Centaurea nigra*, hedge woundwort *Stachys sylvatica*, hawkbeard *Crepis* sp., cuckooflower *Cardamine pratensis*, cat’s-ear *Hypochoeris radicata* and tufted vetch *Vicia cracca*. Other species recorded distributed throughout include broad-leaved dock *Rumex obtusifolius*, sheep’s sorrel *Rumex acetosella*, ribwort plantain *Plantago lanceolata*, common nettle *Urtica dioica*, heath woodrush *Luzula multiflora* and thistle *Cirsium* sp. Rushes such as soft rush *Juncus effusus* and jointed rush *Juncus articulatus* are present; however, cover is <15%. *Pteridium aquilinum* has encroached in the southern fields particularly where dense bracken (HD1) occurs to the east and south (refer to Figure 2.5) and is outcompeting native wildflowers.

The project site comprises some of the best examples of treelines (WL2) along field margins concentrated in the western section of the project site (refer to Figure 2.5). Treelines recorded onsite were largely dominated by mature pedunculate oak *Quercus robur* with occasional ash *Fraxinus excelsior*, grey willow *Salix cinerea*, downy birch *Betula pubescens*, holly *Ilex aquifolium* and hawthorn *Crataegus monogyna*. Other plants recorded at the base of trees included bramble *Rubus fruticosus* agg., ivy *Hedera helix*, bracken, honeysuckle *Lonicera perichyenum*, common nettle *Urtica dioica*, tufted vetch *Vicia cracca* and hedge woundwort. Some grey willow treelines were also recorded

along drainage ditches where surface water had accumulated. Oak dominated treelines attained heights ranging from 20 m to 30 m, while willow dominated treelines attained heights ranging from 10 m to 20 m. Cracks, crevices and fissures were noted in mature oak trees which offer suitable roosting opportunities for bats. The habitat is well structured with few gaps and serves as an important ecological corridor for roosting, foraging and commuting bats and nest habitat for birds. The treelines connect to bog woodland (WN7) habitat located to the east which in turn connects to raised bog (PB1) and cutover bog (PB4).

In the case of the project site, bog woodland has established on the cutover concentrated largely along the margins of peatland habitats onsite (refer to Figure 2.5). The woodland habitat has regenerated and matured on cutover habitats particularly over the past twenty years and an example of a developing secondary habitat. The woodland canopy is dominated by downy birch *Betula pubescens* with occasional stands of rowan *Sorbus aucuparia*, oaks *Quercus* spp., eared willow *Salix aurita* and holly *Ilex aquifolium*. Tree stands attain heights of approximately 25 m along the western and northern margins of the cutover. In drier areas, the ground layer was dominated by bramble with occasional bracken, ivy *Hedera helix* and purple moor-grass *Molinia caerulea*. The local abundance of bracken indicates that the woodland is drying out. This is attributed to the presence of a drainage network within and surrounding the woodland. Ground conditions are firm underfoot. Bog woodland located along the western section of the cutover supports a high abundance of *Sphagnum palustre* with *S. fallax* in isolated pockets often occurring in association with soft rush, purple moor-grass and tormentil. Other mosses recorded include *Pseudoscleropodium purum*, *Polytrichum commune* and *Thuidium tamariscinum*. Drainage in these areas is characterised as reduced functional drainage systems whereby drainage has become somewhat impeded. Bog woodland habitat recorded onsite transitions to dense bracken (HD1) and scrub (WS1) at the woodland margin with stands of common gorse *Ulex europeus* and bracken prominent along the outer margins of the woodland.

The succession and encroachment of dense bracken (HD1) and scrub (WS1) (particularly bramble and immature birch) onto areas of neutral grassland (GS1) and cutover bog (PB4) is problematic where bracken *Pteridium aquilinum* outcompetes native wildflowers on grassland habitats; and on peatland habitats that are drying out attributed to semi-functional drainage systems.

2.4.2 Invasive species

A consultant specialising in invasive species was commissioned by Shanakyle Bog Restoration Group to identify and map invasive species within the project site. Three scheduled and high impact invasive species; Rhododendron *ponticum*, Giant Hogweed *Heracleum mantegazzianum* and Himalayan Balsam *Impatiens glandulifera* were identified within and surrounding the confines of the project site (refer to Figure 2.6). Six Rhododendron stands were noted within the site boundary concentrated on peatland habitats. Four linear sections of Himalayan balsam and one record of giant hogweed was noted along road side verges along a local road which provides access to the project site (located outside the site boundary to the west; refer to Figure 2.6). All other records (refer to Figure 2.6) were recorded in an ornamental garden surrounding the project site beside an existing dwelling located to the west. In response to this, an Invasive Species Management Plan (ISMP) was prepared to treat, control and eradicate scheduled invasive species within the project site.

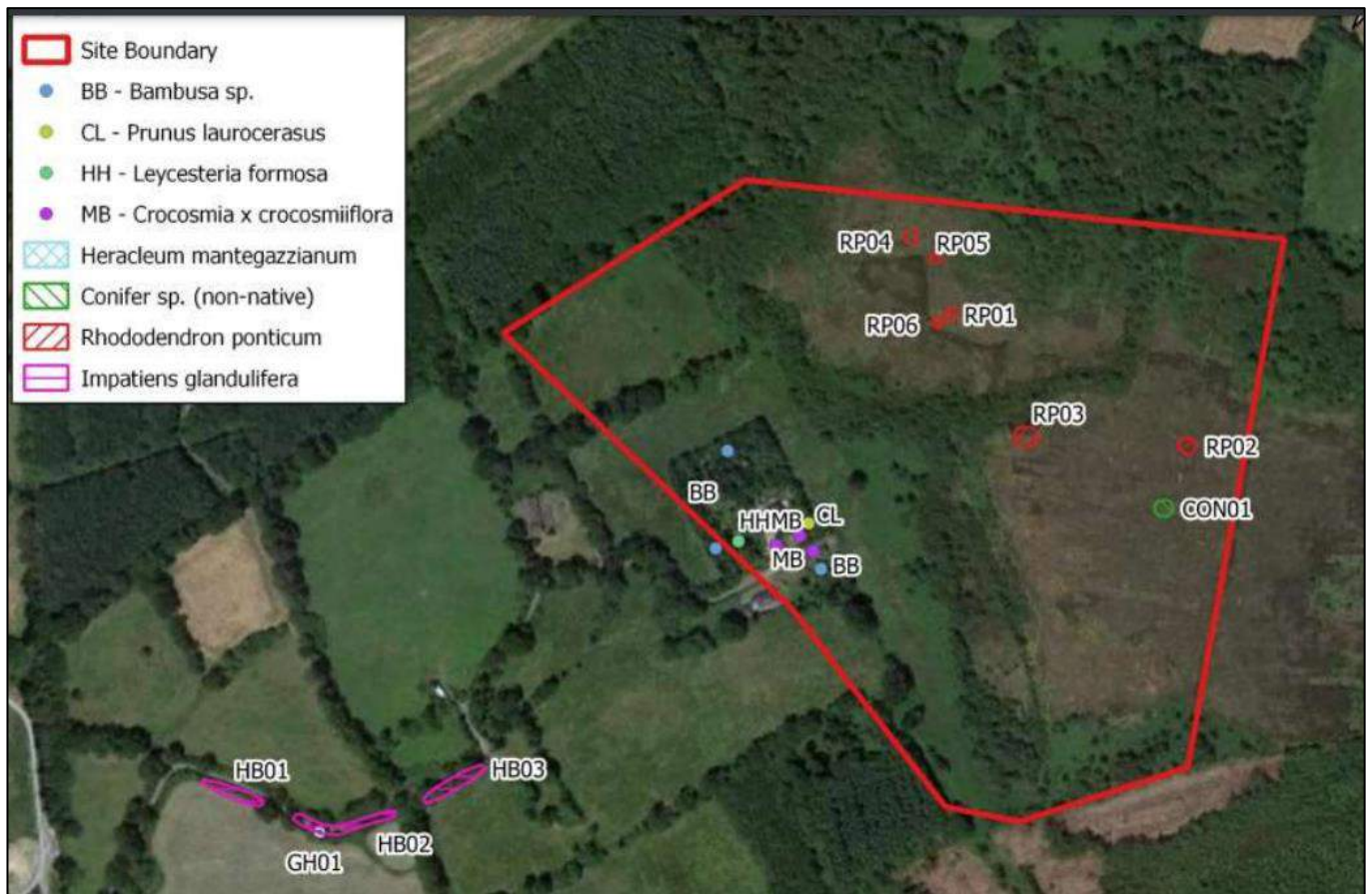


Figure 2.6 Location of scheduled invasive species (*Rhododendron*, *Himalayan Balsam* and *Giant Hogweed*) within and surrounding Shanakyle Bog.

2.4.3 Birds

Incidental records of birds were recorded during walkover surveys in 2021. Aural and visual registrations of birds were detected in habitats comprising bog woodland, raised bog, cutover bog, outhouses, neutral grassland, scrub and treelines within the project site. Raptors including kestrel, buzzard, long-eared owl and sparrowhawk were observed using peatland habitats, grasslands and bog woodland habitats within and surrounding the project site. Incidental records of barn owl were recorded during summer months of 2021. Summer migrants recorded during field surveys included chiffchaff, swallow, cuckoo, blackcap and willow warbler (chiffchaff blackcap and willow warbler are green listed species (BoCCI) while swallow and cuckoo are included on the amber list (Gilbert *et al.*, 2021)). Species abundances were recorded in relatively low numbers using bog woodland, scrub and surrounding conifer plantation which offer suitable breeding habitat for the species. Common passerines such as goldcrest, robin and wren were recorded in scrub and woodland habitats onsite. Corvids such as rook, hooded crow and jay were observed using treelines and bog woodland along the peripheral margins of peatlands and grassland habitats. Other species included house sparrow near domestic dwellings and pheasant in grassland fields managed for agriculture. Meadow pipit, woodcock and snipe (three red-list bird species of conservation concern in Ireland) were recorded using raised and cutover bog within the project site. Overall, the project site was found to support five red-listed bird species of conservation concern; kestrel, snipe, woodcock, meadow pipit and barn owl. The restoration of peatland habitats and the installation of bird nest boxes for specialist species will provide additional nesting and foraging opportunities for birds of conservation concern and enhance the diversity of bird species composition in the short to medium-term. Birds and their nest sites are afforded protection under the Irish Wildlife Act 1976 (as amended).

2.4.4 Bats

All bats in Ireland are afforded protection under the Irish Wildlife Act 1976 (as amended), which make it an offence to injure bats (or their young), or to wilfully interfere with or disturb bat breeding or resting places. The project site comprises treelines (WL2) along the margins of grassland fields concentrated in the western

section of the project site dominated by mature pedunculate oak. Cracks, crevices and fissures were noted in mature pedunculate oak trees which offer suitable roosting opportunities for bats. In addition, the treelines onsite are well developed and form a network within the project site serving as an important ecological corridor for commuting and foraging bats linking with other habitat types such as bog woodland and raised and cutover bog. A targeted bat survey conducted in August 2022 which employed the use of static bat detector surveys and bat activity and emergence surveys, identified seven species of bat (soprano pipistrelle, common pipistrelle, leisler's bat, lesser horseshoe bat, natterer's bat, whiskered bat and brown long-eared bat) within the project site.

2.4.5 Non-volant mammals

There was no evidence of otter or associated territories including resting places, natal dens/holts or couches recorded during the course of field surveys. In addition, no paths, slides or spraints were observed. This is largely attributed to an absence of natural watercourses within the project site. A trail camera recorded footage of badger along the southern section of the site near bog woodland. Walkover surveys of the project site did not detect any badger setts or associated territories along treelines and bog woodland; however, not all areas of woodland were accessible due to dense scrub. It is considered that the project site supports suitable badger habitat in the form of treelines, scrub and bog woodland. Incidental records of pine marten were recorded along a local access road to the west of the project site while incidental records of red squirrel were also recorded onsite. The project site is fringed by conifer plantation to the north, south and west. Other protected mammals such as the western European hedgehog and Eurasian pygmy shrew are considered present given the presence of suitable habitat (e.g. treelines, raised bog, bog woodland, scrub).

2.5 Amphibians and reptiles

Common frog *Rana temporaria* was recorded at several locations during field surveys on areas of cutover bog, remnant high bog and drainage ditches. There were no records for Smooth newt *Lissotriton vulgaris* or Common lizard *Zootoca vivipara* encountered during field surveys; however, this does not infer they are absent from the area. Suitable habitat for smooth newt exists in the form of peatland habitats. Common frog is protected under the Wildlife Act, 1976 (as amended). It is an offence to injure common frogs (or their young), or to wilfully interfere with or disturb smooth newt or common frog breeding or resting places. The species is listed on Annex V of the EU Habitats Directive. Rewetting of peatland habitats and installation of a wildlife pond in grassland habitat will create new habitat opportunities for common frog and smooth newt.

2.5.1 Invertebrates

No butterflies, bees, or other conspicuous invertebrates of high conservation concern (i.e. Annex II of the EU Habitats Directive) were recorded during field surveys of the project site. Incidental records of butterflies such as ringlet, meadow brown, small copper, tortoiseshell and peacock butterfly were recorded during field surveys in grassland, woodland and peatland habitats. There are opportunities to enhance pollinator and invertebrate populations (e.g. honeybees, dragonflies and damselflies) by rewetting peatland habitats, installing a wildlife pond and managing grassland habitats for wildflower meadow to link in with the 'All Ireland Pollinator Plan'.

Section 3 Key Performance Indicators (KPIs)

The Key Performance Indicators (KPI) that outline the management and enhancement measures for habitats, flora and fauna are presented in Table 3.1. This includes actions carried out to achieve KPIs, timeline completed, and status of each KPI. Management and enhancement KPIs (1 to 8) are presented in Table 3.1 and presented in Figure 3.1. Table 3.1 also sets out a range of biodiversity actions (KPIs 9 to 16) targeted at education, environmental awareness, specialist surveys and scientific research.

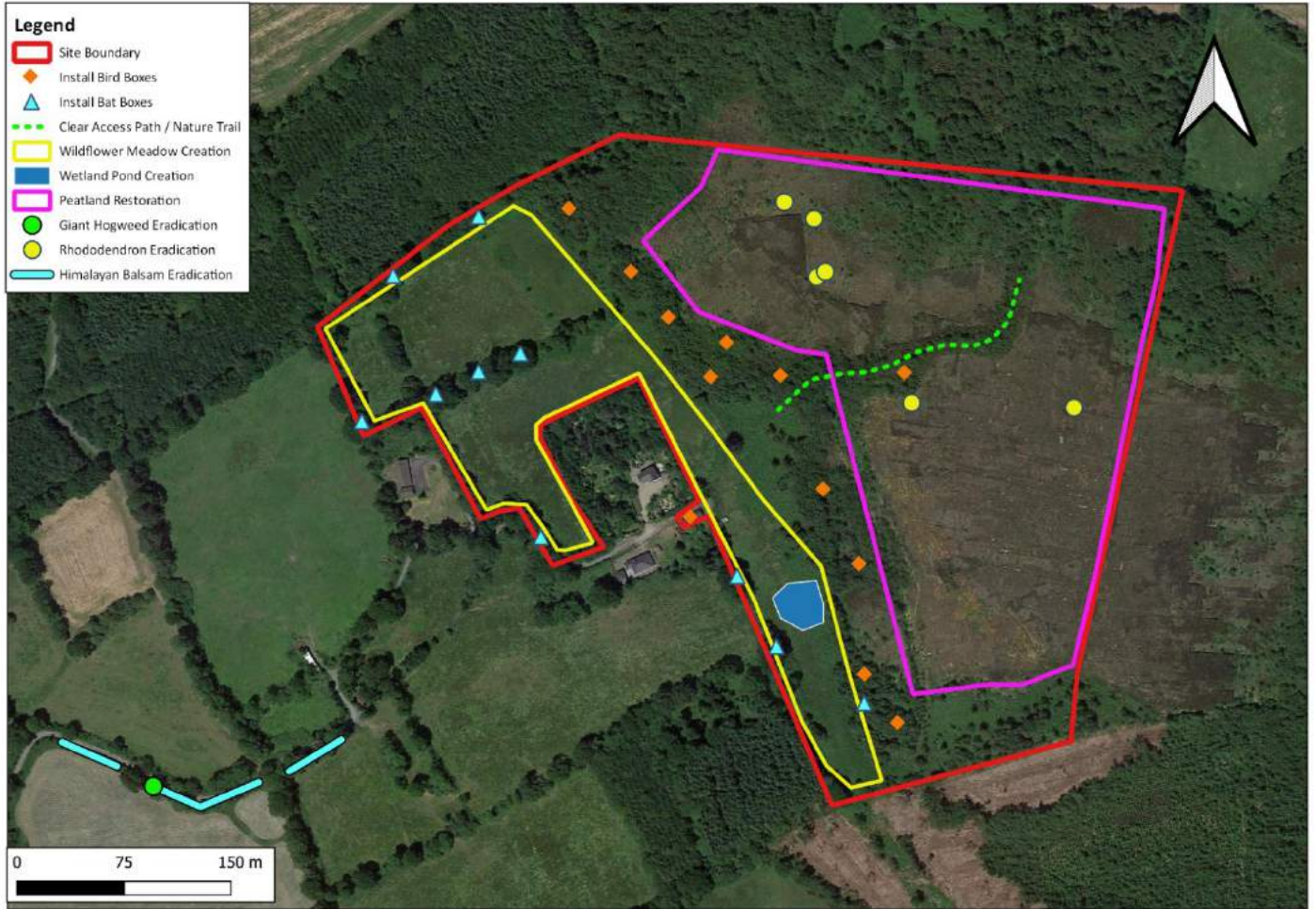


Figure 3.1: Habitat management and enhancement measures implemented as part of Shanakyle Bog Restoration and Habitat Enhancement Project EIP.

Table 3.1 Key Performance Indicators and Enhancement Measures (including Biodiversity Actions) for Shanakyle Peatland Restoration and Habitat Enhancement EIP

Key Performance Indicator	Actions	Timeline Deliverable	Status
<p>1. Peatland restoration and rewetting</p>	<p>The following actions were implemented to achieve this KPI:</p> <ul style="list-style-type: none"> • Commissioned an experienced peatland contractor with a proven track record working on peatland rewetting projects with a focus on targeted drain blocking and bund construction on 30 acres of raised and cutover bog at Shanakyle Bog. • Implementation of peatland rewetting project design taking cognisance of ecological constraints (refer to Figure 2.4, Figure 3.1 and Section 2.3). • Employing a wide tracked excavator with a low bearing capacity and equipped with 1400 mm wide Nyrim pads to reduce rutting and damage to the bog surface. • Blocking of key marginal drains, including Sphagnum infilled drain along the western boundary to support stable and high summer water levels across a wider area of the cutover bog. • Blocking of drainage features on the high bog with peat dams. • Construction of a series of high bog bunds (shallow bunds 250-300 mm high) to rewet sections of the high bog (these included “finger bunds” where the individual bund length exceeded 15 m). • Construction of a series of cutover bunds, which aim to retain water at a maximum depth of 200 mm on the cutover. The bunds were 500-600mm at finished height equipped with overflow pipes to manage and regulate surface water at optimal levels for Sphagnum development. • Works were conducted outside the bird nesting season (1st of March to 31st of August inclusive) to avoid disturbance to nesting birds. <p>Refer to Figure 2.4 for locations of peat dams, peat bunds and overflow pipes for rewetting peatland habitats.</p> <p>The construction of bunds and peat dams involved:</p> <ul style="list-style-type: none"> • Excavation of peat from 'borrow pits' from donor areas (4 m x 4 m). • Installation of peat dams and bunds at marked locations along drainage crossings. 	<p>October – December 2021</p>	<p>Complete</p>

Key Performance Indicator	Actions	Timeline Deliverable	Status
	<ul style="list-style-type: none"> • Re-instatement of catotelm and acrotelm peat at 'borrow pit' locations to enable rapid vegetation colonisation of disturbed areas. • Ecological monitoring (walkover surveys, quadrat surveys, measuring water levels, establishing permanent quadrats). 		
2. Wetland Pond Creation	<p>The following actions were implemented to achieve this KPI:</p> <ul style="list-style-type: none"> • Shanakyle Bog Restoration Group commissioned an experienced contractor to excavate the wildlife pond within the project site (refer to Figure 3.1). • In October and November 2021, the pond was excavated (< 1 m in depth; and 12 m wide and 15 m in length) which comprised a saucer-shaped profile with a gentle gradient to support the establishment of wetland plants at the pond margins. • A geoline membrane was installed in November 2021 to hold surface water and earthen spoil was backfilled to create near natural substrate conditions to support invertebrates and the establishment of wetland plants. • In December 2021, a selection of locally sourced reed mace <i>Typha latifolia</i> plants were translocated from a donor site to the pond to kick start vegetation colonisation. • A stone hibernaculum (2 m x 2 m) was constructed adjacent to the pond to serve as a micro-habitat to support populations of overwintering smooth newt <i>Lissotriton vulgaris</i>. • Log piles from windblown birch trees were placed adjacent to the pond to serve as a micro-habitat for invertebrates. <p>The following operational management measures were carried out:</p> <ul style="list-style-type: none"> • The pond was fenced off from livestock access to avoid damage of pond margins and nutrient enrichment. • No spraying of herbicides or application of fertilisers is permitted. • Shading has been kept to a minimum around the pond and no more than 10% of the pond is shaded by surrounding trees. • The pond was sited in proximity to oak treelines and bog woodland to facilitate the development of wildlife corridors and attract species diversity. 	October – November 2021	Complete (Ongoing Management)

Key Performance Indicator	Actions	Timeline Deliverable	Status
	<ul style="list-style-type: none"> There was no introduction of fish species. 		
3. Invasive Species Treatment and Eradication	<p>The following actions were implemented to achieve this KPI:</p> <ul style="list-style-type: none"> An external consultant was commissioned to carry out a targeted invasive species survey to identify and map scheduled invasive species within the project site (refer to Figure 2.6 and Figure 3.1). Following a field survey, an Invasive Species Management Plan was produced outlining treatment and eradication measures to address Rhododendron, Giant Hogweed and Himalayan balsam. Rhododendron treatment and eradication using the ‘cut, drill and paint’ method was carried out in August 2021. Herbicide treatment (Foliar Herbicide Application (spot spray)) of two stands of Giant hogweed up to 2m² was carried out in August 2021. Clearance of Himalayan Balsam (hand pulling) was first carried out in June 2022. Follow up treatment (if and where required) and monitoring of Rhododendron & Giant hogweed stands) Monitoring: Follow up visits in August 2022 to clear Himalayan balsam, herbicide treatment/tap rooting Giant of hogweed seedlings and monitoring of Rhododendron. Invasive species treatment reports were produced by the external consultant following each site visit. Implemented best practice having regard to biosecurity measures *(e.g. wash down facilities, invasive species signage). 	August 2021 to August 2022	Complete (Ongoing monitoring of regrowth of Himalayan balsam)
4. Wildflower Meadow Creation	<p>The following actions were implemented to achieve this KPI:</p> <ul style="list-style-type: none"> Managed 10 acres of neutral grassland (GS1) for wildflower meadow creation to link in with the ‘All Ireland Pollinator Plan’ to support pollinator populations within the project site (refer to Figure 3.1). Grazing stocking levels were adjusted to keep down the encroachment of bracken onto grassland habitats in the southern section of the project site. The grasslands were mown in late August 2021 to set the seed and encourage the growth of late season wildflowers. This facilitates the growth of wild flowers and in turn provide important food and nectar sources for pollinators and invertebrates (e.g. butterflies, bees, beetles), and feeding areas for birds and bats. The application of fertilisers, herbicides and/or pesticides was avoided. 	Commenced management measures in August 2021.	Complete (Ongoing management)

Key Performance Indicator	Actions	Timeline Deliverable	Status
	<ul style="list-style-type: none"> The application of artificial seed mixes was avoided relying on natural colonisation of wildflowers. 		
5. Install bat roost boxes	<p>The following actions were implemented to achieve this KPI:</p> <ul style="list-style-type: none"> An appraisal of the habitats and trees of the project site (refer to Figure 3.1) to identify suitable locations to install bat roost boxes and selection of specialised boxes for specific species identified during baseline surveys. Bat roost boxes were installed on mature oak tree trunks in April 2022. Boxes were targeted where trees were devoid of cracks, crevices and fissures (that otherwise serve as suitable potential roost habitat). The installation of bat boxes aims to provide additional roosting opportunities for bats. Several boxes were installed on the same tree trunk facing in different directions to account for temperature changes day to day. The bat boxes were placed on treelines which offer suitable commuting habitat to link in with other habitats present within the site including bog woodland and raised bog. A range of different models were installed including Beaumaris WoodStone Bat Box, Harlech WoodStone Bat Box and Chillon WoodStone Bat Box. The boxes will be monitored for occupancy by a dedicated bat specialist in the short to medium-term. 	April 2022	Complete (monitoring ongoing)
6. Install Bird Nest Boxes	<p>The following actions were implemented to achieve this KPI:</p> <ul style="list-style-type: none"> An appraisal of the habitats and trees of the project site (refer to Figure 3.1) to identify locations to install bird nest boxes and a selection of specialised boxes (e.g. kestrel and barn owl) identified during baseline surveys. In February 2022, over 30 bird nest boxes were installed within the project site concentrated in areas of bog woodland, treelines and outhouses for specialist species (including red, amber and green-listed bird species of conservation concern) such as treecreeper, swift, swallow, kestrel, great spotted woodpecker, wren, robin, house sparrow, blackbird, house sparrow and blue tit. The installation of bird nest boxes provides enhancement opportunities to attract additional bird species to the project site and takes cognisance of predator prey relationships and the habitat heterogeneity within the project site. In June 2022, a custom made barn owl nest box was installed on an oak tree in conjunction with BirdWatch Ireland and Shanakyle Bog Restoration Group. 	February and June 2022	Complete (monitoring ongoing)

Key Performance Indicator	Actions	Timeline Deliverable	Status
	<ul style="list-style-type: none"> Monitoring of bird nest boxes to confirm occupancy (during the previous breeding season) was carried out during winter months of 2022/2023. 		
7. Clear Access Path for Nature Trail	<p>The following actions were implemented to achieve this KPI:</p> <ul style="list-style-type: none"> A path which used to provide access to the main bog from grassland habitats to the west had become overgrown with gorse and wind-blown birch trees in recent years (refer to Figure 3.1). The path was cleared in September 2021 and windblown birch trees were cut into log piles and left in-situ which served as a micro-habitat for invertebrates and fungi along the nature trail. The work was conducted outside the bird nesting season (1st of March to 31st of September inclusive) to avoid disturbance to nesting birds. Bog woodland surrounding the path was retained for wildlife. A mammal survey (emphasis on pine marten and badger) was conducted prior to project operations to confirm absence of potential territories in proximity to the path. The path is now used as a nature trail which serves as an educational resource for visitors and students. 	September 2021	Complete
8. Retain Bog Woodland and Treelines	<p>The following actions were implemented to achieve this KPI:</p> <ul style="list-style-type: none"> With the exception of clearance of gorse and windblown birch trees along an overgrown path, habitats such as bog woodland and treelines have been retained and protected. 	All phases of the project	Complete
9. Install Trail Cameras	<p>The following actions were implemented to achieve this KPI:</p> <ul style="list-style-type: none"> Three trail cameras were purchased to record and monitor wildlife (emphasis on birds and mammals) within the project site. Licences were sought from; and subsequently approved by the National Parks and Wildlife Service to install the trail cameras on the bog to film footage of wildlife for educational purposes. Trail cameras have been installed on the rewetted bog and bog woodland habitat to record and monitor wildlife and to provide an inventory of additional records of fauna using the project site. These records will be documented and submitted to the National Biodiversity Data Centre's biodiversity database. 	January – August 2022.	Complete (Ongoing)

Key Performance Indicator	Actions	Timeline Deliverable	Status
10. Install Signage	<p>The following actions were implemented to achieve this KPI:</p> <ul style="list-style-type: none"> • Signage was installed to promote the management of the project site as a wildlife sanctuary. 	November 2022	Complete
11. Video Production Synopsis of Project and website – Digital and Media Marketing	<p>The following actions were implemented to achieve this KPI:</p> <ul style="list-style-type: none"> • A digital media marketing company was contracted to film the project progress over a year and produce a three minute synopsis of the project to capture all work phases (before, during and after) and is available to view at https://www.youtube.com/watch?v=v8G0tOyd5S0 • Filming incorporated drone footage and camera shots which commenced in August 2021. This footage captures the baseline environment prior to the implementation of practical measures. • A second visit was conducted in October 2021 to film work in progress (e.g. excavation of wildlife pond, peatland rewetting, invasive species eradication). • A third visit was conducted in July 2022 to film the project site following implementation of all practical measures. • A short video was produced in August 2022 to showcase the habitat restoration and enhancement work carried out over the previous year and captured key project milestones before, during and after the work. The video will be used to promote and inspire biodiversity projects to communities and local interest groups; and to promote Shanakyle Bog Restoration and Habitat Enhancement EIP at events and talks. In addition, the footage will serve as a platform to promote the project and raise biodiversity awareness to the general public through social media. • Two short clips of drone footage were cut in October 2021 and January 2022 to promote peatland restoration and the project on social media (e.g. Twitter and Instagram) • A dedicated website for the project was developed with film footage, photographs, project synopsis of work carried out, contact information and scientific reports uploaded to the website available at https://shanakylebogrestoration.ie/ 	August 2021 – August 2022	Complete
12. Conduct Raised Bog Ecotope and Cutover Bog	<p>The following actions were implemented to achieve this KPI:</p> <ul style="list-style-type: none"> • A targeted raised bog ecotope and cutover habitat survey was carried out of the entire Shanakyle Bog complex (30.6 ha) in 2021. The surveys included targeted raised bog ecotope surveys and mapping of 	June 2021 – March 2022	Complete

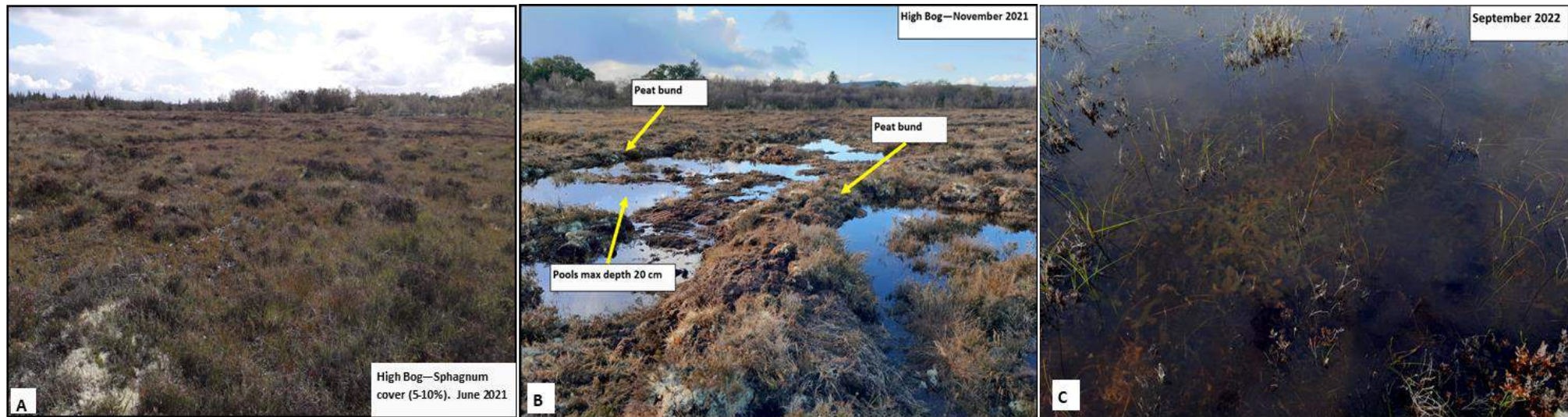
Key Performance Indicator	Actions	Timeline Deliverable	Status
<p>Survey and Report and Habitat Management and Enhancement Programme</p>	<p>the high bog in line with Fernandez <i>et al.</i>, (2014). The study aims to identify, map and document areas of active raised bog (ARB) and degraded raised bog (DRB) on remnant raised bog. A targeted survey and habitat mapping was carried out on cutover habitats (approx. 25 ha in extent) in line with Smith & Crowley (2020) to assess the extent of recolonising vegetation on the cutover, to categorise and map habitats on the cutover (e.g. high sphagnum group, moderate sphagnum group, low sphagnum group, bare peat), identify positive indicator species to confirm presence of ‘active raised bog (7110)’; and to carry out a baseline study to provide an information base against which to monitor and assess peatland restoration and rewetting effectiveness. A report documenting the findings of the study was prepared and has been made available from the project website https://shanakylebogrestoration.ie/</p> <ul style="list-style-type: none"> • A Habitat Management and Enhancement Programme report was prepared which outlines biodiversity actions associated with the Shanakyle Bog Restoration and Habitat Enhancement EIP project and has been made available to view at https://shanakylebogrestoration.ie/ • Monitoring of Permanent Quadrats was conducted in September 2022. The data has been uploaded to the project website https://shanakylebogrestoration.ie/ 		
<p>13. Interpretation and Local Participation – Guided walks and talks; and Project Launch Day</p>	<p>The following actions were implemented to achieve this KPI:</p> <ul style="list-style-type: none"> • Shanakyle Bog Restoration Group has hosted several bog walks and talks in 2021 and 2022 for our project partners and local interest groups including National Parks and Wildlife Service, Irish Wildlife Trust, Community Wetlands Forum, Irish Farmers Association, BirdWatch Ireland, Clare County Council, peatland conservation interest groups, local communities, third level institutions including research academics with the University of Limerick and third level art students with Limerick School of Art and Design. • In August 2022, Shanakyle Bog Restoration Group hosted an event ‘Walk & Talk on Shanakyle Bog’ during National Heritage Week. Shanakyle Bog Restoration Group won the County Clare Heritage Week Event Award for the event ‘Walk & Talk on Shanakyle Bog’ awarded by the Heritage Council in October 2022. There were ninety other events in contention for the award. • In April 2023, the project was shortlisted as a finalist in the category ‘Best Practice Small Scale Nature Conservation’ for the CIEEM (Chartered Institute of Ecology and Environmental Management) awards in the UK and Ireland scheduled to be held in Birmingham in June 2023. 	<p>December 2021 - Ongoing</p>	<p>Complete (Ongoing)</p>

Key Performance Indicator	Actions	Timeline Deliverable	Status
	<ul style="list-style-type: none"> Continue to organise a series of events throughout the year to increase knowledge and awareness of the wildlife and conservation value of Shanakyle Bog and associated habitats (in conjunction with national events, e.g. Heritage week, biodiversity week, world wetlands day) and standalone events (e.g. specialists to lead bat walks; bird walks e.g. dawn chorus). This measure aims to promote biodiversity to the wider community with an emphasis on local farmers, landowners and an education resource for students and senior academics studying biological sciences in nearby University of Limerick. Shanakyle Bog Restoration Group hosted and celebrated the launch of Shanakyle Bog Restoration and Habitat Enhancement EIP in September 2022. The event was well attended and Shanakyle Bog Restoration Group received support from attendees from both farming and nature conservation groups, all coming together to endorse the project. The opening address was delivered by the Minister of State for Landuse and Biodiversity and guest speakers included representatives of the Community Wetlands Forum, National Parks and Wildlife Service and the Clare Heritage Officer. 		
14. Interpretation Lectern – Education and Awareness	<p>The following actions were implemented to achieve this KPI:</p> <ul style="list-style-type: none"> In July and August 2022, a signage company was commissioned to design a lectern and information board to communicate the biodiversity and wildlife of Shanakyle Bog with input from Shanakyle Bog Restoration Group. This serves as an education resource for visitors to facilitate bog walks and talks. Interpretation has been provided to convey the importance of the habitats and fauna found within the project site. The selection of a suitable lectern was important along with the use of appropriate graphics and text to communicate the biodiversity present at Shanakyle Bog. The lectern was installed in September 2022 for visitors, students and local interest groups. 	July - September 2022	Complete
15. Interpretation – Bat and Invertebrate Survey	<p>The following actions were implemented to achieve this KPI:</p> <ul style="list-style-type: none"> Specialised surveys to generate an inventory of invertebrate species such as moths, pollinators, damselflies; and separately bats have been carried out with local interest groups and bat specialists to gather information on the diversity of fauna within the project site. The surveys will be linked in to promote education and awareness of the project site for the local community and interested groups. A bat specialised was commissioned to carry out a dedicated bat survey in August 2022 employing the use of static bat detectors. Seven species of bat were found to be using the environs of the project site 	June/July 2022 to Ongoing	Complete (Ongoing)

Key Performance Indicator	Actions	Timeline Deliverable	Status
	<p>(soprano pipistrelle, common pipistrelle, natterer’s bat, whiskered bat, leisler’s bat and brown long-eared bat). All species are listed on Annex IV of the EU Habitats Directive and are afforded protection under the Irish Wildlife Act 1976 (as amended).</p> <ul style="list-style-type: none"> • Invertebrate surveys targeted at damselflies and dragonflies were carried out by the Irish Wildlife Trust (Limerick branch) in the summer months of 2022. The surveys targeted rewetted bog pools and the wildlife pond. • Records will be submitted to the National Biodiversity Data Centre’s biodiversity database. 		
16. Research	<p>The following actions were implemented to achieve this KPI:</p> <ul style="list-style-type: none"> • It is envisaged that following implementation of key measures, the work will aim to serve as an important education resource for research students and academics at the nearby University of Limerick and other third level institutions. In November 2022, Shanakyle Bog Restoration Group hosted research academics associated with the nearby University of Limerick on a potential collaborative carbon research project of the rewetted bog. 	November 2022 - Ongoing	Ongoing

Section 4 Implementation and Results

This section of the report provides an overview of the practical actions implemented as part of the project. The peatland restoration and habitat enhancement actions were carried out from August 2021 to September 2022. Photographic records are included which capture and document changes from project inception to completion.



Plates 4.1 (a) (b) and (c): Peatland restoration of the high bog prior to rewetting operations in June 2021 (A); during and after targeted rewetting of the high bog with peat bunds and peat dams (B); and the establishment of pioneer *Sphagnum* mosses (*Sphagnum cuspidatum*) in rewetted pools in September 2022 (C).

Peatland restoration and rewetting of the high bog was carried out from October to November 2021. Prior to construction of peat bunds and peat dams, the *Sphagnum* cover ranged from 5-10% and was very dry underfoot (refer to Plate 4.1(a)). The construction of peat bunds across shallow cut out depressions (associated with former turf cutting operations) on the high bog combined with peat dams has been highly successful in terms of raising the water table and retaining surface water (pools with max depths of 20 cm; refer to Plate 4.1(b)). The restoration techniques employed have been effective in creating favourable baseline conditions for the establishment of *Sphagnum* mosses, despite a surface slope >1%. Monitoring of the high bog 10 months post-restoration found an overall positive response to the installation of peat dams and bunds with water retained. The water levels fluctuated during the summer months of 2022; however; surface water levels remained within 10 cm of the bog surface and the predicted outcome will result in the development of ARB and an improvement in the habitat quality of DRB (increase in positive indicator species characteristic of ARB predicted). There is an expectation that areas comprising marginal ecotope complexes (DRB) will transition to sub-central ecotope complexes, an ecotope characteristic of peat forming ARB in the medium to long-term. It is expected that some marginal ecotopes in areas of DRB will become progressively wet and transition initially to sub-marginal ecotope community complexes in the short-term. Permanent quadrats (4 m x 4 m) were

established to inform recovery of peat forming vegetation (e.g. *Sphagnum* mosses). Monitoring of quadrats carried out 10 months post-restoration confirmed the colonisation and regeneration of the pioneer peat forming moss *Sphagnum cuspidatum* in rewetted pools (refer to Plate 4.1(c)).



Plates 4.2 (a) (b) and (c): *Overflow pipes were adjusted to regulate surface water levels at optimal levels for Sphagnum establishment on the cutover in December 2021 (A); peat bunds were constructed into compartments to hold water on the cutover at depths of 20 cm (B); and the establishment of pioneer Sphagnum mosses (Sphagnum cuspidatum) in rewetted sections of the cutover monitored during September 2022, 10 months after rewetting was completed (C).*

Rewetting of the cutover was carried out from November to December 2021 and primarily involved construction of peat bunds, peat dams and installing overflow pipes to regulate surface water at optimal levels (0-200 mm above the peat surface)) for *Sphagnum* development (refer to Plates 4.2 (a) and (b) above). *Sphagnum cuspidatum* and *Eriophorum angustifolium* were both confirmed colonising in rewetted sections on the cutover which indicates that the site is on a positive trajectory in terms of achieving the development of ‘active raised bog (7110)’ (refer to Plate 4.2(c)). The rewetting of cutover areas aimed to create favourable baseline conditions for the establishment of *Sphagnum* mosses and to enable the peatland system to function as a net carbon sink once more, as opposed to a carbon source, to regulate atmospheric carbon. The regenerating *Sphagnum* mosses at Shanakyle Bog will sequester atmospheric carbon back into the underlying soil layers of the bog and also store remaining carbon stocks within the soil profile and reduce carbon

dioxide (CO₂) and methane (CH₄) emissions. Overflow pipes were adjusted when water depths within cells were considered too deep (in excess of 200 mm) and were placed at a lower depth on the peat bund to regulate surface water at optimal levels for Sphagnum mosses to colonise. The work has also started to establish and enhance the EU priority Annex I listed habitat ‘active raised bog (7110)’; and improve the habitat quality of two other Annex I habitats ‘degraded raised bogs still capable of natural regeneration (7120)’ and ‘Depressions on peat substrates of the *Rhynchosporion* (7150)’. It is expected that following targeted rewetting measures, the installation of peat bunds and dams will enhance and expand peat forming High Sphagnum Groups for ARB development on the cutover in the medium to long-term and the gradual transition of Moderate Sphagnum Groups and Low Sphagnum Groups to High Sphagnum Groups. Rewetting of the bog serves as a natural control to manage the encroachment and colonisation of scrub and dense bracken onto peatland habitats.



Plates 4.3 (a) (b) and (c): *The pond was excavated in agricultural grassland in October and November 2021 and a stone hibernaculum (micro-habitat) for amphibians was created (A); reed mace was translocated from a donor site to the pond margins in December 2021 (B); and the successful establishment of reed mace in May 2022 (C).*

In October and November 2021, a wildlife pond measuring 15 m x 12 m was created in an area of semi-natural grassland located in the southern section of the study area (refer to Plate 4.3(a)). The pond was excavated to adopt a saucer-shaped profile with a gentle gradient to support the establishment of wetland plants at the pond margins. A stone hibernaculum was constructed adjacent to the pond to provide a micro-habitat for wintering smooth newt

(refer to Plate 4.3(a)). Log piles from windblown trees were left adjacent to the pond margins to serve as a micro-habitat for invertebrates. In December 2021, a selection of reed mace *Typha latifolia* plants were translocated to the pond (refer to Plate 4.3(b)) from a donor site to encourage vegetation colonisation which resulted in the successful establishment of the plant species by May 2022 (refer to Plate 4.3(c)). The pond now provides a wildlife refuge for damselflies, dragonflies and pond skaters (recorded during summer months of 2022) which is monitored by the Irish Wildlife Trust (Limerick branch). It is hoped that as wetland vegetation matures, the pond will provide a wildlife refuge for amphibians including common frog and smooth newt; and birds such as reed bunting.



Plates 4.4 (a) (b) and (c): *Bracken had encroached onto the neutral grassland (GS1) in the southern section of the project in recent years (June 2021) (A); the grassland habitats were mown in late August 2021 to set wildflower seed late in the growing season (B); and the stocking rates were adjusted to reduce bracken encroachment at the expense of wildflowers (July 2022) (C).*

10 acres of grassland is currently managed for wildflower meadow to link in with the ‘All Ireland Pollinator Plan’. The grasslands are grazed by ponies. Bracken is a problematic species which had encroached onto semi-natural grassland in the southern section of the study area (refer to Plate 4.4(a)). The grasslands were mown in late August 2021 (refer to Plate 4.4(b)) to set the seed and encourage the growth of late season wildflowers. The management regime avoids any input of fertiliser, pesticides or herbicides. In addition, the introduction of artificial wildflower seed was avoided. As the meadows already contain a good diversity of wildflower seeds, it was an objective of Shanakyle Bog Restoration Group to maintain the grassland habitats in a natural condition. The grasslands comprise a good diversity of wildflowers that include red bartsia, meadowsweet, creeping buttercup, meadow

buttercup, common spotted orchid, white clover, red clover, oxeye-daisy, common bird's-foot trefoil, water-mint, eyebright, common field-speedwell, tormentil, common knapweed, hedge woundwort, hawksbeard, cuckooflower, cat's-ear and tufted vetch. In April 2022, the stocking rate of ponies was increased slightly to keep bracken down and reduce encroachment; however this requires ongoing management (refer to Plate 4.4(c)). The management of 10 acres of grassland for wildflower meadow creation will support pollinator populations within the project site; and create a biodiversity hotspot in a landscape otherwise managed for intensive agriculture and urban development in the wider surroundings.



Plates 4.5 (a) (b) and (c): Six stands of *Rhododendron* were recorded on peatland habitats in July 2021 (A); treatment methods to eradicate and control invasive species commenced in August 2021 (B); no regrowth has been reported following treatment and rewetting (2022) (C).

Surveys for scheduled invasive species (listed on the ‘Third Schedule’) were carried out in compliance with Regulation 49 of the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended) which includes legislative measures to manage the potential dispersal and introduction of invasive alien species. *Rhododendron* was recorded on the western section of the bog. The level of infestation was low (six stands recorded in total in 2021; refer to Plate 4.5(a)); however, in order to prevent further spread of the species, Shanakyle Bog Restoration Group commissioned an invasive species specialist to identify, map, treat, control and where possible eradicate scheduled invasive species. Stands of the scheduled invasive species Himalayan Balsam and Giant Hogweed were recorded along a local access road which provides access to the bog from the west. An Invasive Species

Management Plan (ISMP) was prepared outlining treatment options to eradicate all three scheduled invasive species. The first treatment was carried out in August 2021 where stands of Rhododendron plants were cut to ground level as close to the main root system as possible and treated with herbicide applied through drilled holes in the stump and then sealed (refer to Plate 4.5(b)). A single stand of Giant Hogweed was treated in August 2021. Himalayan balsam was managed through hand pulling techniques twice annually; from May-June 2022 and August 2022. As of August 2022, following site visits and update report, there was no regrowth of Rhododendron and Giant Hogweed observed following treatment in August 2021 (refer to treatment report available at <https://shanakylebogrestoration.ie/#Reports>). Rewetting carried out on the cutover has created waterlogged conditions which has resulted in sub-optimal conditions for Rhododendron, with no regrowth observed by the project team (refer to Plate 4.5(c)). The treated Rhododendron stands were marked out during peatland restoration and have not regrown following treatment.



Plates 4.6 (a) (b) and (c): bird nest boxes including specialist boxes for red-listed bird species of conservation concern including barn owl were installed in February and June 2022 (A); bat roost boxes were installed on mature oak trees maximising use of ecological corridors present within the project site) (B); a wildlife trail was developed in 2021 and a lectern illustrating the wildlife of Shanakyle Bog was installed adjacent to the path (C).

In the Spring of 2022, approximately 30 bird nest boxes were installed in habitats comprising bog woodland, treelines and outhouses. It was a vision of Shanakyle Bog Restoration Group to enhance the existing habitats for wildlife and at the same time attract new native bird species into the project area. Shanakyle Bog is a biodiversity hotspot surrounded by agricultural farmland and ribbon development. The project site supports several species of raptor

including sparrowhawk, kestrel, long-eared owl and buzzard. Taking into consideration predator prey relationships and the habitats present within the study area, different bird nest boxes were installed to cater for a diverse range of species including barn owl (refer to Plate 4.6(a); treecreeper, swift, swallow, kestrel, great spotted woodpecker, wren, robin, blackbird, house sparrow and blue tit among others. The project site currently supports five red-listed bird species of conservation concern in Ireland; snipe, meadow pipit, kestrel, barn owl and woodcock. Following monitoring of bird nest boxes in December 2022, it was found that several species had taken up occupancy during the previous breeding season. The most recent report of the status of birds in Ireland (2020-2026) (fourth review: Birds of Conservation Concern in Ireland 4: 2020–2026) highlights that of the 211 species studied, 54 (25.6%) birds are now on the Red list, 79 (37.4%) (Gilbert *et al.*, 2021). More than a quarter of native Irish bird species are now considered to be at the highest level of conservation concern. The red list increased by almost 50% since the previous survey (third review of the status of birds in Ireland; 2013-2018) with 23 species moving onto the red list. Shanakyle Bog Restoration and Habitat Enhancement EIP aims to halt biodiversity loss on a local scale. Bat roost boxes were installed on mature oak tree trunks in April 2022 (refer to Plate 4.6(b)). Some of the oak treelines comprised cracks, crevices and fissures that serve as potential suitable roost habitat for bats. The installation of bat boxes aims to provide additional roosting habitat where such features are absent and to support bat populations within the project site. Several boxes were installed on the same tree trunk facing in different directions to account for temperature changes day to day. The bat boxes were placed on treelines which offer suitable commuting habitat along ecological corridors to link in with other habitats present within the site including bog woodland and raised bog. A range of different models were installed including Beaumaris WoodStone Bat Box, Harlech WoodStone Bat Box and Chillon WoodStone Bat Box. Shanakyle Bog Restoration Group commissioned a dedicated bat survey in August 2022 which confirmed the presence of seven species of bat; soprano pipistrelle, common pipistrelle, brown long-eared bat, leisler's bat, whiskered bat, lesser horseshoe bat and Natterer's bat. Wildlife signage including a lectern and the development of a nature trail was provided for educational purposes (refer to Plate 4.6(c)).

Section 5 Financial Report

L.V Hogan Accountants Ltd. were contracted to carry out an audit and prepare financial statements of the company for the financial year end 31 December 2021 and 31 December 2022; which comprise the Income Statement, the Balance Sheet, the Reconciliation of Shareholders Funds and notes from the company's accounting records and from information provided by the company director. The statements have been prepared for the Director of Shanakyle Bog Restoration Company Limited. Income and Expenditure for the twelve months ended 31st of December for 2021 and 2022 respectively are summarised in Table 5.1 and 5.3. Tables 5.2 and 5.4 summarise the Balance Sheet for 2021 and 2022 respectively. Overall, the project was completed within budget and within the specified timeframe. The budget outlined in the Project Plan included 10% contingency. This was an important factor in delivering project milestones within budget and to overcome rises in inflation and cost of living over the project duration. A project tracker was developed by the project team to monitor expenditure. Expenditure reports were submitted to the project sponsor every three months and a project status report was submitted to the DAFM every six months.

Table 5.1 Income and Expenditure for 2021

<u>Income & Expenditure</u>	-	-
<u>For the 12 months ended 31st December</u>	<u>2021</u>	<u>2020</u>
	€	
Grant Income	46,575	
	-----	-----
Gross Income	100% 46,575	-----
	-----	-----
Sub Contractors	30,543	
Consultants	2,312	
Administration		
Insurance	273	
Travel and subsistence expenses		
Telephone		
Photocopying, printing and postage		
Bank Charges		
Purchases	2,466	
Signage		
Equipment Hire	160	
Bird & Bat Bxes	119	
Sundries	12	
	-----	-----
	35,885	
Profit on Ordinary Activities before Interest	10,689	-----
	-----	-----
	10,689	-----

Interest payable and similar charges			
<i>Profit on Ordinary Activities before Taxation</i>		10,689	
-			
-		10,689	
-			
Tax on profit on ordinary activities			
<i>Profit for the Financial Period</i>		10,689	
		10,689	
Reserves and non cash adjustments	-	-	-
Opening Balance	-	-	-
Profit for the period		10,689	
Closing Balance		10,689	

Table 5.2 Balance Sheet for 2021

Balance Sheet		
<u>As at 31st December</u>	2021	2020
	€	€
Fixed Assets		
<i>Tangible Asset</i>		
-		
<u>Current Assets</u>		
<i>Bank</i>	10,689	
Debtors	100	
	10,789	
<u>Current Liabilities</u>		
Creditors and Accruals	(0)	
	(0)	
Net Current Assets	10,789	
<i>Net Assets</i>	10,789	

<i>Financed By</i>		
Issued Share Capital	100	
Income and Expenditure reserves	10,689	
	<u>10,789</u>	

Table 5.3 Income and Expenditure for 2022

<u>Income & Expenditure</u>		<u>2022</u>	<u>2021</u>
<u>For the 12 months ended 31st December</u>			
		€	
Grant Income		9,026	46,575
Gross Income	100%	<u>9,026</u>	<u>46,575</u>
Sub Contractors		2,787	30,543
Consultants		5,276	2,312
Administration			
Insurance		285	273
Travel and subsistence expenses		64	
Telephone			
Photocopying, printing and postage		457	
Bank Charges		2	
Purchases		6,096	2,466
Signage			
Equipment Hire		289	160
Bird & Bat Bxes		1,387	119
Sundries		322	12
Corporate Entertainment		547	
Accountancy		2,139	
Licence & subscriptions		65	
		<u>19,716</u>	<u>35,885</u>
Profit on Ordinary Activities before Interest		<u>(10,689)</u>	<u>10,689</u>
		(10,689)	<u>10,689</u>
Interest payable and similar charges			
<i>Profit on Ordinary Activities before Taxation</i>		<u>(10,689)</u>	<u>10,689</u>
-		<u>(10,689)</u>	<u>10,689</u>
-			
-			
Tax on profit on ordinary activities			
<i>Profit for the Financial Period</i>		(10,689)	10,689

	(10,689)	10,689
Reserves and non cash adjustments	-	-
Opening Balance	10,689	-
Profit for the period	(10,689)	10,689
Closing Balance	-	10,689

Table 5.4 Balance Sheet for 2022

<u>As at 31st December</u>	2022	2021
	€	€
Fixed Assets		
<i>Tangible Asset</i>		
-		
<u>Current Assets</u>		
<i>Bank</i>		10,689
Debtors	100	100
	<u>100</u>	<u>10,789</u>
<u>Current Liabilities</u>		
Creditors and Accruals	(0)	(0)
	<u>(0)</u>	<u>(0)</u>
Net Current Assets	<u>100</u>	<u>10,789</u>
<i>Net Assets</i>	<u>100</u>	<u>10,789</u>
<i>Financed By</i>		
Issued Share Capital	100	100
Opening balance / reserves	10,689	
Income and Expenditure reserves	(10,689)	10,689
	<u>100</u>	<u>10,789</u>

Section 6 Dissemination

This section of the report provides an overview of the projects outreach programme to communities, farmers and local interest groups, in addition to key achievements (refer to Table 6.1).

Table 6.1 Dissemination Table of Events and Achievements

Date	Action	Targets Achieved	Carried out by	Location	Lessons Learned
May 2021 - Present	Social Media Posts	Established a dedicated twitter profile and Instagram profile to communicate the work and project on social media.	Project Leads	Online	<p>There has been significant interest in the project since peatland restoration work commenced in October 2021. Film footage and images of the work in action was shared on social media with positive feedback received from online users. Posts on Twitter received a significant number of 'likes'. This led to members of the public seeking advice on how to carry out peatland rewetting work in their own communities. An Instagram account was also setup to promote the project and give peatland rewetting more visibility on social media platforms.</p> <p>The project team has learned that social media is an important platform in terms of communicating the work to members of the public and media outlets; and inspiring communities and local interest groups to undertake a nature conservation project.</p>
January 2022 – September 2022	Print Media (Clare Champion, Agriland, Farming Independent, Irish Examiner and The Clare Echo newspapers)	The project leads conducted interviews with print media to raise awareness of the project and the important role of peatlands in terms of biodiversity and ecosystem services	Project Leads	Print media	The project received a positive response following appearances on print media which communicated the rewetting work carried out on Shanakyle Bog and the important role of farmers/landowners in conserving peatlands

		(e.g. carbon sequestration, water quality, flood control, community participation, education and research).			and the science behind carbon sequestration and peatlands. Shanakyle Bog Restoration Group received several emails and phone calls enquiring about how to carry out peatland restoration and rewetting work and the potential financial incentives for farmers. The project team learned that there is a strong appetite amongst members of the public to carry out community led peatland restoration projects and that Shanakyle Bog Restoration and Habitat Enhancement EIP project can be used as a demonstration test site to showcase the work. A local interest group in Offaly have now embarked on a peatland restoration project of their own following publication of the Farming Independents article on Shanakyle Bog.
November 2021 and February 2022	Television Media ('Nuacht TG4'; broadcast November 2021 and RTE's 'Ear to the Ground'; broadcast February 2022)	The project leads and the rewetting work appeared on television media to raise awareness of the project and the important role of farmers in terms of conserving peatlands and the benefits of peatland restoration for biodiversity and other ecosystem services.	Project Leads	Television media	The project received a huge response following an appearance on RTE's 'Ear to the Ground' which showcased the rewetting work carried out on Shanakyle Bog and the important role of farmers/landowners in conserving peatlands. Shanakyle Bog Restoration Group received several emails and phone calls enquiring about how to carry out peatland restoration and rewetting work and the potential financial incentives for farmers. The project leads learned that there is a

					strong appetite amongst members of the public to carry out community led peatland restoration projects and that Shanakyle Bog Restoration and Habitat Enhancement EIP project can be used as a demonstration test site to showcase the work.
December 2021 – Various dates	Field demonstration events	As set out in the project plan submitted to the project sponsor in March 2021, the project team showcased the rewetting and habitat enhancement work to statutory and non-statutory organisations including BirdWatch Ireland, Irish Farmers Association, local county councillors, National Parks and Wildlife Service, local interest groups (peatland communities) from Connemara; Limerick School of Art and Design and academics from the University of Limerick on various dates. The field visits aimed to raise awareness of biodiversity community initiatives to stakeholder groups; and the potential of the project site as an area of research for third level institutions.	Project Leads	Onsite field visits	<p>Shanakyle Bog Restoration Group received positive feedback from stakeholder groups and have formed a collaborative approach with project partners to conserve wildlife. The University of Limerick expressed interest in the potential to carry out carbon research on the peatland habitats of Shanakyle Bog. Limerick School of Art and Design have embarked on an environmental creative art project and used the rewetting of Shanakyle Bog as one of their primary themes. An art exhibition titled ‘The Land is Soft’ was exhibited at the People’s Museum of Limerick in April 2023. The Mayor of Limerick was in attendance and commended the project leads of Shanakyle Bog Restoration Group for undertaking the project in his opening address.</p> <p>There is a growing interest in community led peatland restoration project. Onsite demonstration events and shared knowledge is key to inspiring others to address the climate and biodiversity crisis at local scale.</p>

<p>August 2022</p>	<p>Bog Walk and Talk – National Heritage Week ‘Bog Walk and Talk on Shanakyle Bog’.</p>	<p>Shanakyle Bog Restoration Group hosted an event ‘Bog Walk and Talk on Shanakyle Bog’ to coincide with National Heritage Week. The talk aimed to raise awareness of peatland conservation and demonstrate the work carried out by Shanakyle Bog Restoration Group.</p>	<p>Project Leads</p>	<p>Onsite event</p>	<p>Shanakyle Bog Restoration Group won the County Clare Heritage Week Event Award for the event ‘Walk & Talk on Shanakyle Bog’ awarded by the Heritage Council in October 2022. There were ninety other events held in Clare that were in contention for the award. The project has inspired several local interest groups who attended the event including the Tullamore Lions Club, who have gone on to embark on their own peatland restoration project. The event was well attended. There is a growing interest in community led peatland restoration projects and hosting field events and sharing knowledge is key to inspiring community groups to address the climate and biodiversity crisis at a local and national scale.</p>
<p>September 2022</p>	<p>Shanakyle Bog Restoration and Habitat Enhancement EIP Project Launch</p>	<p>Shanakyle Bog Restoration Group hosted and celebrated the launch of Shanakyle Bog Restoration and Habitat Enhancement EIP project launch in September 2022. The launch was hosted at a nearby public house and gardens. The project leads of Shanakyle Bog presented an overview of the actions of the project. The opening address was delivered by the Minister of State for Landuse and Biodiversity and</p>	<p>Project Leads</p>	<p>Onsite event</p>	<p>The event was well attended and Shanakyle Bog Restoration Group received great support from attendees from both farming and nature conservation groups, all coming together to endorse the project. Attendees included members of the National Parks and Wildlife Service, local farmers, Irish Farmers Association, BirdWatch Ireland, Irish Wildlife Trust, Clare County Council, DAFM, Green Party representatives, locally led farming EIP groups. The project team learned that fostering and building strong partnerships</p>

		<p>guest speakers included representatives of the Community Wetlands Forum, National Parks and Wildlife Service and the Clare Heritage Officer. The theme of the event was centred around peatlands. An information pack including a synopsis of the project and actions carried out, leaflets, best practice farming for wetlands guidance was circulated to members in attendance. The launch was followed by a field trip to the project site to showcase the work to attendees.</p>			<p>with organisations and communities is important in terms of driving success of the project and adopting a bottom up approach. Under the right leadership, farming and nature conservation led organisations can work together to deliver biodiversity initiatives and sustainable farming practices.</p>
April 2023	<p>CIEEM Awards Finalist - 'Best Practice Small Scale Nature Conservation'</p>	<p>The project leads Barry O'Loughlin and Catherine Ní Ciardha have been short-listed as a finalist for the project 'Shanakyle Bog Restoration and Habitat Enhancement EIP' within the award category 'Best Practice Small Scale Nature Conservation'</p>	<p>Project leads nomination</p>	<p>Botanical Gardens, Birmingham, UK (June 2023)</p>	<p>This is the first Irish Project to be short listed as a finalist in the category 'Best Practice Small Scale Nature Conservation' at the CIEEM awards in the UK. The CIEEM awards recognises outstanding work undertaken by ecologists and environmental managers across the UK and Ireland.</p>



Plate 6.1. Reconfigured wetland habitat: Aerial view of the high bog in February 2022.



Plate 6.2. Shanakyle Bog Restoration Group hosted an event 'Bog Walk and Talk on Shanakyle Bog' during National Heritage Week. The group won the County Clare Heritage Week Event Award.

Section 7 Value for Money

Funding for the project has resulted in the promotion of nature-based solutions through the wise use of peatlands in County Clare. This is the first raised bog restoration project to be carried out in County Clare and one of only a handful of peatland restoration projects to be carried out on privately owned lands in Ireland. 30 acres of degraded raised bog is now actively transitioning to peat forming ‘active raised bog’. Shanakyle Bog Restoration Group has partnered and collaborated with several organisations including the Irish Wildlife Trust, National Parks and Wildlife Service, BirdWatch Ireland, Clare County Council, Irish Farmers Association; Community Wetlands Forum, University of Limerick, Limerick School of Art and Design, local farmers and local interest groups. Shanakyle Bog Restoration Group won the County Clare Heritage Week Event Award for the event ‘Walk & Talk on Shanakyle Bog’ awarded by the Heritage Council in 2022. There were ninety other events held in Clare in contention for the award. In April 2023, the project was shortlisted as a finalist in the category ‘Best Practice Small Scale Nature Conservation’ for the CIEEM (Chartered Institute of Ecology and Environmental Management) awards encompassing the UK and Ireland scheduled to be held in June 2023.

The project has inspired several local interest groups who have visited Shanakyle Bog for bog walks and talks; and have now gone on to embark on their own community peatland restoration projects in Counties Offaly, Clare and Galway. The restoration and enhancement work carried out now provides a range of ecosystem services including rewetting peatlands for carbon sequestration; biodiversity enhancement and habitat restoration; improving water quality of surrounding watercourses; increasing the water storage capacity of the bog and providing educational opportunities for third level institutions. Shanakyle Bog Restoration and Habitat Enhancement EIP is a good example of a project using nature based solutions to address the climate and biodiversity crisis at a local level. The project team has actively worked with farm organisations in Clare to promote and raise awareness of biodiversity and nature conservation measures that can be adopted by local farmers. The project has received national attention in both television and print media; which strived to promote and highlight the biodiversity benefits of peatland restoration and habitat enhancement actions; and the important role of locally led EIP projects to deliver ecosystem services within agricultural communities. The project was celebrated at the launch day hosted by Shanakyle Bog Restoration Group in September 2022 and the opening address was delivered by the Minister of State for Landuse and Biodiversity.

Section 8 Operational Approach

Following approval to proceed with the project by the DAFM in May 2021, Shanakyle Bog Restoration Group prepared a Project Initiation Document (and a Project Plan) which set out the organisational structure of the project; project management team structure; quality management strategy; risk management strategy; communications management strategy; project approach; budget; and monitoring and control. The project leads of Shanakyle Bog Restoration Group set up a private limited company, *Shanakyle Bog Restoration Company Limited* which was incorporated on 11th of August 2021 (CRO number: 70152). The company was registered with the Register of Beneficial Ownership (Reference No: CR1161123). The Register of Beneficial Ownership (RBO) is the central repository of information held by companies and industrial and provident societies in their own internal registries in respect of the natural persons who are their beneficial owners/controllers. A company director and secretary were appointed. L.V Hogan Accountants Ltd. were contracted to prepare financial statements for the year end of 2021 and 2022 respectively. The company was also registered with the revenue commissioners as a non-profit company. Following company registration, a bank account was setup with Allied Irish Bank (106/108 O'Connell Street, Limerick) as a Business Start-up Current account. This type of bank account was eligible under the Deposit Guarantee Scheme and registered for phone and internet banking. Shanakyle Bog Restoration Group acquired Public Indemnity Insurance to facilitate bog walks and talks to members of the public (e.g. local interest groups, local community, NGO's). *Shanakyle Bog Restoration Company Limited* was registered as a non-profit organisation and did not employ any staff. Sub-contractors were engaged and appointed to carry out necessary works to achieve project deliverables such as hydrological studies, peatland rewetting, pond creation, installation of a lectern, invasive species surveys and treatment eradication measures, baseline ecology surveys. The work was administered by the project leads. Volunteers (three individuals) assisted with the installation of bird nest boxes and bat roost boxes. Shanakyle Bog Restoration Group also engaged with BirdWatch Ireland to install a barn owl box on a voluntary capacity as part of the Clare Barn Owl Survey, and the Irish Wildlife Trust (Limerick Branch) to record damselflies and dragonflies. A GDPR and Risk Management document, *Shanakyle Bog Restoration and Habitat Enhancement Project EIP: GDPR and Risk Management* was compiled to ensure all personal data processed was carried out in accordance with the law on data protection taking cognisance of the legislative instruments, Data Protection Act 1988 (as amended by the 2003 Data Protection Act), The Data Protection Act 2018 and The General Data Protection Regulations (EU 2016/679). A Health and Safety document, *Shanakyle Bog Restoration and Habitat Enhancement Project EIP: Health and Safety* was also prepared prior to the implementation of project actions and was updated regularly along with the GDPR and Risk Management document. Risks and responses associated with Covid-19 were identified in the risk management strategy of the Project Plan and Project Initiation document. Covid-19 did not impact on the project achieving key milestones and timelines as the project coincided with the Irish government lifting Covid-19 restrictions. Overall, the project was delivered within budget and within agreed timeframes (refer to Table 8.1) as set out in the Project Plan and Project Initiation Document. Project status reports and expenditure reports were submitted to the DAFM on a regular basis. Following completion of project works, the company bank account was closed in 2023 and an application was made to cease Corporation Tax Registration with the Revenue Commissioners through the company's accountants which was subsequently granted. The accountants then applied for a Letter of no Objection from the Revenue Commissioners for a Voluntary Strike off at the Companies Registration Office (CRO).

Table 8.1 Summary of project finances throughout all phases of the project.

Period	01/07/2021 - 31/12/2021	01/01/2022 - 30/06/2022	01/07/2022 - 31/12/2022	Total Project Spend
Income	€46,574.61	-	€9,026.39	€55,601.00
Expenditure				
Sub-Contractors	€30,542.95	€794.50	€1,872.75	€33,210.20
Consultants	€2,312.40	€2,193.17	€ 9,111.81	€13,617.38
Insurance	€272.97	-	€284.94	€557.91
Travel and subsistence expenses	-	-	€64.03	€64.03
Launch Day Expenses	-	-	€663.40	€663.40
Photocopying, printing and postage	-	€35.70	€421.03	€456.73
Interest payable and similar charges	-	€0.48	€1.62	€2.10
Purchases	€2,466.15	-	-	€2,466.15
Equipment Hire	€159.90		€172.20	€332.10
Bird Boxes & Bat Boxes & Trail Cameras	€118.90	€1,287.40	€100.00	€1,506.30
Sundries	€12.00	€464.44	€44.11	€520.55
Accountancy	-	€759.50	€1,379.54	€2,139.04
Licence & Subscriptions	-	-	€65.11	€ 65.11
				-
Total Expenditure	€35,885.27	€5,535.19	€14,180.54	€55,601.00
			-	-
Balance in account	€10,689.34	€5,154.15	-	-

Section 9 Lessons Learned

Shanakyle Bog Restoration and Habitat Enhancement EIP aims to address the biodiversity and climate crisis at a local level through targeted habitat restoration and habitat enhancement actions. Clare County Council have recently commissioned a county wide wetland identification and inventory survey which will involve assessing the condition of wetland sites and assigning a conservation value through ground-truthing data collection. Information collated from this exercise could be used to inform site selection to repair degraded wetlands by employing targeted restoration techniques; and address threats and pressures on wetland ecosystems of conservation importance. This will require an integrated landscape and farm level approach to improve the conservation status of wetland habitats in County Clare. There is a risk that site specific biodiversity targeted actions may be missed when considering generic agri-environmental schemes rolled out at national level. The EIP funding model provides a valuable opportunity for Clare farmers to carry out peatland restoration projects at a large scale under a dedicated EIP project employing a results based payment scheme with a view to using Shanakyle Bog Restoration and Habitat Enhancement EIP as a pilot site. Consultation with farmers and other stakeholders at the onset of any future environmental schemes gives ownership of the scheme to local farmers. This will ensure the long-term success and interest of biodiversity actions. A proactive working relationship between an appointed project team and the local area is beneficial for both a pilot project and participating landowners. Should a peatland restoration initiative be carried out at a much broader scale in County Clare, the provision of ecosystem services with regard to water quality (intercepting silt run-off), flood prevention (water retention of rewetted peatlands), carbon sequestration, biodiversity enhancement; and amenity and educational opportunities must be profiled in advance. The restoration of wetlands has the potential to link in with the Water Framework Directive in terms of achieving ‘good status’ for ‘at risk’ waterbodies at a regional scale and addressing flooding of farmland in downstream catchments by employing nature based solutions through farmer/landowner participation into similar schemes. There is also an opportunity to manage and enhance adjoining grasslands and woodlands surrounding peatlands in Clare for pollinators and protected and endangered species through the creation of wildflower meadows and the installation of bird nest boxes and bat roost boxes at suitable locations. Such projects can build social relationships among farming communities and contribute towards achieving national targets set out under the National Biodiversity Action Plan and Climate Action Plan.

9.1 Actions to Carry Forward

As detailed in Table 3.1, it is an objective of Shanakyle Bog Restoration Group to continue to host events including bog walks and talks to coincide with National Heritage Week and Biodiversity Week; and to host demonstration events to the farming community, local interest groups and third level institutions. Shanakyle Bog Restoration Group is committed to engaging and collaborating with the local farming community, local interest groups, scientists, specialists and statutory and non-statutory organisations to record species and assemblages of wild flora and fauna, undertake further scientific research and to promote education and awareness of raised bogs in County Clare. It is envisaged that following implementation of biodiversity actions, the work will aim to serve as an important education resource for research students and academics at the nearby University of Limerick and other third level institutions. This will provide research opportunities to study the project site and potentially to carry out detailed scientific studies of the effects of peatland restoration work carried out and carbon sequestration. A second raised bog ecotope and cutover survey will be carried out at 5 year intervals with the next survey scheduled for 2026. The purpose of this study is to monitor changes in vegetation communities following targeted rewetting, monitor ecotopes on the high bog and Sphagnum groups on the cutover. The raised bog ecotope and cutover habitat boundaries will be remapped and the findings will be documented in a final report. Permanent quadrats established in September 2022 will be monitored to assess Sphagnum recovery in conjunction with the next raised bog ecotope and cutover habitat survey.

Section 10 Improving a Future Project

Timing: Shanakyle Bog Restoration and Habitat Enhancement EIP was awarded funding in May 2021. Taking into consideration the detailed level of ecology surveys carried out, the project captured the optimal growing season of 2021 to carry out baseline surveys. The allocated start date was restrictive in terms of planning ecology baseline surveys; with time spent on project setup (i.e. preparing administrative documentation, company registration, opening bank accounts, submission of additional information to the project sponsor). From the project teams experience, it may be more advantageous going forward to grant funding at an earlier date in the first quarter of the year and ahead of the summer season. The peatland restoration and rewetting work; and creation of a wildlife pond was conducted from October to December 2021 and outside the bird nesting season to avoid disturbance impacts on nesting birds. In this respect, there were no timing constraints in relation to achieving these KPI's with enough time allocated to inform the peatland rewetting design phase.

Finance Allocation: Shanakyle Bog Restoration Group factored in 10% contingency in relation to estimated costs in the proposal submitted for funding. The project team found that some KPI's such as the creation of the wildlife pond needed additional financing (due to the requirement to install a geoline membrane). Contingency funding was used to implement this KPI. Overall, finance allocation to implement Shanakyle Bog Restoration and Habitat Enhancement Project EIP was considered adequate as all project KPI's were achieved within budget.

Duration: In the case of Shanakyle Bog Restoration and Habitat Enhancement Project EIP, all practical project KPI's were completed within sixteen months. A timeframe of eighteen months is more realistic for undertaking a project of a similar size in scale to cater for any potential delays in terms of missed survey opportunities due to seasonal constraints, for example.

Section 11 Closing Evaluation

Shanakyle Bog Restoration and Habitat Enhancement Project EIP has achieved the main objectives set out within the project plan within allocated timeframes and budget. 30 acres of raised and cutover bog has been rewetted and restored by installing a network of peat dams, peat bunds and overflow pipes and the degraded peatland is now slowly transitioning to active raised bog. The biodiversity actions carried out have set the project site on a positive trajectory in terms of transitioning the peatland from a carbon source to a carbon sink. The habitat enhancement measures implemented including the creation of a wildflower meadow, bird nest box installation, bat roost box installation and the creation of a wildlife pond in conjunction with rewetting peatland habitats will provide a wildlife refuge and biodiversity hotspot for species of conservation concern in a landscape surrounded by urban sprawl and agriculture. The project highlights alternative landuse management measures farmers can undertake to enhance their lands for biodiversity. The project has raised awareness both locally and nationally in terms of the biodiversity benefits of peatland rewetting and habitat enhancement to local interest groups. Many of these groups have gone on to embark on their own peatland rewetting projects inspired by the work of Shanakyle Bog Restoration and Habitat Enhancement EIP. Shanakyle Bog is of international importance due to the presence of the EU priority listed Annex I habitat; ‘active raised bogs (7110)’ and two additional Annex I habitats of national importance; ‘degraded raised bogs still capable of natural regeneration (7120)’ and ‘Depressions on peat substrates of the *Rhynchosporion* (7150)’. The peatland habitats have added significance due to the limited geographic range of ‘active raised bog (7110)’ habitat in County Clare. Despite its relatively small size, Shanakyle Bog is a site of considerable conservation significance comprising regenerating ‘active raised bog (7110)’, a rare priority listed habitat of the European Union and one that is becoming increasingly rare and under threat in Ireland. The site is now actively managed for conservation as part of Shanakyle Bog Restoration and Habitat Enhancement Project EIP. This is a flagship project which has set a precedent for nature conservation and peatland restoration in County Clare and nearby County Limerick. A project of this undertaking would not have been possible without the funding and support of the DAFM’s locally led EIP scheme (under the Rural Development Programme) and the dedicated work carried out by Shanakyle Bog Restoration Group to deliver the first raised bog restoration and rewetting project in County Clare.

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