National Parks & Wildlife Service

Tóchar Midlands Wetland Restoration Scheme

Ballylynan

NFS site 109003

Fen Restoration Plan

September 2026

Tóchar Athchóiriú Bogach Lár na Tíre Midlands Wetland Restoration
ARUP
Rialtas na hÉireann Government of Ireland
Arna chomhchistiú ag an Aontas Eorpach Co-funded by the European Union
Tionól Réigiúnach an Oirthir agus Lár Tíre Eastern and Midland Regional Assembly
NPWS An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra National Parks and Wildlife Service

Fen Restoration Plan

Ballylynan

Hannah Comber, Amy Sproule,

Rafaela Christ da Silva, Hannah Sheridan , Gerry Baker, George Smith

ARUP

Citation:

Comber, H., Sproule, A., Christ, R., Sheridan, H., Baker, G, Smith, G. (2026)

Fen Restoration Plan. Ballylynan (Laois). The National Parks and Wildlife Service.

Tóchar Midland Wetlands Restoration is co-funded by the Government of Ireland and the European Union through the EU Just Transition Fund Programme and managed by the National Parks and Wildlife Service, of the Department of Housing, Local Government and Heritage.

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Executive Summary

Ballylynan is a small site located 1 km north of the village of Ballylynan, in Co. Laois. The site is hydrologically connected to River Barrow/Nore Special Area of Conservation (Site Code: 002162). The site is mainly rich fen, including Annex I quality 7230 Alkaline fen and areas of rank non-Annex fen, along with scrub, wet heath, reed and tall-herb swamp. Surrounding land use is primarily improved grassland, arable agriculture, and conifer forestry, with hawthorn treelines and vegetated drains forming field boundaries.

This assessment of Fen Restoration Plan has been developed to set out proposals for the restoration of Annex I quality 7230 Alkaline fen habitat.

The following pressures were identified at site level through the review of historical and current site data:

- Abandonment of traditional management (undergrazing);
- Drainage and hydrological modification;
- Localised impacts from invasive or non-native species (e.g. self-seeded conifers).
- Nutrient enrichment associated with surrounding land use (agriculture); and
- Scrub encroachment and vegetation succession.

Restoration Plan

The Fen Restoration Plan is informed by a combination of desktop review of available datasets and surveys, including the National Fen Survey (2022), supplemented by detailed aerial imagery, topographic analysis, and targeted hydrological and ecological field surveys. These data were used to characterise site conditions, validate key pressures, and inform the development of appropriate restoration measures.

Hydrological measures will focus on drainage impacts along the water output in the eastern site boundary, and two other drains, located in the northwest and southeast, where evidence of dry fen habitats have been identified. The aim of these drain measures is to raise water levels and restore natural fen conditions. The effectiveness will be assessed through a programme of groundwater monitoring using piezometers and surface water monitoring. To address nutrient pressures, the plan promotes collaboration with local landowners and farmers to reduce nutrient runoff from surrounding agricultural land, supported by ongoing water quality monitoring.

Vegetation restoration measures focus on the recovery and long-term maintenance of 7230 Alkaline fen through the implementation of conservation grazing, targeted scrub management, vegetation monitoring, establishment of a vegetated buffer strip to protect water quality, invasive non-native species monitoring and control, and adaptive management in response to hydrological restoration. These measures are designed to reduce the dominance of competitive

species, maintain open fen conditions, improve habitat structure and resilience, and support progress towards favourable conservation condition and achievement of the site-specific conservation objectives. Successful delivery will require ongoing collaboration between landowners, NPWS and other relevant stakeholders.

Habitat and Restoration Map

The habitats recorded during the 2022 NFS and classified according to the Fossitt Habitat Classification system is presented in Figure 1-1.

The Restoration and Monitoring Map including both hydrological and ecological measures is presented in Figure 1-2.



Figure 1-1: Annex I habitats recorded during the 2022 NFS . Refer to Table 9-1 for the Annex habitat names and codes. Note the % value indicates the %cover of the Annex I and Annex I quality habitat recorded in the polygon

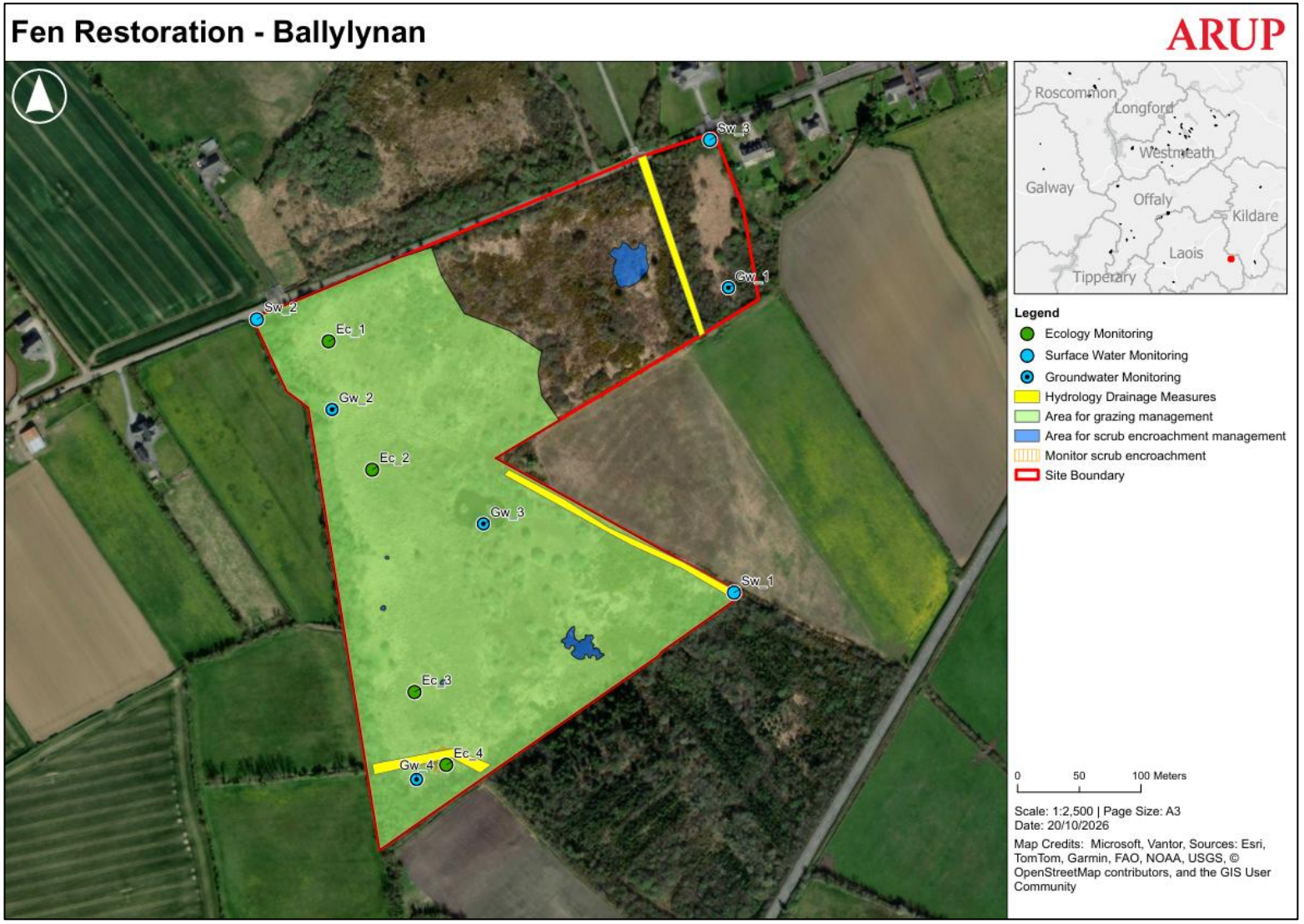


Figure 1-2: Restoration measures for Ballylynan

Acknowledgements

This Fen Restoration Plan was prepared following consultation with a broad range of groups and individuals involved in Peatland restoration, local residents and stakeholders through several workshops.

Thanks to the members of the SAR Directorate, NPWS Regional Staff, Ecological Assessment Unit (EAU), Ecological Guidance and Advisory Unit (EGAU), Wildlife Enforcement and Nature Protection Directorate, Conservations Measures Unit, Conservation Planning Unit, The FENCES Project team and the Tóchar Wetlands Project Team, including Shirley Clerkin (Project Manager), Monica Byrne (Project Administrator), Hazel Daly (Community Engagement Officer), and Emily Nolan (Community Engagement Officer).

Tóchar Wetlands is a wetlands restoration project, co-funded by the Government of Ireland and the European Union through the EU Just Transition Fund Programme. It is managed by the National Parks and Wildlife Service, of the Department of Housing, Local Government and Heritage.

1 Introduction

1.1 Purpose of this Fen Restoration Plan

This Fen Restoration Plan (FRP) report was developed by Arup on behalf of National Parks and Wildlife Service (NPWS) to set out proposals for restoration of Annex[1] I quality[2] 7230 Alkaline fen habitat within the site which contributes to favourable conservation condition of the fen habitat.

Ballylynan is approximately 19 km southeast of Portlaoise, Co. Laois. The site forms part of the River Barrow and River Nore Special Area of Conservation (SAC) (Site Code: 002162), however, the Annex I quality 7230 Alkaline fen present at Ballylynan is not a qualifying interest feature of the SAC. The site covers a total area of 12.17 ha, of which 5.5 ha is a mosaic fen habitat although several other associated wetland habitats are also present (wet heath, reed swamp, and tall-herb swamp). According to the National Fen Survey (NFS) conducted in 2022, as reported by the National Parks and Wildlife Service (NPWS) in (Brophy et al., in prep.), the total area of Annex I quality 7230 Alkaline fen habitat is 2.94 ha.

The main aim of the restoration actions proposed as part of this FRP is to maintain or improve the quality of existing areas of fen and their hydrological condition, allowing an expansion of the measurable area of fen thus impacting favourable conditions. However, in some areas, it must be recognised that restoration to increase areas of existing fen will not be possible due to unsuitable hydrological conditions, and the objective may simply be to ensure no further deterioration.

Although the focus of the FRP is on fen habitat, it is anticipated that restoration actions will also benefit other wetland habitats, including wet heath, reed swamp, and tall-herb swamp, of which some can be considered as Annex I quality habitats; 6430 Hydrophilous tall-herb swamp which were mapped in the centre of the site; and 91E0 Alluvial forests also mapped at the centre and to the south-west boundary. 4010 Northern Atlantic wet heaths with Erica tetralix (referred to as 4010 Wet heath) as mosaics to the north and south of the site (Brophy et al., in prep.). 1016 Desmoulin's whorl snail Vertigo moulinsiana, (hereafter referred to as 1016 Vertigo moulinsiana) are species associated with fen habitats, with the desk study suggesting potential records on the site.

The implementation of the actions proposed within this FRP report may also provide wider improvements to biodiversity, reduce carbon emissions and potentially improve water quality all of which may be demonstrable under eventual post implementation monitoring.

[1] Each habitat and species type protected under the EU Habitats Directive (Council Directive 92/43/EEC of 21 May 1992) is given a unique numeric code so that all. Member States use the same reference in legislation, reporting and monitoring. Each habitat and species code is an index in the Annex lists with codes grouped by habitat family.

[2] In this report, “Annex I quality” refers to habitats of Annex I type mapped to Annex-quality standard

1.2 Wider benefits of fen restoration

Fens are vital habitats due to their rich biodiversity, supporting a wide array of flora and fauna, many of which are rare or endangered. They act as natural water filters, purifying water by trapping pollutants and sediments, thus enhancing water quality downstream. Additionally, fens store significant amounts of carbon in their peat soils, contributing to climate change mitigation by reducing atmospheric carbon dioxide levels. Their ability to absorb and gradually release water helps regulate water flow and minimise flood risks. Beyond their ecological importance, fens hold cultural, historical, and recreational value, offering opportunities for education, research, and outdoor activities. Although some fens in Ireland are not protected as SACs or Natural Heritage Areas (NHAs), they remain crucial for biodiversity and climate resilience.

Peatland drainage and extraction transform a natural peatland which acts as a modest carbon sink into a carbon source (Waddington & McNeil, 2002; Alm et al. 2007; Wilson et al. 2015). The EPA- funded Carbon Restore Project (Wilson et al. 2012) found that rewetting of drained peatlands can lead to restoration of functional peatland, such as the return of typical plant and animal species, which in turn may lead to the restoration of peat-formation and the carbon sink function.

The restoration of fen habitat at Ballylynan is likely to lead to improved water quality. Well-functioning fen habitat reduces the risk of dissolved organic carbon passing into water course and has been shown to attenuate the speed at which water moves downstream thereby reducing flood risk.

1.3 Key pressures on Fens

The overarching (National) key pressures and threats to Annex I quality fen habitats, have been identified in the latest Status of EU Protected Habitats and Species in Ireland (Article 17 report) (NPWS 2025).). The pressures/threats present in Table 1-1 are reflective of the pressures and threats identified for 7230 Alkaline fen at Ballylynan. The overall conservation status is assigned as ‘Bad’ for 7230 Alkaline fen in the Article 17 report.

Table 1-1: National pressures to fen habitats

Habitat	Importance	Pressure
7230 Alkaline fen	High	PA22 Drainage for use as agricultural land J01 Mixed source pollution to surface and ground waters
	Medium	PA01 Conversion into agricultural land (excluding drainage and burning)

Habitat	Importance	Pressure
		PA05 Abandonment of management/use of grasslands and other agricultural and agroforestry systems (e.g. cessation of grazing, mowing or traditional farming) PB24 Drainage for forestry PI02 Other invasive alien species (other than species of Union concern) PL02 Drainage (mixed or unknown drivers) to surface or ground waters
	Low	PI03 Problematic native species PE01 Roads, paths, railroads and related infrastructure PC05 Peat extraction PA17 Agricultural activities generating pollution to surface or ground waters (including marine) PA20 Livestock farming generating pollution PB19 Forestry activities generating pollution to surface or ground waters (including marine)

1.4 Legislative Context

There is a comprehensive system of legislation, both domestic and international, which aims to protect biodiversity at a landscape, habitat and species level in Ireland. This legislation exists within, and independently of, the planning process.

In Ireland, the most important pieces of legislation underpinning biodiversity and conservation are:

- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, hereafter referred to as the Habitats Directive;
- Regulation (EU) 2024/1991 of the European Parliament and of the Council of June 2024 on nature restoration and amending Regulation (EU) 2022/869;
- Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds, hereafter referred to as the Birds Directive;
- European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. No. 477 of 2011), as amended, hereafter referred to as the Birds and Habitats Regulations;
- Wildlife Acts 1976 to 2017, hereafter referred to as the Wildlife Acts; and

- Flora (Protection) Order, 2015 (S.I. No. 356 of 2015).

According to the EU Habitats Directive (92/43/EEC) and the EU Birds Directive (79/409/EEC), Member States are required to establish a Natura 2000 network of sites of highest biodiversity importance for rare and threatened habitats and species across the EU. In Ireland, the Natura 2000 network of European sites includes SACs and Special Protection Areas (SPAs).

The EU Nature Restoration Regulation aims to restore damaged ecosystems and improve biodiversity with particular focus on capturing and storing carbon and reducing the impact of natural disasters. Specific targets include improving and re-establishing biodiverse habitats on a large scale and bringing back species populations by improving and enlarging their habitats. EU countries are required to submit National Restoration Plans to the European Commission showing how they will deliver on the targets and monitor their progress. Member States are required to implement restoration measures for specific habitats and species, including marine ecosystems, forests, wetlands, and pollinators.

SACs are selected for the conservation of Annex I habitats (including priority types which are in danger of disappearance) and Annex II species (other than birds). SPAs are selected for the conservation of Annex I birds and all migratory birds and their habitats. The Annex habitats and species, for which each site is selected, are the qualifying interests (QI) of the SAC and special conservation interest (SCI). Conservation objectives for the site are defined for these qualifying interests.

Ireland is required to manage water resources in an integrated way under the Water Framework Directive (WFD, 2000/60/EC) and the European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003). Member States are required to submit River Basin Management Plans to the European Commission showing how they will protect and improve the water environment. Restoring surface and groundwater bodies to the equivalent of ‘good status’ or better and to protect water from any further deterioration requires collaboration at a local and national level. Implementing the WFD supports the achievement of site-specific conservation objectives for fen habitats, contributing to their favourable conservation status.

2 Site Overview

2.1 Ballylynan

Ballylynan is located approximately 19 km southeast of Portlaoise, Co. Laois (Figure 2-1). The site comprises a groundwater-fed valley-bottom fen system that supports alkaline wetland habitats of high ecological value. Historic mapping indicates a long-standing association with wetland vegetation, including a north-south oriented drainage feature. The site elevation ranges from 60 mOD to 77 mOD. Higher elevations are found to the east of the site, at approximately 120 mOD.

Ballylynan is located with the Barrow WFD Catchment, with the Bennetsbridge (WFD Code IE_SE_14B011900) forming the eastern boundary and ultimately draining to the Barrow River. For the purposes of the Water Framework Directive (WFD), the site is situated within the Barrow_SC_070 sub-catchment.

The Ballylynan site is underlain by the Bagenalstown Upper Groundwater Body, which is at 'good' status and 'not at risk' of not achieving the Water Framework Directive (WFD) objectives.



Figure 2-1: Site Location Map

2.2 Fen condition assessment

Ballylynan was surveyed as part of the NFS (Brophy et al., in prep., 2022) on the 22nd of July 2022. While the NFS has not assigned pressures and threat codes that correspond with EU Reporting frameworks, the survey identified a few pressures influencing the condition of the fen habitat:

- Drainage along the eastern boundary of the site
- Extensive grazing surrounding the site
- Lack of active management

The NFS assessment of Annex I habitats highlighted contrasting conservation conditions, with the 7230 Alkaline Fen classified as 'Unfavourable – Bad', reflecting significant impacts on the habitat's structure and functioning.

The pressures identified during the NFS assessment were all considered to have a negative impact on the condition of the alkaline fen habitat (Table 2-1). In particular, drainage along the eastern boundary was identified as a key hydrological pressure, with the potential to alter site water levels and adversely affect habitat functioning. Extensive grazing and the absence of active management were also recognised as factors contributing to changes in vegetation structure and overall habitat condition. To support the restoration planning process, these pressures were evaluated during a field assessment undertaken in 2026, the findings of which are presented in Section 5 of this report.

Table 2-1: Conservation Status Assessment of 7230 Alkaline fen (Brophy et al., in prep., 2022).

Annex I habitat	Area (ha)	Overall Status	Rationale
7140	Not recorded	Not recorded	Not provided
7210	Not recorded	Not recorded	Not provided
7230	2.94	Unfavourable-Bad	Not provided.

2.3 Outline of this FRP document

- Section 2 of this FRP report outlines details of Ballylynan and condition assessment for Annex I quality fen habitat (7230 Alkaline fen);
- Section 3 outlines the findings from the land and water desktop and site monitoring surveys that were carried out to inform the development of this FRP;
- Section 4 outlines the findings from the ecological desktop and site monitoring surveys that were carried out to inform the development of this FRP;

- Section 5 provides a summary of the key pressures identified by this FRP report that are impacting on fen;
- Section 6 outlines the key restoration measures proposed by this FRP;
- Section 7 outlines additional considerations to inform the development of the FRP; and
- Section 8 outlines key players in the FRP, summarises restoration actions proposed, habitats that will benefit and further steps required to prepare for implementation.

Restoration actions proposed by this FRP assessment have been mapped in GIS format and delivered to NPWS in accordance with NPWS data standards. This includes detailed mapping of the key pressures addressed by this assessment, detailed mapping of proposed restoration actions, ecological survey results and referenced sensitivity areas. Regarding maps presented, and following consultation with NPWS, due to the sensitivity of many of the species recorded or referenced, species names have been omitted from Map legends. This is to ensure no confidential or highly sensitive locations are revealed which might result in negative impacts. GIS Shapefiles which accompany this report include all relevant data on referenced species.

3 Land and Water

3.1 Desktop Study

3.1.1 Meteorological Conditions

Understanding long-term meteorological patterns is key for informing effective fen restoration planning, particularly with respect to hydrological dynamics. In support of this analysis, historical precipitation data from the nearest Met Éireann weather station, Athy Levitstown (2014), have been examined for the past 23 years to evaluate seasonal rainfall variability at the site and in its vicinity (Met Éireann, 2026)

The data set presented is showing the average monthly precipitation (mm), incorporating a 23-year period to show seasonal distribution patterns (Figure 3-1). This information is important to assess water availability and to evaluate the feasibility and sustainability of restoration actions aimed at restoring or maintaining suitable hydrological conditions.

The average monthly rainfall is highest in the winter months (October to January) and lowest in late spring (April and May). Minimum rainfall follows a similar pattern, while the maximum monthly rainfall shows a notable increase in winter (Figure 3-1).

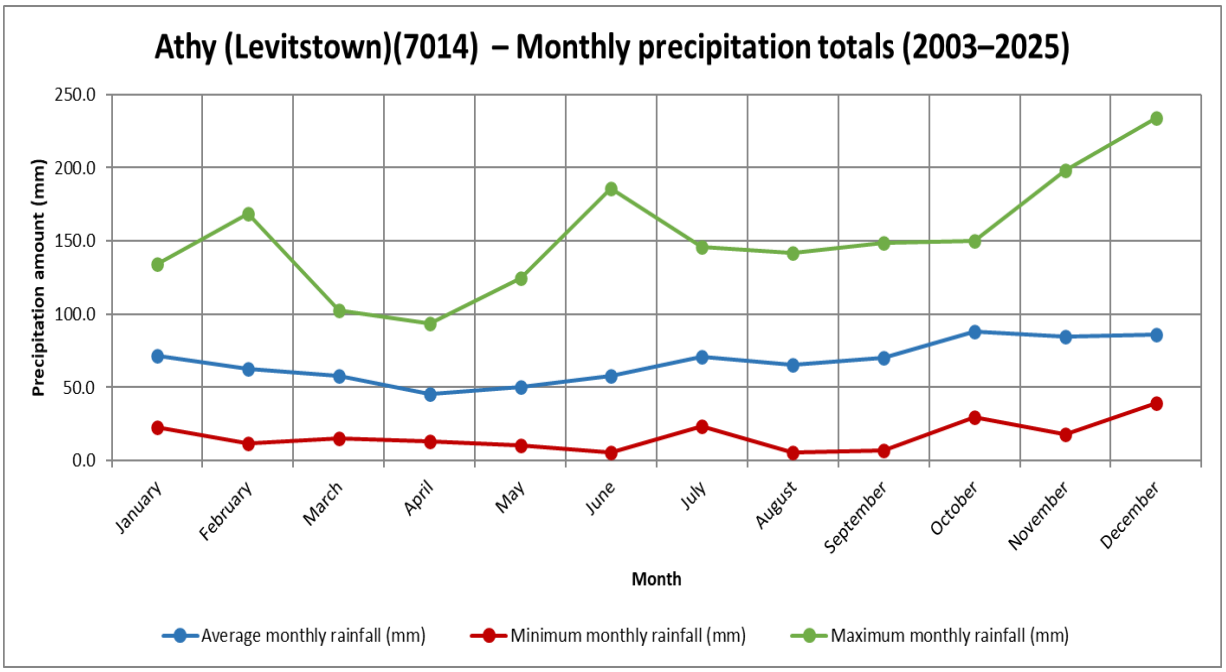


Figure 3-1: Athy (Levitstown) (7014) Weather Station – Total monthly precipitation within the last 23 years (2003-2025)

3.1.2 Hydrogeological Setting

The site is underlain by the Ballyadams Formation, characterised by thin-bedded, argillaceous limestones and calcareous mudstones, reflecting deposition in a relatively deeper-water,

low-energy marine environment during the Lower Carboniferous (Bedrock Geology 100K layer (GSI), as shown in Figure 3-2.

The area is underlain by a Regionally Important Karstified (diffuse) Aquifer (Rkd), which is moderately to highly productive, with groundwater flow occurring predominantly through enlarged fractures and diffuse karst features within the bedrock. Most of the groundwater flow is concentrated within the upper 15 m, comprising a weathered bedrock zone and an underlying interconnected fracture network. The aquifer map is presented in Figure 3-3.

Quaternary sediments are predominantly cut over raised peat, with an area of limestone-derived till present in the northeast. The surrounding area is underlain mainly by limestone-derived till, with cut over raised peat and a band of alluvium at the north of the site interspersed with areas of gravel derived from limestone. The subsoil type map underlying the site is presented in Figure 3-4.

Recharge rates follow a similar pattern, reflecting the influence of subsoil type on the water infiltration. Where the site is covered by peat, recharge rates are significantly lower, typically between 1 and 50 mm per year. In areas dominated by till and alluvium deposits, recharge rates raise from approximately 101 to 150 mm per year.

Groundwater vulnerability ranges from low to moderate, reflecting the influence of subsoil type on the water infiltration (Figure 3-5).

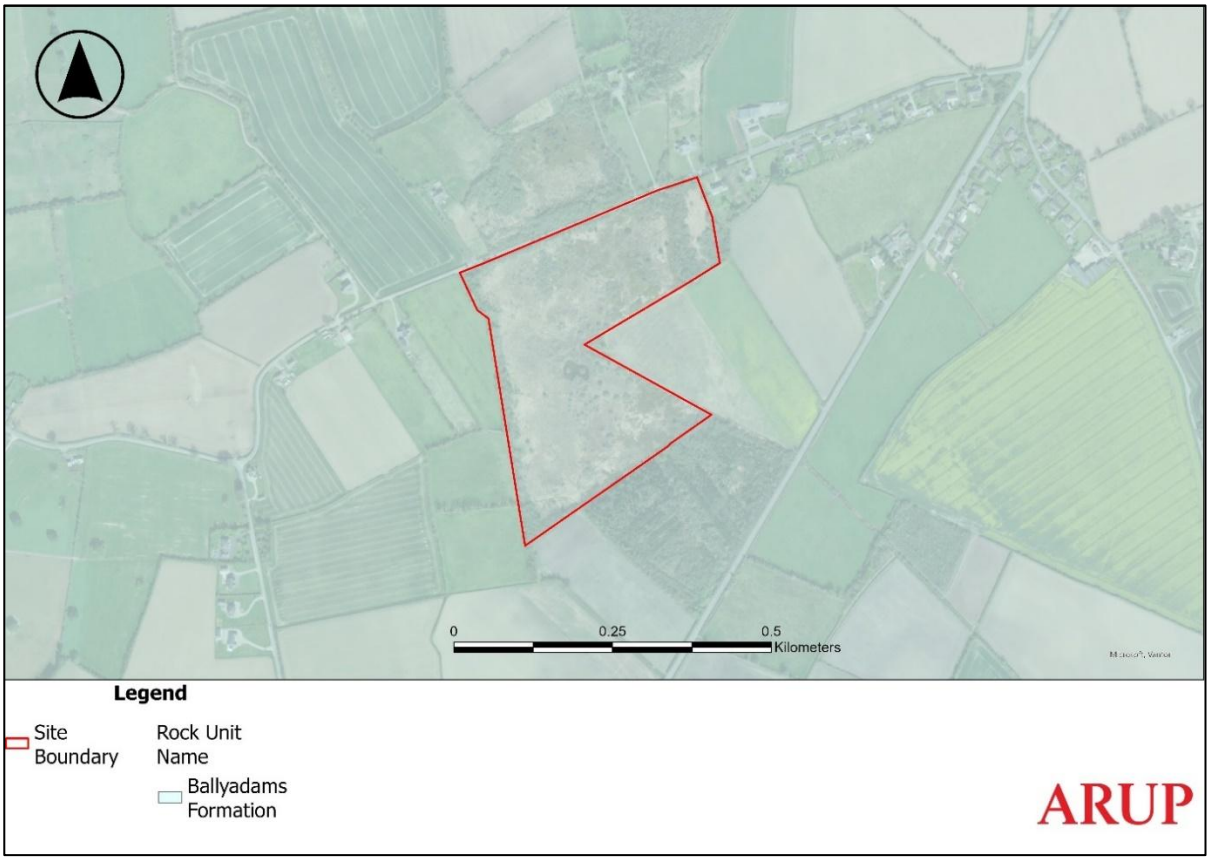


Figure 3-2: Bedrock Geology of Ballylynan

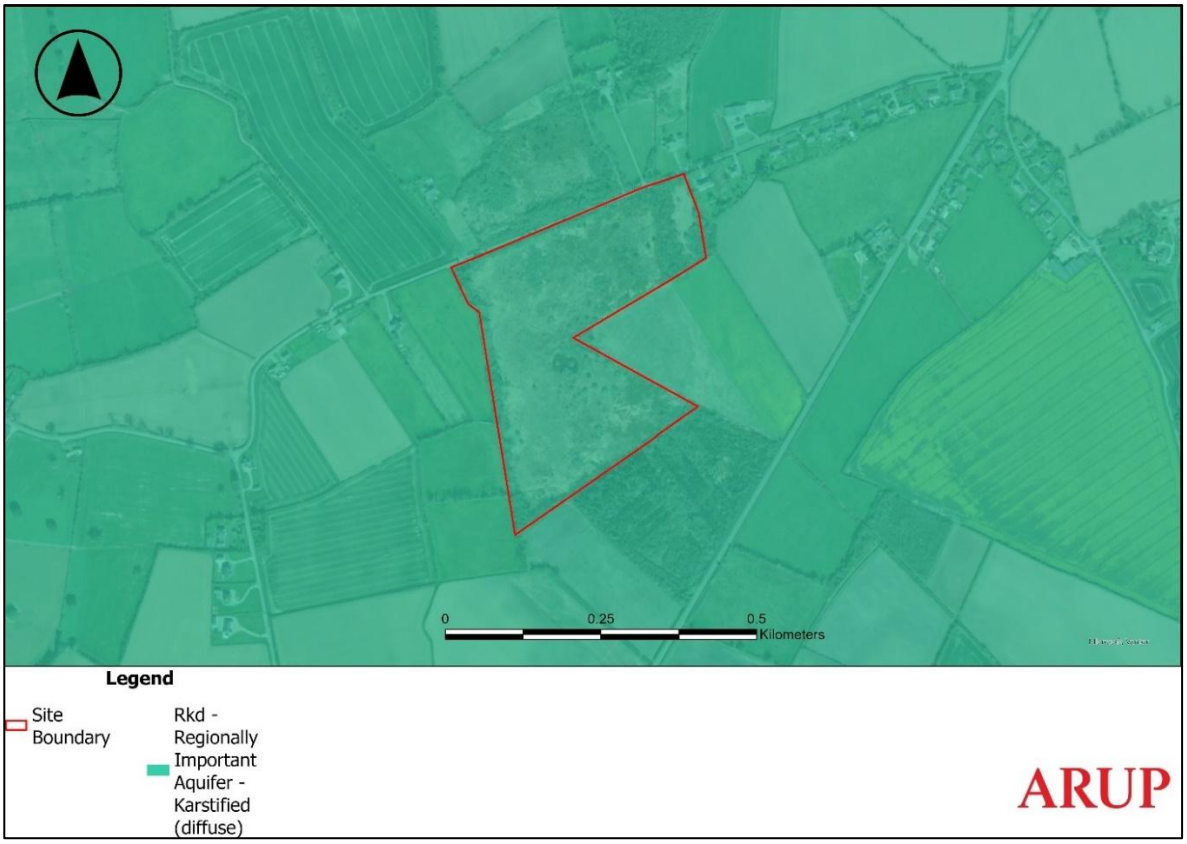


Figure 3-3: Aquifer classification underlying Ballylynan

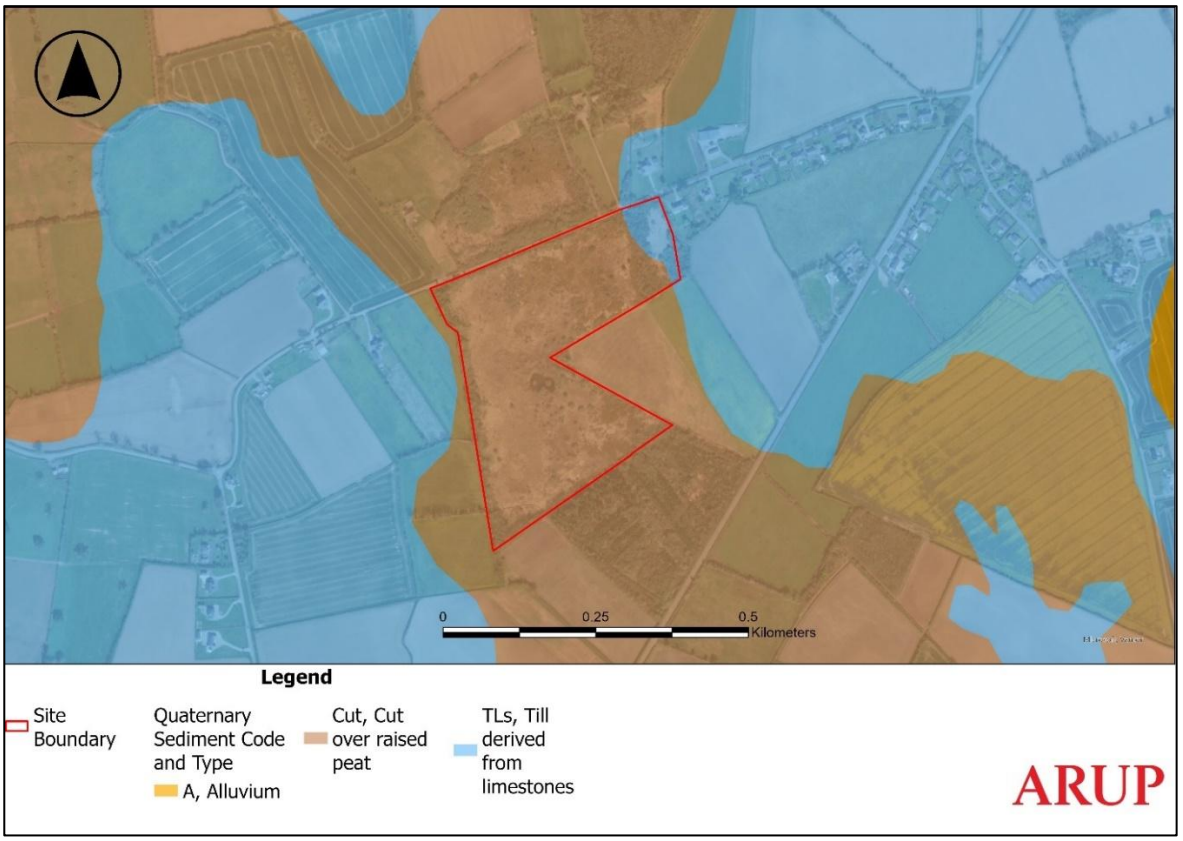


Figure 3-4: Sub-soil type underlying Ballylynan (Source: GSI Quaternary map)

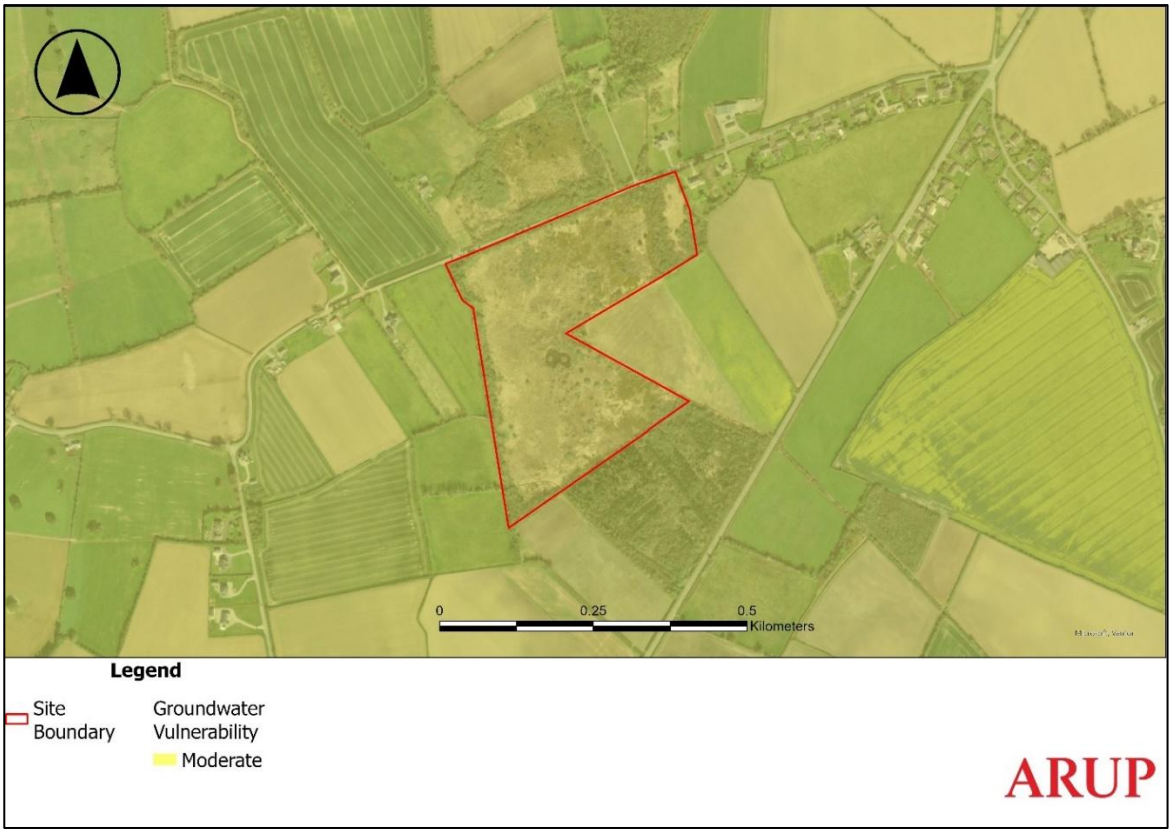


Figure 3-5: Groundwater vulnerability map for Ballylynan (Source: GSI)

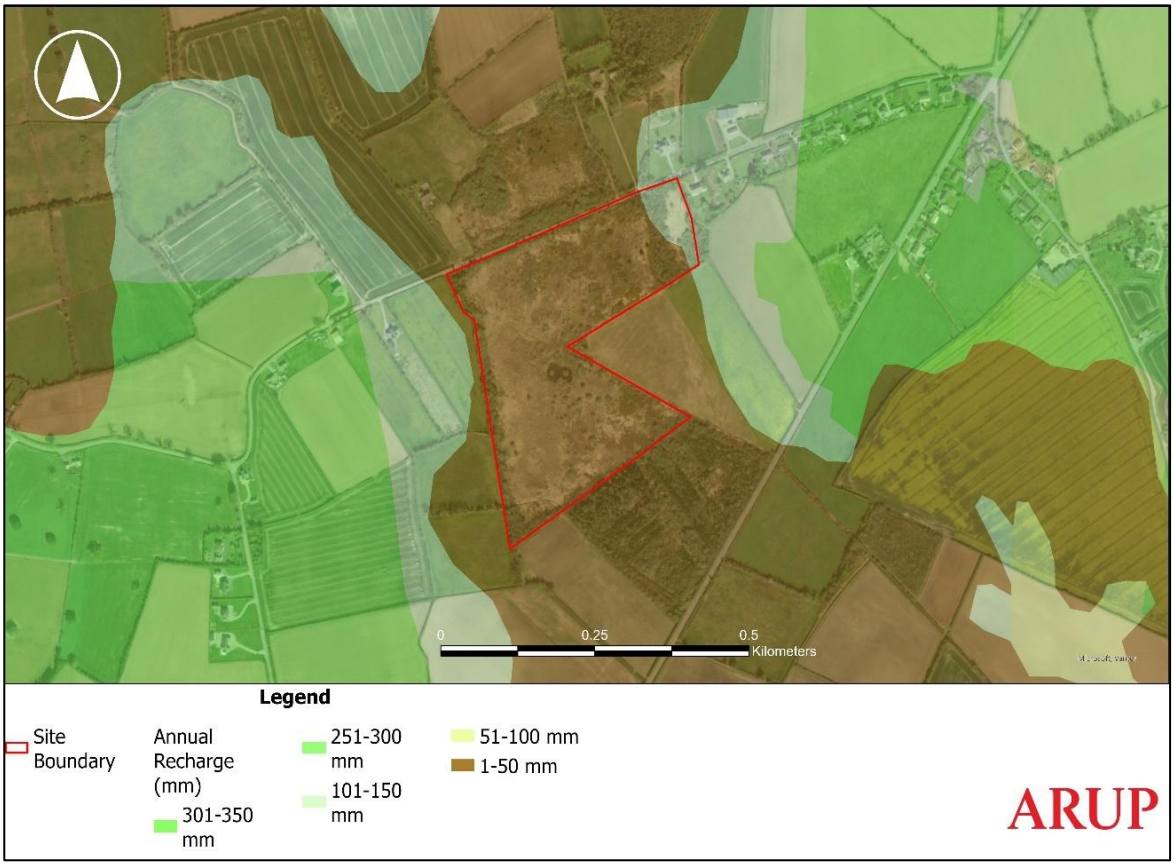


Figure 3-6: Groundwater Recharge map for Ballylynan (Source, GSI)

3.1.3 Topographic and Surface Water Drainage

The topography of the site is mainly flat at approximately 70 mOD. There is an area of high elevation to the southwest of the site at approximately 120 mOD.

The site is located within the Barrow Catchment (Catchment ID:14) and the WFD Catchment sub catchment: Barrow_SC_070 (Catchment ID: 14_12) (Figure 3-7). Drainage from the Barrow catchment flows downstream to the Upper Barrow Estuary, which then connects to the Barrow–Nore Estuary (Upper), continues past New Ross Port, and ultimately discharges to the Barrow–Suir–Nore Estuary and out to sea at Waterford Harbour. At a sub-basin scale, the site is drained eastwards by the WFD river sub-basin Barrow_140 towards River Barrow. The Barrow_140 WFD River waterbody is classed at 'poor' WFD Status and 'at risk' of not achieving its WFD objective.

An assessment of historical and current hydrological data indicates that the water regime of Ballylynan has changed over time, primarily due to drainage for peat extraction activities. Historical mapping from the early 1800s shows a river channel with a narrow band of associated low-lying, marshy ground (shown as red shading) running through the centre of the site, with the channel continuing and draining towards the south-east. The mapping also confirms the presence of the well. Historical water distribution and retention within Ballylynan is shown in Figure 3-8.

Groundwater is considered a potential inflow mechanism to the site, as indicated by the presence of a well and a marl pond. The well is located to the northwest of the site and is connected via a small channel to a marl pond. It indicates groundwater abstraction and suggests that the local water table is accessible at shallow depth.

The National Fen Survey (2022; Brophy et al., in prep.) identified a series of drainage features within and around the site, including drains along the south-eastern and eastern boundaries. Additional drainage features were recorded, comprising a drain flowing southeast from the well and a district drain located in the northern part of the site, which discharges towards the northwest (Figure 3-9).

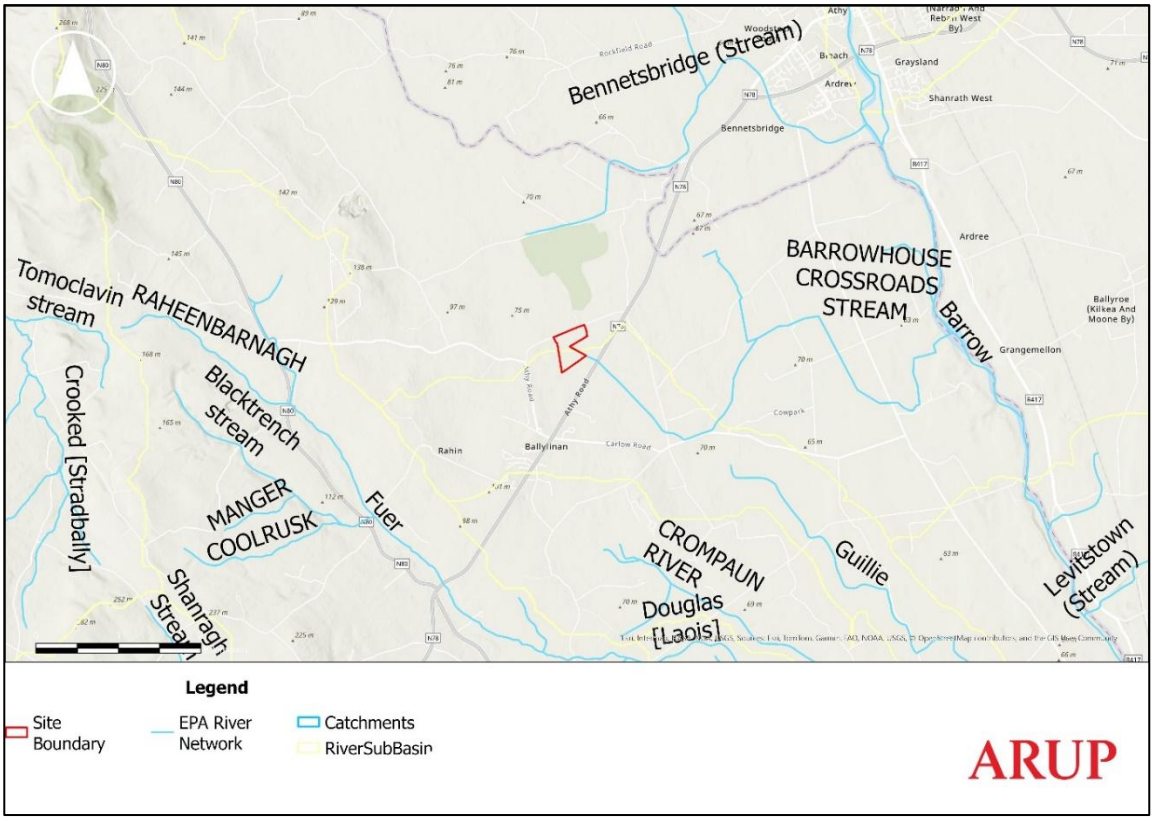


Figure 3-7: WFD Catchment and River sub-basin (EPA, 2025)

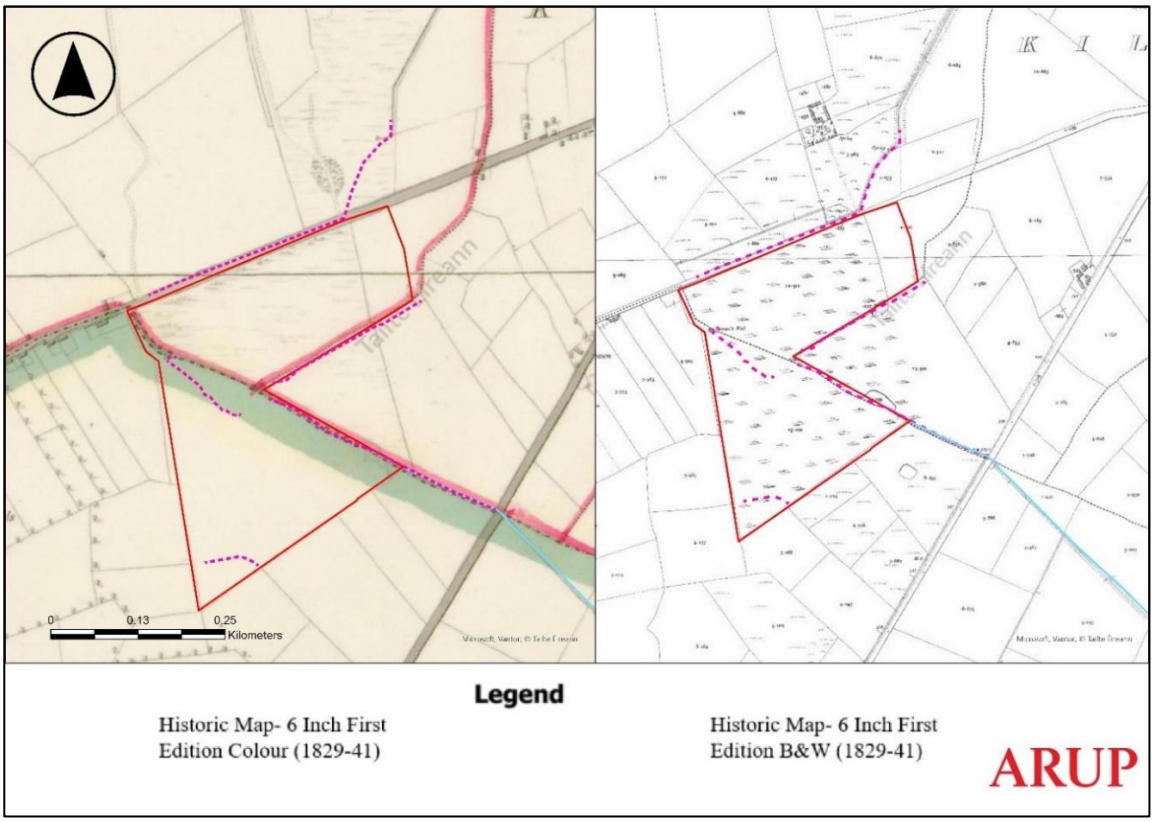


Figure 3-8: Historical water distribution and retention within wetland (Tailte Éireann Historical mapping)



Figure 3-9: Mapped drainage network of Ballylynan

The mapped Wetness Index[3] classifies the site as temporarily wet, indicating alternating periods of saturation and dryness between 2012 and 2018. This pattern suggests a mosaic of variable soil moisture conditions, supporting intermittent wetland characteristics across the site (Figure 3-10).

Total productivity mapping for Ballylynan shows that most of the site is classified as moderate productivity, typically associated with semi-degraded peatland habitats impacted by drainage and vegetation encroachment. There are areas of low productivity, which is characteristic of functioning peatland in the same areas that showed permanent wetness (Figure 3-11).

The Digital Terrain Model (DTM) and site photogrammetry are presented in Figure 3-12 and Figure 3-13, respectively.

These images indicate that the most prominent water feature within the site is a well located in the western section. A network of drains extends outward from this area towards a marl pond situated in the eastern centre of the fen. A drain is present along the eastern site boundary, connecting to Bennetsbridge Stream and flowing southwards. This drain was measured at approximately 1.7 m deep and 1.5 m wide. The DTM LiDAR images show a drain

[3] Dataset available at 10m resolution indicating the occurrence of water and wet surfaces over the period from 2012 to 2018.

in the northeastern part of the site, oriented perpendicular to the adjacent road. However, no evidence of this feature was observed during the site visit. A further distinct drain is visible in the southern portion of the site and was confirmed during site visits, which was measured at 0.5 m wide and where the water was at ground level.



Figure 3-10: High Resolution Layer (HRL) Water and Wetness – 2018 of Ballylynan (Copernicus, 2025)

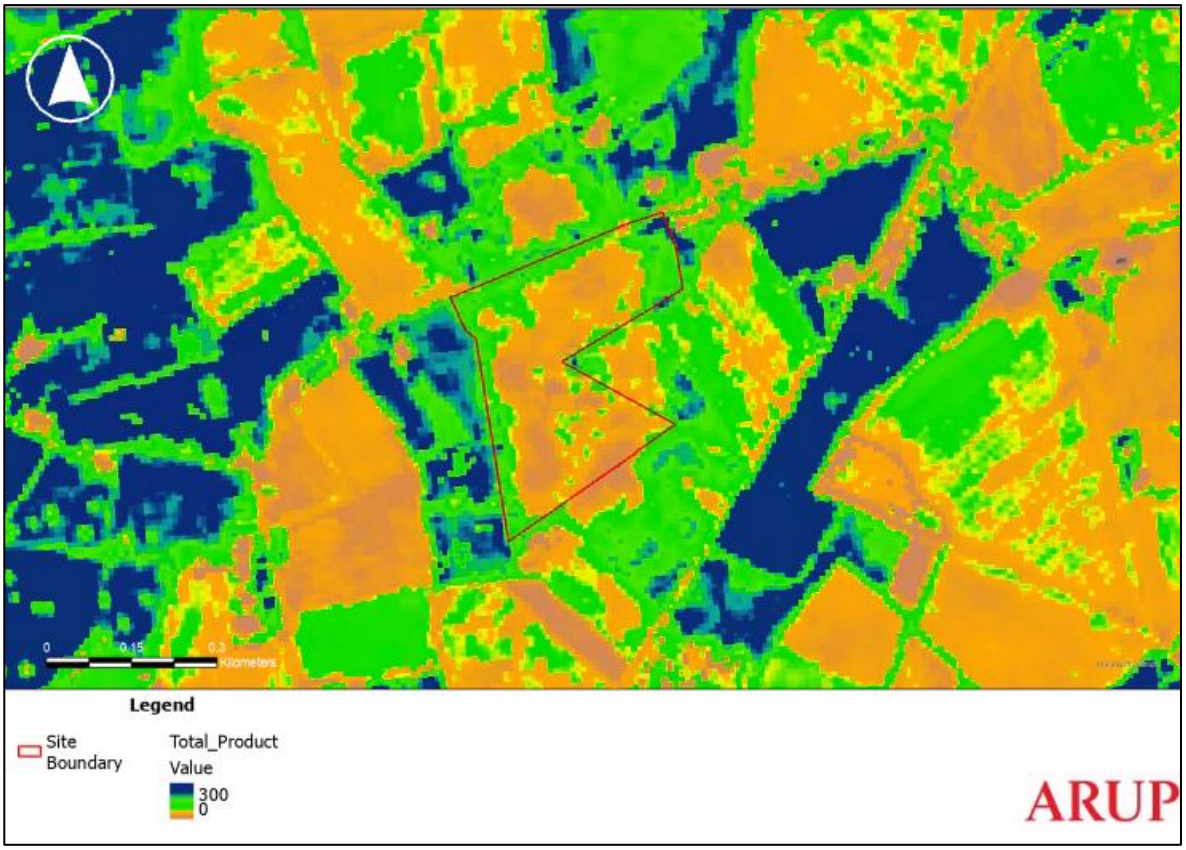


Figure 3-11: Total Productivity 2017 -present, Europe – raster 10m (season 1) of Ballylynan (Copernicus, 2025)



Figure 3-12: Topographic (LiDAR) map of Ballylynan showing ground elevation (m) across the site



Figure 3-13: Photogrammetry map of Ballylynan

3.1.4 Land use Pressures and Water Quality

Pollution Impact Potential (PIP) maps (EPA,2025 identify areas of the landscape that are at risk of nitrate and phosphorus losses to water bodies. The PIP maps estimate the annual nutrient losses from the agricultural land using spatial data on farm management, soils and hydrogeology. PIP maps for Phosphorous are presented in Figure 3-15 and Nitrate (near surface and sub surface) are presented in Figure 3-16 & Figure 3-17.

Ballylynan is surrounded by soil with very high PIP rank which indicated the presence of poorly drained soils and moderate to high livestock intensity. The maps indicate that phosphorus delivery flow paths across the site range from medium to high risk. There are potential preferential pathways identified from north to southeast and which may provide a pathway towards the fen. These locations may be targeted for measures. Flow delivery paths and points for Phosphorus are presented in Figure 3-14.

Areas identified as high risk for Nitrate are typically due to the presence of freely draining soils and groundwater pathways. The risk of nitrate loss is generally low across the site.



Figure 3-14: PIP- P - Flow delivery paths for Phosphorus (EPA, 2021)

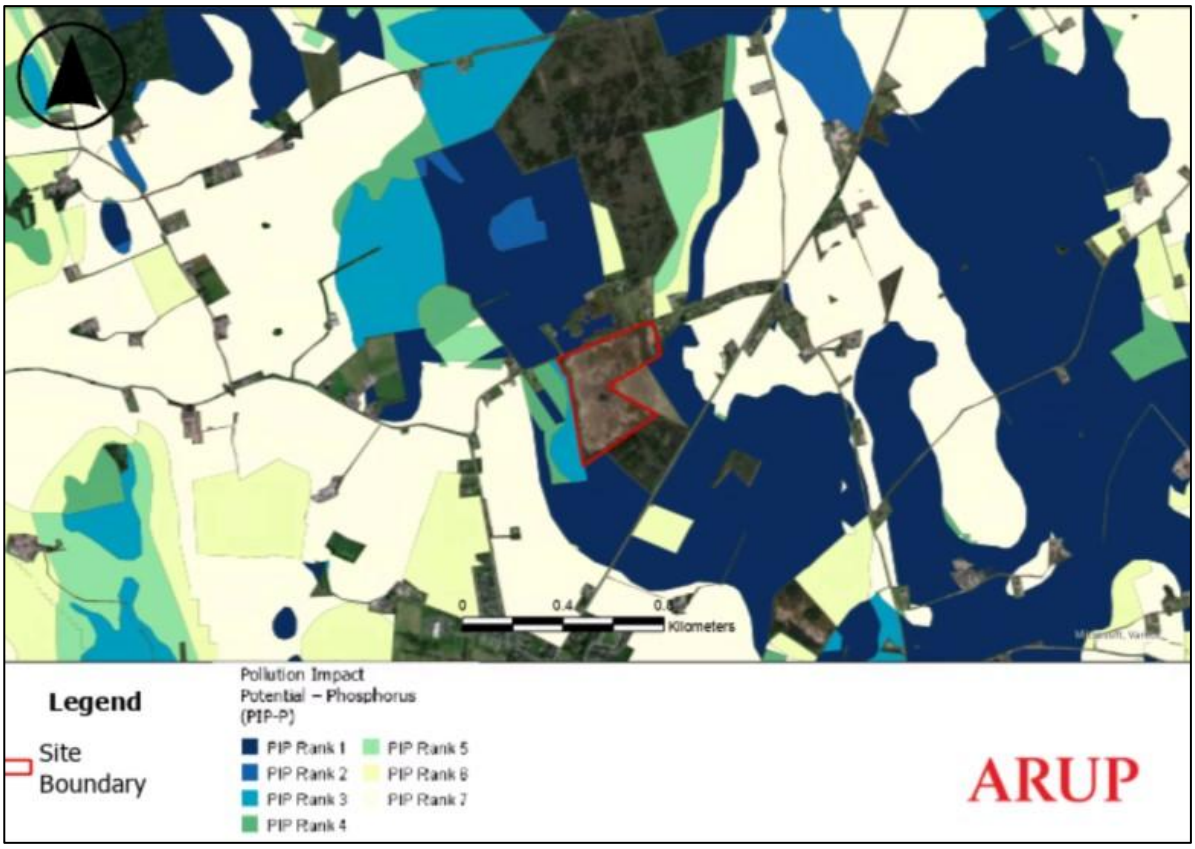


Figure 3-15: PIP maps (Phosphorus) of Ballylynan



Figure 3-16:Pollution Impact Potential – Near surface Nitrate (PIP- N) at Lough Sewdy (EPA, 2025)

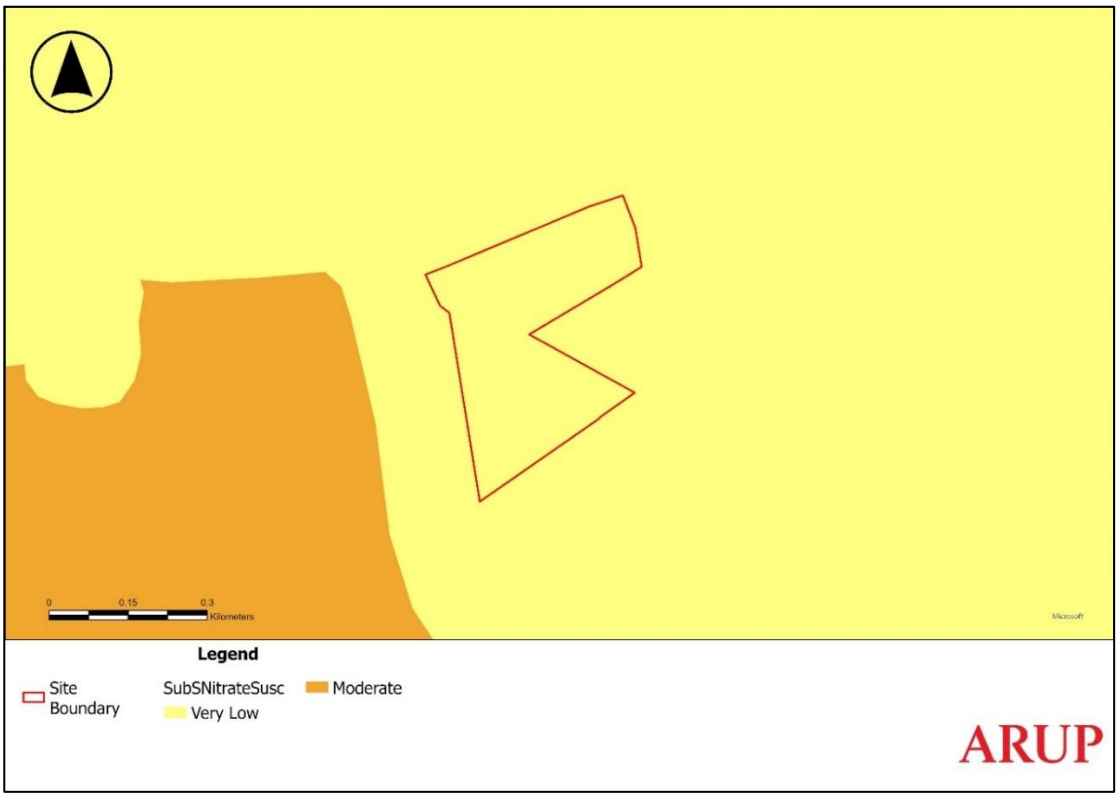


Figure 3-17:Pollution Impact Potential – Sub-surface Nitrate (PIP- N) at Lough Sewdy (EPA, 2025)

3.2 Field Survey

Electrical Conductivity (EC), pH and peat depth data were recorded as part of the National Fen Survey (Brophy et al., In prep). EC values ranged from 526 to 773 µS/cm, while pH values ranged from 7.0 to 7.24. Peat depth was measured at a single location and recorded as 0.25 m. The spatial locations of the monitoring measurements were not provided.

Site monitoring was undertaken in February, May and August 2026, focusing on developing the understanding of the water regime, pressures and implementation of restoration measures within the habitat. The monitoring included peat depth probing, water quality monitoring (pH, EC, temperature, nitrate, and phosphate) and oobservations of water flow, which were undertaken throughout the site's drainage network to further understand hydrological dynamics.

During the site visit completed in August 2026, all surveyed drains were dry and contained no standing or flowing water. Consequently, water quality data could only be collected from the well and another adjacent drain.

Field survey monitoring locations are presented in Figure 3-18.



Figure 3-18: Monitoring survey points for Ballylynan

3.2.1 Peat Depth Probing and Ground Investigations

Peat depth probing was conducted throughout the site to assess substrate characteristics. Findings from the National Fen Surveys (Brophy et al., In prep), documented a peat depth of 25 centimeters (0.25 m) based on a single measurement across the site.

During the site visits peat depth measurements across the site shows that peat is generally shallow, ranging from 0.15 to 0.55 m, with the exception of an area located within the northwest site boundary, where peat depth was measured at 1.5 m (Figure 3-19).



Figure 3-19: Baseline peat monitoring locations of Ballylynan

3.2.2 Groundwater Levels and Springs

The well depth was measured from the base of the well, located 0.8 m above ground level. At the time of monitoring (February 2026), the water level was at the top of the well. Clear water was observed within the well structure. Vegetation was present around the perimeter and at the base of the well. No evidence of peat was recorded at this location. No evidence of peat was recorded at this location.

Figure 3-20 shows the aerial photogrammetry from the drone survey at this location with a clear overflow channel emanating from the well to the east with signs of eutrophication within the channel. Figure 3-21 shows the inner well within the external stone wall and Figure 3-22 the water level during the site monitoring.

Two springs were identified in the historical maps, at distances of approximately 123 m and 142 m northeast of the site boundary. These springs are not mapped under the GSI. These features are shown in the Figure 3-23.



Figure 3-20: Ballylynan Well Aerial Photo showing overflow channel to the east



Figure 3-21: Ballylynan Well



Figure 3-22: The groundwater at the top of the well.



Figure 3-23: Well location at Ballylynan and historical springs in the northern of the site

3.2.3 Surface Water levels

Surface water conditions varied across the site during the site visits, particularly in relation to water flow. Figure 3-24 shows the site monitoring points and the water level measured during site visits.

Two drains were identified in the southern and south-western areas of the site. The south-eastern drain (ID 1) measured approximately 1 m deep and 3 m wide, with a water depth of 0.5 m, and was observed to flow from west to east. The southern drain (ID 2) was heavily overgrown with scrub vegetation, being approximately 2 m wide. The water depth and flow could not be determined due to dense vegetation at this location.

The drain at the eastern boundary of the site presented dense aquatic vegetation and exhibited low to stagnant flow conditions, which a wide of approximately 1.5 to 2 m and a water level of 0.20 m (ID 3, 4 & 5). It flows southeast into Bennetsbridge Stream, where a water sample was collected approximately 1.2 km downstream of the site. At the sampling location, the stream was approximately 4 m wide and 0.75 m deep. Water levels were shallow, with a measured depth of approximately 0.10 m.

At the northeastern boundary of the site, the drain is 1.5 m wide and 1.7 m deep and is highly vegetated. Water depth was measured at 0.75 m (ID 6 & 7).

In the north of the site, the trapezoidal water channel (ID 8 & 9) had a width of 0.5 m with a depth of 0.15 m, and contained clear water with silt in the riverbed.

A drain located adjacent to the well was infilled with algae and measured at 0.20 m wide. The water was at ground level (ID 12). The drain is shown to be discharging from the well.

In the middle of the site there is a marl pond (ID 13 & 14), with a small island of vegetation in its centre. The water depth taken from the edge of the pond was recorded at 0.5 m.



Figure 3-24: Baseline surface water monitoring locations of Ballylynan, with water levels.

3.2.4 Water Quality

Water quality monitoring shows spatial variation in nutrient concentrations across the site, with potential sources of enrichment particularly evident in areas adjacent to agricultural activity and livestock presence.

Phosphate concentrations (PO_4) vary across the site, with most measurements exceeding the WFD good status for environmental quality standard of 0.107mg/l PO_4. Towards the southern site boundary, concentrations were at 0.03 mg/l PO_4 (ID 2), with a sample taken adjacent to the marl pond at 0.07 mg/l (ID 14). These samples are within the WFD good status guidelines. In the northern drain, phosphate concentrations were elevated, with a concentration of 0.2 mg/l PO_4 (ID 9), decreasing downstream to 0.13 - 0.16 mg/l PO_4 at the well (ID11), however still exceeding the WFD good status guideline. Phosphate concentrations at the central marl pond were also high, with a recorded value of 0.26 mg/l PO_4 (ID 13). Elevated phosphate concentrations were therefore most consistently recorded in the drain flowing from the well to the marl pond, with values ranging from 0.13 to 0.26 mg/l PO_4. This area is adjacent to agricultural land where agricultural runoff is likely to occur (Figure 3-25).

Nitrate concentrations (NO_3) did not exceed the regulatory groundwater threshold value of 37.5 mg/l NO_3 at any locations within the site. Although there is no regulatory surface water

environmental quality standard for nitrate, mean nitrate concentrations greater than 1. 8 mg/l NO_3 may adversely affect the ecological health of rivers (EPA, 2025b).

In the southern section of the site nitrate was measured at 23.5 mg/l NO_3 (ID 2) (Figure 3-26). Nitrate concentrations at the northern boundary and at the well were of 14.3 mg/l NO_3 and 10.5 mg/l NO_3, respectively (ID 11 & 12). In contrast, near the marl pond, the concentration was of 2.6 mg/l NO_3 (ID 13).

EC and pH were measured during site visits across the study area. pH showed a neutral to slightly alkaline pattern, ranging from 7.0 at the well, in the northwest of the site to 7.64 in the northern of the site. EC values recorded have not showed a considerable variation, ranging from 675 to 765 µS/cm across the site (Figure 3-27 and Figure 3-28).

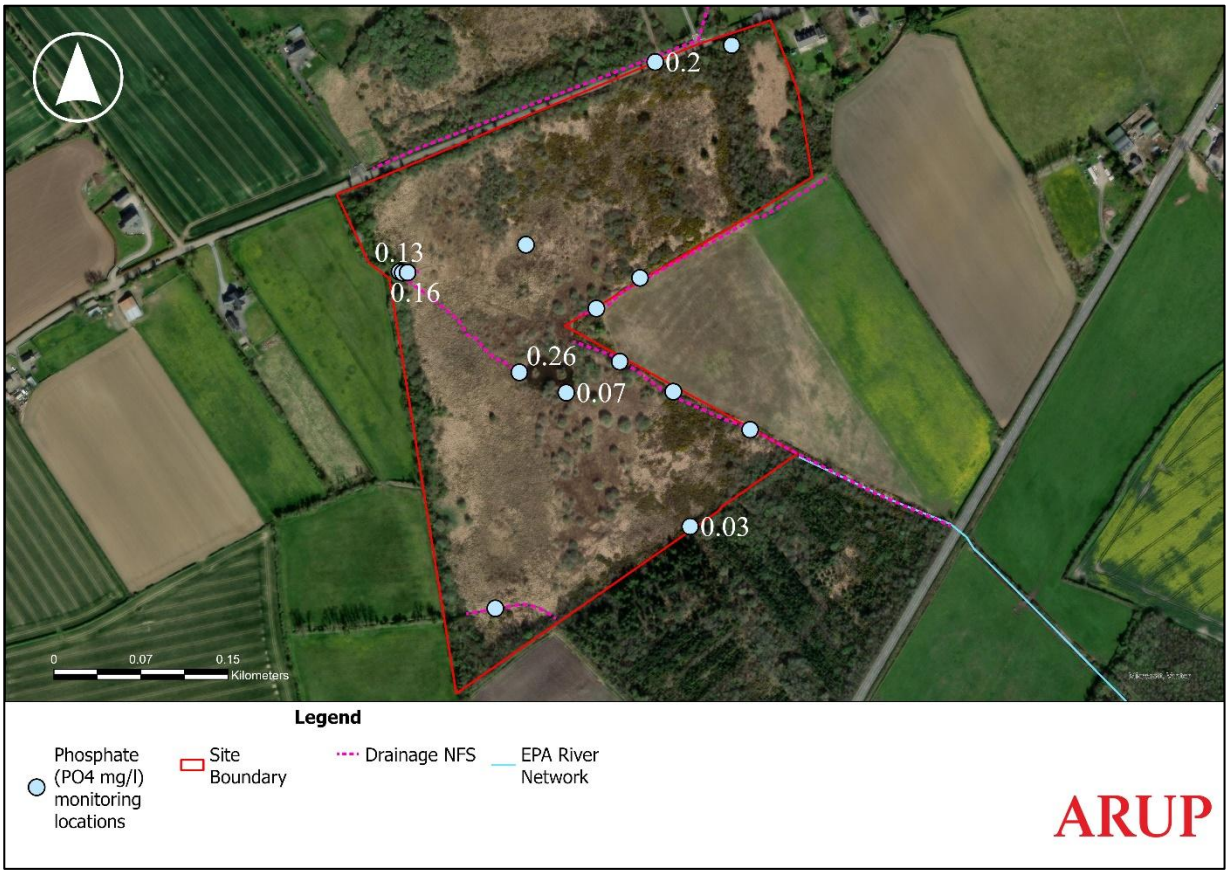


Figure 3-25: Phosphate (PO4) at survey points in Ballylynan

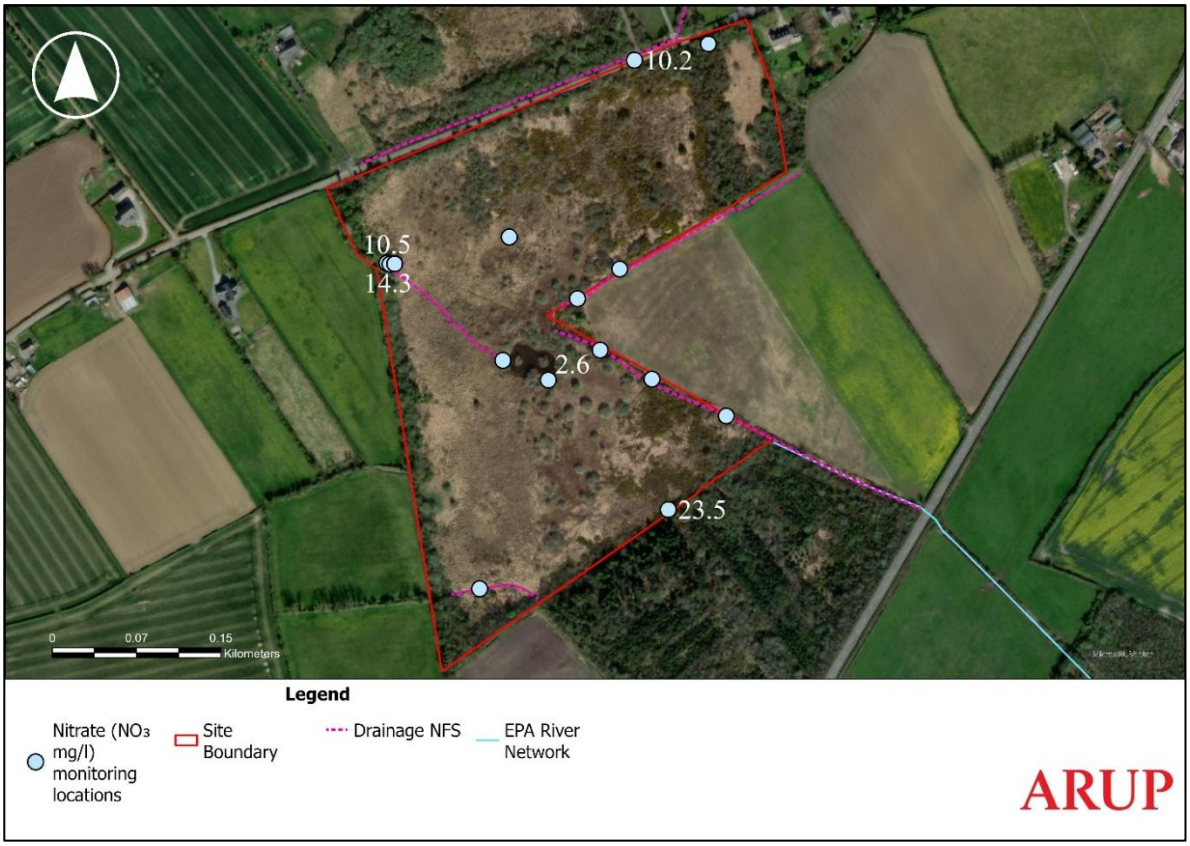


Figure 3-26: Nitrate (NO_3) at survey points in Ballylynan

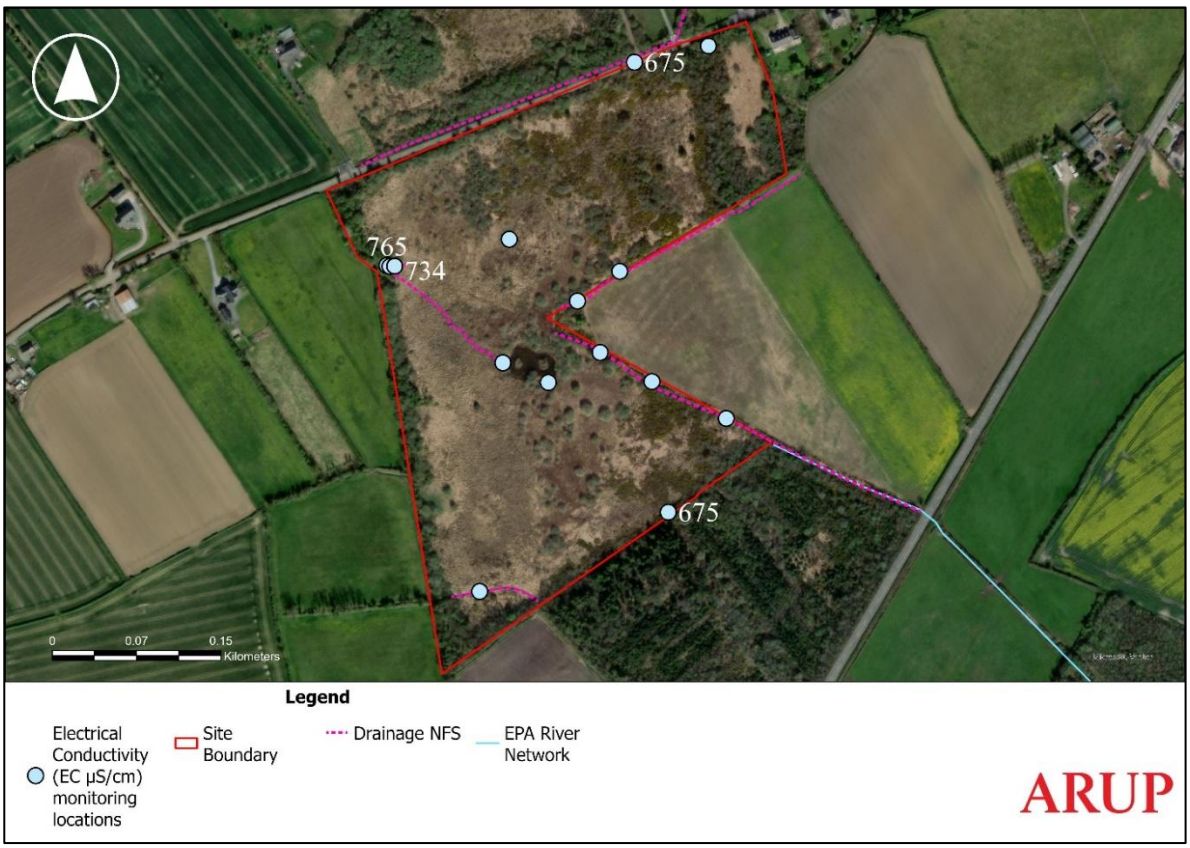


Figure 3-27: EC monitoring points at Ballylynan



Figure 3-28: pH monitoring points at Ballylynan

3.3 Conceptual Site Model

Ballylynan is classified as a groundwater-influenced fen system, characterized by a valley-bottom fen system that has developed within a basin and is predominantly maintained by groundwater discharge from adjacent higher ground, with water flowing through the fen to a surface water outfall, corresponding most closely to WETMEC Type 9b (part-drained groundwater bottom).

The classification is supported by the following information:

- Ballylynan is at an elevation of approximately 70 mOD. The topography of the site is representative of a floodplain, with higher elevated land to the southwest at 120 mOD.
- The site is underlain by the Ballyadams Formation, which is form by thin-bedded, argillaceous limestones and calcareous mudstones, reflecting deposition in a relatively deeper-water, low-energy marine environment during the Lower Carboniferous. Within the site boundary, quaternary sediments are primarily cut-over raised peat, with an area of limestone-derived till present in the northeast. The surrounding landscape is largely underlain by limestone-derived till.

- The site is underlain by a Regionally Important Karstified Aquifer (Rkd), which is moderately to highly productive, with groundwater flow occurring predominantly through enlarged fractures and diffuse karst features within the bedrock. The Rkd aquifer is characterised by diffuse flow, relatively high storage, and higher potential yields.
- Surface water features on site comprise a drain along the northern boundary, a seasonal drain along the western boundary, and a drain along the south-eastern boundary. Hydrological observations indicate that water enters the fen from the west and flows in a south-easterly direction across the site, to the drain along the southeastern boundary. Surface water outflows occur via the northern drain, which flows north-westwards, and via the south-eastern boundary drain, which connects to the Bennetsbridge Stream before ultimately discharging to the Barrow River.
- Groundwater influence is evident from the presence of a well in the northwestern part of the site and a centrally located marl pond.
- The electrical conductivity measurements taken within the monitoring points range from 675 to 765 µS/cm, indicating groundwater contribution. pH is neutral to slightly alkaline from 7 to 7.73, indicating influence from calcium-rich groundwater, which supports the development of fen habitats.
- Elevated phosphate concentrations (0.13 to 0.26 mg/L PO_4) were predominantly observed within the well, the algae filled drain and the marl pond located to the eastern area of the site which is adjacent to farmland. No elevated nitrate concentrations were registered within the site.
- The vegetation mosaic recorded at Ballylynan, comprising non-Annex PF1 Rich fen and flush together with wet heath, reed swamp and tall-herb swamp habitats, is consistent with a groundwater-influenced fen system supported by base-rich hydrological conditions.
- The site's hydrological characteristics are groundwater-fed systems, with direct springs or seepages generally not evident, and groundwater inputs inferred from hydrogeological conditions. The site is classified as rheo-topogenous, with groundwater levels broadly in equilibrium with the wetland water table. Hydrological connectivity within the fen is limited, with water movement primarily controlled by shallow gradients and boundary drainage features rather than well-defined internal flow paths.

The CSM is presented in Figure 3-29

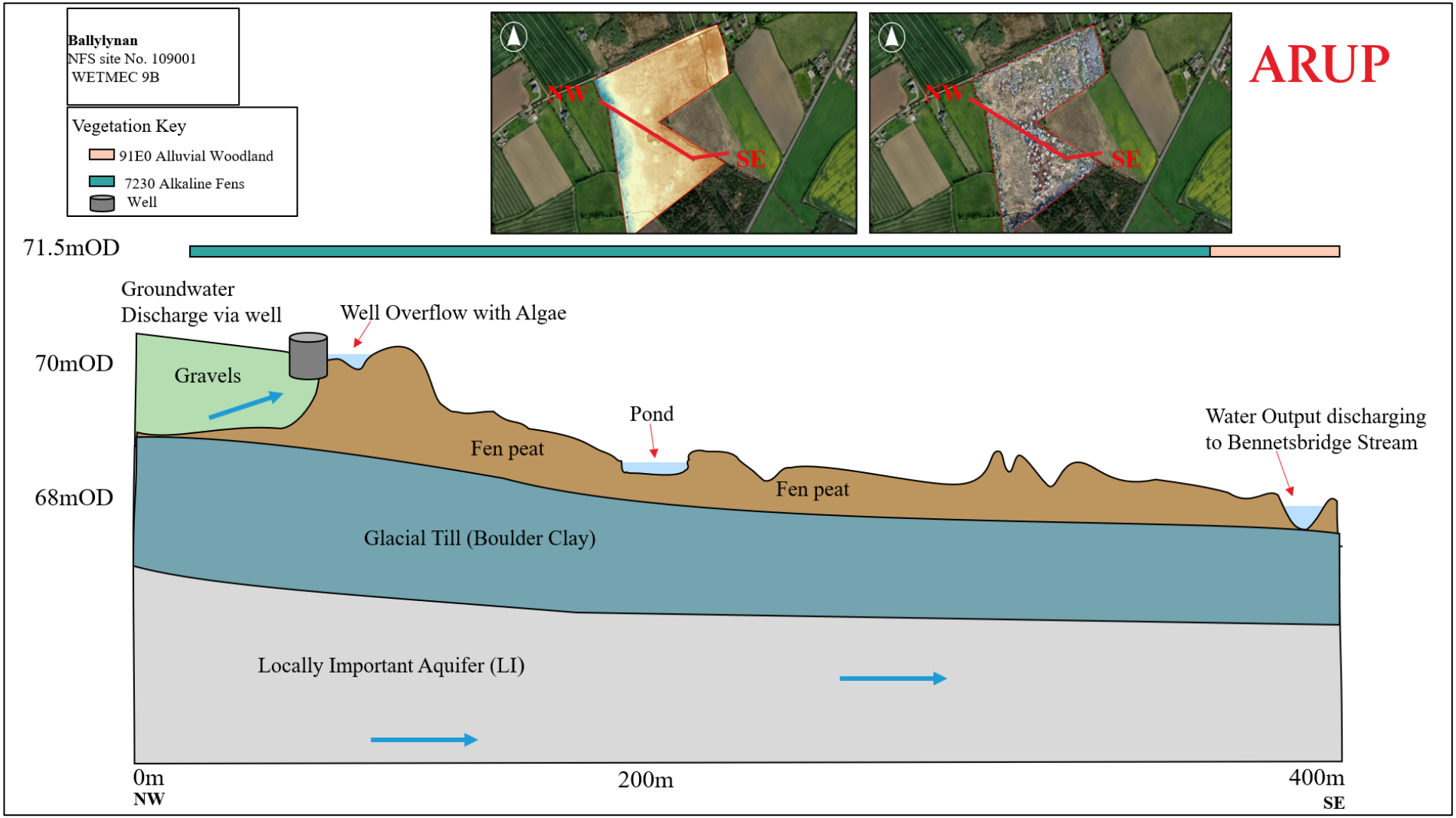


Figure 3-29: Conceptual site model of Ballylynan

4 Ecology

4.1 Desk Study

A review of available desktop information on the ecological baseline for Ballylynan was reviewed from the below information sources:

- NPWS Article 17 habitats distribution datasets;
- NFS (Brophy et al, In prep);
- Biodiversity Maps - National Biodiversity Data Centre (NBDC); and
- Plant Atlas 2020 website - Botanical Society of Britain & Ireland (BSBI).

As discussed in Section 1, the site was surveyed in July 2022 as part of the NFS, with a focus on Annex I quality fen habitats. The survey methodology included:

- Detailed vegetation assessments using quadrats to record species composition and structure;
- Hydrological observations such as water levels and flow; and
- Documentation of disturbance indicators including drainage, grazing, and invasive species.

GPS mapping and photographic records were also used to support habitat boundary delineation and condition assessment. While the primary emphasis was on habitat quality, vascular plants and bryophytes were recorded as part of the vegetation surveys, contributing to an understanding of species diversity and habitat integrity at the site.

4.1.1 Habitats

The NFS at Ballylynan revealed that the site comprises a mosaic of habitats, as discussed in Section 1.1. Drains run through the centre of the site and within the areas of fen. Approximately 20% of the site was identified as Annex I quality 7230 Alkaline fen.

4.1.1.1 Annex I Quality

The following Annex I quality habitats were identified and mapped (Figure 1-1):

- **7230 Alkaline fen** – The 7230 Alkaline fen covering approximately 2.94ha of the site, forming a mosaic with other fen habitats, predominantly located to the west of the site. It features black bog rush *Schoenus nigricans*, purple moor-grass *Molinia caerulea* and meadow thistle *Cirsium dissectum*. Other species include marsh helleborine *Epipactis palustris*, devil's-bit scabious *Succisa pratensis*, marsh horsetail *Equisetum palustre*, wild Angelica *Angelica sylvestris*, sweet vernal grass *Anthoxanthum odoratum*, Yorkshire fog *Holcus lanatus*, and ling heather *Calluna vulgaris*. In wetter areas there was bogbean *Menyanthes trifoliata*, water mint

Mentha aquatica and bottle sedge *Carex rostrata*. Brown mosses found include *Campylium stellatum*, *Ctenidium molluscum*, and *Fissidens adianthoides*.

- **6430 Hydrophilous tall-herb swamp** – this habitat was mapped in the central north of the site with the following species present: common reed *Phragmites australis*, hemp-agrimony *Eupatorium cannabinum*, meadow sweet *Filipendula ulmaria*, marsh horsetail, bogbean and tall fescue *Festuca arundinacea*.
- **91E0 Alluvial forests** – was also mapped centrally and along the south-west boundary of the site, comprising alder *Alnus glutinosa*, with frequent willow *Salix* spp., and occasional ash *Fraxinus excelsior*, forming areas of woodland associated with poorly drained soils and floodplain conditions.
- **4010 Wet heath** – This habitat was mapped as mosaics to the north and south of the site, occurring on poorly drained, acidic soils and forming transitional areas with adjacent heathland and wet grassland habitats.

4.1.1.2 Non-Annex/Fossitt habitats

Non-Annex I fen and other habitats were also recorded, with mapping based on Fossitt[4] (2000) classification. These habitats were distributed across the site, where fen habitat is the dominant habitat throughout the site. Fossitt habitats recorded are noted in Table 4-1.

Table 4-1: Fossitt Habitat Description

Habitat	Details
Rich fen and flush (PF1)	Fen habitats supporting a diversity of vascular plants and bryophytes, typically found in mosaic across the site and mapped according to Fossitt (2000). Fen habitat is the dominant habitat type throughout the site.
Reed and large sedge swamps (FS1)	Reed and sedge habitat primarily centred in the southern part of the site, contributing to structural diversity and habitat integrity.
Tall-herb swamps (FS2)	Located in the northern sector of the site, forming a mosaic with WN6.
Wet Willow-Alder-Ash Woodland (WN6)	Wet woodland dominated by willow, alder, and ash species, occurring within the centre of the north of site and south-west corner.
Scrub Woodland (WS1)	Woodland habitat with a significant scrub component, located to the north-east.
Wet grassland (GS4)	Restricted to the western border of the site.
Treelines (WL2)	Limited treelines in the south of the site.
Drainage ditches (FW4)	Records exist of multiple drains on site, though only one has been classified as FW4.
Wet heath (HH3)	Wet heath communities centred in the north of the site, contributing to the mosaic of vegetation types.

[4] Fossitt habitats refer to the classification system outlined in A Guide to Habitats in Ireland by J.A. Fossitt (2000). It provides a standardised framework for habitat identification and mapping in Ireland, grouping habitats into hierarchical levels based on vegetation, landform, and ecological characteristics.

4.2 Species

4.2.1.1 Species Within the Site

Records from the NBDC indicate the presence of 1016 *Vertigo moulinsiana* within the 10km grid square encompassing the site, although this record dates from 1933. In addition, golden plover *Pluvialis apricaria* have been recorded along the northern boundary and represent a species of conservation interest associated with open habitats within the wider landscape. Records also indicate the presence of snowberry *Symphoricarpos albus* has also been recorded to the north of the site. Snowberry is a non-native invasive shrub species and has the potential to spread into adjacent wetland habitats if unmanaged, where it may contribute to habitat degradation through competitive exclusion of native vegetation.

4.2.1.2 Species within the Zone of Influence

Table 4-2 lists the functionally linked species recorded within the 2km distribution zone of influence around Ballylynan within the last ten years (from NBDC).

Table 4-2: Species records within the Zone of Influence of Ballylynan

Legislative Protection	Common name	Latin name	Date of Last Record
Birds Directive	Goldcrest	*Regulus regulus*	04/04/2024
Birds Directive	Golden Plover	*Pluvialis apricaria*	04/11/2024
Birds Directive	Greenfinch	*Chloris chloris*	04/04/2024
Birds Directive	House Sparrow	*Passer domesticus*	20/04/2021
Birds Directive	Linnet	*Linaria cannabina*	20/04/2021
Birds Directive	Meadow Pipit	*Anthus pratensis*	24/04/2024
Birds Directive	Pheasant	*Phasianus colchicus*	04/04/2024
Birds Directive	Robin	*Erithacus rubecula*	04/04/2024
Birds Directive	Skylark	*Alauda arvensis*	06/11/2024
Birds Directive	Swallow	*Hirundo rustica*	14/04/2023
Birds Directive	Willow Warbler	*Phylloscopus trochilus*	04/04/2024
Birds Directive	Yellowhammer	*Emberiza citrinella*	04/04/2024

4.3 Field Survey

Following a comprehensive review of available desktop data, a targeted ecological survey was undertaken at the Ballylynan in April 2026 to collect site-specific baseline data to inform the FRP.

The field surveys concentrated on key areas highlighted during the desk-based assessment, specifically those with potential for restoration activities. These locations were investigated in detail to verify and further assess ecological conditions and parameters, ensuring that any recommended restoration measures would be both appropriate and effective in the identified zones.

Two survey forms were created to collect data relevant to:

- Monitoring data; and
- Pressures and threats.

4.3.1 Monitoring Points

The targeted walkover survey on the 17 April 2026, was a focused assessment designed to gather site-specific data at pre-identified locations. The walkover was designed to assess ecological condition at six pre-identified monitoring points (Monitoring Points 1 - 6), selected based on hydrological features, habitat potential, and restoration feasibility. The locations were determined through expert discussion and review of baseline data and will serve as fixed monitoring stations post-restoration. Monitoring locations are shown in Appendix B.

These monitoring points now serve a dual purpose:

- Baseline characterisation of current site conditions.
- Long-term monitoring stations to assess ecological change following restoration.

The surveys focused on two key components:

- Target Notes: Qualitative observations at each monitoring point, capturing site condition, vegetation structure, hydrological features, and legacy management.
- Pressures and Threats Identification: Systematic recording of anthropogenic and natural pressures affecting each location.

The monitoring data confirmed the presence of PF1 Rich fen and flush across all monitoring points. Annex I quality 7230 Alkaline fen was recorded at Monitoring Points 1, 2, 3, 5 and 6. Monitoring Point 6 also recorded Annex I quality 7220 Petrifying springs.

4.3.2 Pressure & Threats

This section outlines the historical and current pressures and threats affecting fen habitats at Ballylynan, with emphasis on the Annex I quality 7230 Alkaline fen.

Historical Pressures

The NFS does not provide an explicit breakdown of pressures and threats by habitat; however, site descriptions and supporting notes provide clear evidence of key pressures affecting 7230 Alkaline fen.

- **Nutrient enrichment**: Identified as a principal historical pressure, evidenced by dense green algal growth within drains, channels and the constructed stone well on site. This indicates elevated nutrient inputs to the fen system, likely arising from the surrounding agricultural catchment, leading to increased nutrient concentrations in surface water and groundwater. This can result in altered water quality, promoting

the growth of competitive species and reducing suitability for typical alkaline fen communities;

- **Drainage**: The presence of multiple drains and artificial channels connecting the well and pond, as well as boundary drainage features, indicate historical alteration of natural water distribution and retention within the site. Theses drainage features have likely increased water loss from the fen and altered natural flow patterns, reducing water stability and ground water influence. This can result in partial drying of fen habitats and disruption of groundwater-dependent ecological processes;
- **Abandonment of pastoral systems/ undergrazing:** A lack of active land management is also evident from the NFS, which notes that the site is ungrazed and essentially unmanaged. The mechanism involves the absence of grazing or cutting, leading to the development of rank vegetation and reduced turnover of plant biomass. This contributes to reduced structural diversity and the decline of characteristic fen species, including brown moss communities; and
- **Historical peat extraction**: Historical peat extraction is evidenced on site. Peat removal reduces peat thickness and water storage capacity, while also creating preferential drainage pathways. This exacerbates hydrological instability and contributes to further drying of fen habitats. The resulting drier conditions can facilitate the spread of competitive graminoids and other non-wetland vegetation, leading to changes in species composition and a reduction in the extent and quality of characteristic alkaline fen habitat.

These pressures have resulted in a degraded vegetation structure and composition, with large areas of rank fen lacking brown mosses, and are reflected in the NFS assessment of 7230 Alkaline fen as 'Unfavourable – Bad' with respect to Structure and Functions.

Current Pressures

The 2026 ecological walkover and monitoring programme recorded the following current pressures at monitoring points[5] supporting 7230 Alkaline fen:

- **Drainage:** Local and arterial schemes are recorded as affecting the site, with drainage noted as a pressure at both monitoring point 1, 2, 5 and 6. The continued presence of drainage infrastructure is likely to be lowering and destabilising water levels. This results in reduced groundwater influence, drier surface conditions, and a shift away from optimal hydrological conditions required to sustain alkaline fen habitat;

[5] Pressure and threat data were collected for Monitoring Points 1, 2, 5 and 6 and provide site-specific information on the principal pressures affecting fen condition.

- **Abandonment of pastoral systems/ undergrazing:** Grazing was recorded as absent at both monitoring point 1 and 2, with no record of cultivating or mowing either. Field observations at monitoring point 2 describe an overgrown and tussocky sward, indicating a lack of vegetation management. In the absence of grazing, competitive species can dominate, leading to reduced habitat quality and further suppression of typical fen species; and
- **Nutrient enrichment**: recorded as affecting the site, at monitoring points 1 and 2 during the walkover. While the specific pathway is not defined in the monitoring dataset, this pressure is consistent with the historical eutrophication identified in the NFS and is likely related to ongoing nutrient inputs from the surrounding catchment.

4.3.3 Additional Observations

During the 2026 ecological walkover, an area showing evidence of localised hydrological disturbance and drying was recorded towards the southern section of the site, with locally abundant ling heather indicating a local shift towards vegetation associated with drier, more acidic conditions. This pattern is consistent with hydrological modification and may be associated with previously recorded historical drainage activities on the site. The vegetation composition suggests reduced groundwater influence and lower soil moisture conditions relative to surrounding fen habitat. The ecological impact is reflected in a shift in species composition away from characteristic fen communities and a corresponding reduction in habitat quality at this location.

A second area exhibiting signs of localised drying was recorded towards the southern boundary and was assessed as not supporting fen habitat. The vegetation was dominated by common reed and creeping bent grass *Agrostis stolonifera*, with the additional presence of bramble Rubus fruticosus agg. and ash regeneration (recorded as dead). This composition reflects competitive graminoid dominance and colonisation by scrub species, indicative of reduced soil saturation. The presence of woody regeneration suggests ongoing successional processes associated with drying; however, this is not considered a dominant pressure at the site scale. Historical drainage features were recorded nearby and may be contributing to localised drying through increased water loss and reduced hydrological connectivity, facilitating the localised loss of fen habitat.

Monitoring data collected across the site indicate a relatively homogeneous vegetation community with limited variation between monitoring locations. At Fossitt level, PF1 (Rich fen and flush) was recorded as present at all monitoring points. Vegetation structure was characterised by high total vegetation cover (75–100%) across all monitoring points and generally low levels of shrub and tree cover, reflecting the predominance of open fen vegetation across the site. However, localised scrub development was recorded at Monitoring Point 5, where shrub cover of 10–25% was present and field observations noted willow, bramble and occasional pine encroachment. The vegetation recorded across the monitoring

points was relatively species-poor and compositionally similar. Frequently occurring species included jointed rush *Juncus articulatus*, tormentil *Potentilla erecta,* carnation sedge *Carex panicea*, small-fruited yellow-sedge *Carex viridula* and yellow starry feather-moss *Campylium stellatum*, with additional occurrences of marsh horsetail and devil's-bit scabious. Black bog-rush was recorded at all monitoring points, indicating the continued presence of alkaline fen conditions. Monitoring Point 6 also supported Annex I quality 7220 Petrifying springs, indicating localised groundwater discharge conditions and the continued presence of groundwater-dependent wetland habitat features within parts of the site.

Bryophyte communities were relatively limited, with yellow starry feather-moss recorded at several monitoring points, while Sphagnum species and a wider range of brown mosses were largely absent. The limited bryophyte assemblage, together with the scarcity of brown moss species typically associated with high-quality alkaline fen, suggests reduced habitat quality in parts of the site. Graminoid species were present throughout the site, with creeping bent recorded at all monitoring points. Purple moor-grass and common reed were also recorded at several monitoring points, indicating localised dominance of competitive graminoids. No evidence of ammonia deposition was recorded during the site visit; however, given the agricultural land use within the wider catchment, atmospheric nutrient inputs may represent a future threat to habitat condition.

Overall, the ecological walkover and monitoring results indicate that Annex I Alkaline fen habitat remains widespread, although localised areas show evidence of drying and vegetation change associated with historical drainage activities. The relatively homogeneous and species-poor vegetation communities, limited bryophyte diversity and localised dominance of competitive graminoids suggest that habitat quality has been reduced in parts of the site. Additional pressure and threat data from Monitoring Points 5 and 6 provide further evidence of the influence of historical drainage and the absence of active management, with unmanaged and overgrown vegetation recorded at both locations and localised scrub development recorded at Monitoring Point 5. The observed drying, localised scrub development and dominance of competitive graminoids indicate the influence of historical drainage and abandonment of traditional management. Restoration measures focused on improving hydrological conditions through drain management, together with reinstatement of conservation grazing and targeted scrub control where required, will help restore suitable conditions for Annex I quality 7230 Alkaline fen and support the recovery of characteristic fen species, bryophyte communities and vegetation structure.

4.4 Site Conservation Priority Matrix for Ballylynan

The restoration actions proposed, listed in Table 4-3 for the fen habitats of Ballylynan are expected to deliver broader ecological benefits beyond their target habitat types. If these measures are successfully implemented and sustained, they may positively influence associated features such as priority species and locally significant habitats and species. In such cases, the additional restoration interventions outlined for these other features may become

unnecessary or only partially required. However, to validate and understand the extent of these mutual benefits, ongoing post-restoration monitoring will be essential. This will ensure that improvements are not limited to fen habitats alone but extend to the wider ecological network within and around the site.

Table 4-3: Site Conservation Priority Matrix for Ballylynan

Level	Feature Type	Feature Name	Extent/ Population	Pressure/Threat affecting it	Restoration Measure On-Site	Restoration Measure Off- Site
1	Annex I quality habitat (Non-QI)	7230 Alkaline fen	2.94 ha	Drainage; Nutrient enrichment; Abandonment of pastoral systems/undergrazing; and Historical peat extraction	Drain blocking measures and hydrological monitoring; Reinstatement of grazing regime via conservation led grazing; Vegetation monitoring; and Targeted scrub and invasive removal and monitoring of scrub encroachment	Landowner engagement
		91E0 Alluvial forests	N/A	Drainage; and Nutrient enrichment;	Drain blocking measures and hydrological monitoring	Landowner engagement
		6430 Hydrophilous tall herb swamp	N/A	Drainage; and Nutrient enrichment;	Drain blocking measures and hydrological monitoring;	Landowner engagement
		4010 Wet heath	N/A	Drainage	Drain blocking measures and hydrological monitoring;	N/A
2	NHA Habitat	N/A	N/A	N/A	N/A	N/A
3	European priority species	N/A	N/A	N/A	N/A	N/A
3	Nationally important species	1016 Vertigo moulinsiana	N/A	Habitat drying; vegetation succession	Benefit from hydrological measures and monitoring; vegetation management and monitoring	N/A
		Golden plover	N/A	Habitat drying; vegetation succession	Benefit from hydrological measures and monitoring; vegetation management and monitoring	N/A
		Table 4-2	N/A	Hydrological modification; nutrient inputs; abandonment of management	Benefit from hydrological measures and monitoring; vegetation management and monitoring	N/A

Level	Feature Type	Feature Name	Extent/ Population	Pressure/Threat affecting it	Restoration Measure On-Site	Restoration Measure Off- Site
4	Habitats and species of local interest	Rich fen and flush (PF1) Table 4-2	Table 4-2	Drainage; nutrient inputs	Benefit from hydrological measures and monitoring; vegetation management and monitoring	N/A

4.5 Impact Assessment Notes

The restoration measures proposed for Ballylynan focus on hydrological restoration, including drain blocking and re-wetting, supported by vegetation management and water quality monitoring. These measures are intended to address the key pressures identified at the site, namely drainage, nutrient enrichment, and abandonment of pastoral systems/undergrazing.

Hydrological restoration measures will alter local water levels and flow pathways across the site. In the short term, this may result in localised increases in water levels and changes in surface water distribution, particularly in areas adjacent to drainage features. These changes are necessary to restore saturated conditions and re-establish groundwater–surface water interactions required to support Annex I quality 7230 Alkaline fen. Over the medium to long term, stabilisation of the water table is expected to improve hydrological functioning and facilitate recovery of fen vegetation.

Vegetation management measures, including reinstatement of grazing, may result in temporary disturbance during implementation. However, these measures are required to address the current absence of management, which has led to rank vegetation and reduced structural diversity. The reintroduction of appropriate grazing is expected to improve vegetation structure and promote conditions suitable for characteristic fen species and improve the overall condition and resilience of fen habitat.

There is potential for short-term impacts to water quality during implementation, particularly where the potential for disturbance of sediments or mobilisation of nutrients could occur within the drainage network. This is of particular relevance given the elevated nutrient concentrations recorded across the site. The application of good practice measures, including sediment control and pollution prevention, alongside water quality monitoring, will minimise these risks and enable evaluation of restoration effectiveness.

Restoration measures have the potential to influence downstream receptors via hydrological and water quality pathways. In the longer term, restoration of fen hydrology is expected to improve water retention and nutrient attenuation within the site, contributing to improved water quality within the wider catchment.

Consideration should be given to potential indirect effects on the River Barrow and River Nore SAC (Site Code: 002162) via hydrological and water quality pathways. These pathways should be assessed as part of any future Appropriate Assessment (AA) screening prior to implementation of restoration measures.

Overall, the potential impacts associated with the proposed restoration measures are short-term and manageable. With appropriate implementation, monitoring and adherence to good practice, the measures are expected to result in long-term ecological benefits through the reinstatement of conservation grazing, restoration of hydrological conditions, reduction of nutrient enrichment pressures and recovery of Annex I quality 7230 Alkaline fen habitat.

4.6 Good Practice Recommendations

Several good practice measures are recommended based on the requirement for compliance with legislation but also the occurrence of sensitive receptors and possible pathways for negative effects during preparation for or implementation of restoration actions. These are summarised in Table 4-4 below and should be taken as generally applicable in the planning of FRP.

At Ballylynan, vegetation clearance is not a primary restoration measure and is only expected to occur on a limited, localised basis where required to support hydrological restoration and access. On occasion it will be required to prevent encroachment of non-native species.

Consultation with relevant NPWS staff should be undertaken prior to implementation to obtain more recent or up to date information on the locations of sensitive receptors, and buffers revised accordingly. Any further requirements outlined by NPWS at pre implementation stage should also be adhered to.

Table 4-4: Good Practice Recommendations

Receptor	Measure
Ground nesting birds	No vegetation clearance or activity which might contravene Section 40 of the wildlife act (consolidated) should be undertaken.
Invasive Alien Species	All vehicles should undergo stream cleaning before site entry. Identified buffers on IAS should be avoided during site preparation and restoration implementation.
Protection of European Sites	Any required mitigation measures to avoid potentially adverse effects on European Sites should be incorporated into an Environmental Management Plan or Checklist of Environmental Commitments. Implementation should be overseen by a suitably qualified ecologist.
Protection of Sensitive Habitats	High sensitivity habitats should be protected from long term damage by the use of low-pressure vehicles. Extensive repeated tracking over fen habitat or any other identified priority habitat should be avoided. The storage locations of any materials should avoid high & medium sensitivity habitats.

5 Key Pressures – Field Validation and Evaluation

The FRP considers pressures on Ballylynan through an initial desktop assessment of existing information on the site (including previous NPWS commissioned surveys), assessment of land, water and topographic data and aerial imagery, followed by field surveys to characterise and confirm key pressures mapped through desktop assessment. Consultation with NPWS Regional Staff was also undertaken, including a visit with the Conservation Ranger for the area to inform identification of pressures.

The NFS undertook a site evaluation and ranking which determined the conservation value of the site. This evaluation considered 15 criteria as outlined which included naturalness, non-recreatability, potential value, typicality, educational value, size, diversity, fen value, rarity of species, rarity of habitats, viability, recorded history, management needs, intrinsic appeal and expert opinion. These criteria then informed the overall conservation status assessment was applied based.

The conservation status assessment results for Ballylynan is summarised in Table 5-1.

Table 5-1: Conservation Status Assessment as per NFS 2022 (Brophy et al, In prep)

OVERALL CONSERVATION STATUS ASSESSMENT				
Annex I habitat	**Area (ha)**	**Structure & functions**	**Future prospects**	**Overall Conservation Status**
7140	Not recorded	Not recorded	Not recorded	Not recorded
7210	Not recorded	Not recorded	Not recorded	Not recorded
7230	2.94	Unfavourable-Bad		

5.1 Field surveys of key pressures

Following completion of desktop mapping of key pressure, field surveys were carried out by personnel to verify the findings of the desktop assessment and characterise conditions of the pressures to inform selection of appropriate restoration actions required. The site surveys are discussed in Sections 3.2 and 4.2. These surveys aimed to capture information on the land and water environment such as drainage features, peat depth and water quality and the ecology.

As part of the ecology monitoring surveys, pressures and threats associated with the monitoring point were recorded. A summary is provided within Section 5.2.

5.2 Key Pressures

The National Fen Survey (NFS) and site walkovers identified three principal pressures affecting the condition and restoration potential of the Annex I fen habitats at Ballylynan: drainage, scrub encroachment, and the abandonment of traditional grazing practices, resulting in undergrazing and the development of rank vegetation. Potential nutrient pressures

associated with adjacent land uses have also been considered where relevant; such as the drain adjacent to the well infilled with algae.

A summary of the key pressures identified through desktop review and field investigations is provided below.

All historical and currently observed pressures and threats have been comprehensively assessed within the Fen Restoration Plan (FRP) to inform the selection of appropriate restoration measures. The proposed restoration strategy combines hydrological and vegetation management interventions aimed at maintaining and enhancing the condition of Annex I habitats within Ballylynan, while also delivering benefits for associated non-Annex habitats and protected species.

5.2.1 Flora and Fauna Pressures

The principal flora and fauna pressures at Ballylynan are associated with the absence of active management and resulting vegetation structure.

- **Abandonment of pastoral systems/undergrazing**: Grazing was recorded as absent at all pressure and threat monitoring locations (Ecology monitoring points 1, 2, 5 and 6) and identified as affecting the site. Grazing absence was recorded as a medium influence at Ecology monitoring points 1 and 2 and a high influence at monitoring points 5 and 6. Field observations describe overgrown, tussocky and unmanaged vegetation, indicative of the absence of active management. In the absence of grazing or cutting, biomass and litter can accumulate, promoting competitive species, reducing structural diversity and limiting opportunities for characteristic alkaline fen species to persist and expand.;
- **Vegetation succession and competitive species dominance**: Vegetation structure and composition recorded across the site indicate a shift towards rank fen communities and localised dominance by competitive species. This is consistent with the degraded habitat condition described by the NFS and reflects a shift away from species-rich alkaline fen vegetation. Monitoring data indicate localised dominance by competitive graminoid species including common reed and purple moor-grass in parts of the site. These species can become increasingly dominant where hydrological conditions are altered and active management is absent, reducing structural heterogeneity and limiting the abundance of characteristic fen species.; and
- **Localised scrub and woody encroachment (not dominant at site scale)**: Evidence of bramble and woody regeneration (sycamore saplings) was recorded in localised areas during the ecological walkover.. These occurrences are associated with drier microsites and historic disturbance but are not identified as a primary pressure within the monitoring dataset. Monitoring Point 5 recorded shrub cover of 10–25%, together with willow, bramble and occasional pine encroachment, indicating ongoing

vegetation succession within drier parts of the site. These occurrences are associated with localised drying and reduced management but are not considered a dominant site-wide pressure at present. In addition, snowberry (Symphoricarpos albus) was recorded along the roadside to the northern site boundary within the NFS data. Although currently restricted to the site periphery, it has the potential to encroach into adjacent fen habitat if unmanaged.



Figure 5-1: Flora & Fauna Pressures mapped within Ballylynan

5.2.2 Hydrology Pressures

Drainage has been identified as a key pressure for Ballylynan. One drain located along the eastern boundary shows localised impacts and was highlighted as pressures requiring targeted management. This drain flows through the Bennetsbridge Stream which discharges to the Barrow River.

5.2.3 Nutrient Pressures

Nutrient enrichment is recorded as affecting the site within the monitoring dataset and is consistent with eutrophication identified in the NFS (algae within the well and the drain adjacent to the well. Although pathways are not explicitly defined in the monitoring dataset, nutrient pressures are consistent with surrounding agricultural land use. Atmospheric inputs

(e.g. ammonia deposition) are not currently evident but are identified as a potential future threat.

6 Restoration Measures

6.1 Introduction

The restoration actions proposed by the FRP will help to maintain or improve the quality of existing areas of fens and improve the conditions that will allow an expansion of the area of fen. In some areas it must be recognised that restoration to fen habitat will not be possible, and the objective may simply be to improve the habitat condition.

Selection of the most appropriate restoration action depends on a range of factors including peat depth, hydrological conditions (flow rates, existing and expected flow paths after restoration), substrate type, existing ecological conditions, potential ecological constraints and practicality of access for machinery.

Each of the factors was considered based on a combination of desktop analysis combined with site-specific field surveys to select the most appropriate restoration technique to address each pressure considered by the FRP. The restoration measures proposed are outlined in Section 6.2 to Section 6.3, with detailed mapping of proposed measures illustrated in the maps provided in Appendix B.

6.2 Hydrology Measures

6.2.1 On-site Fen Hydrology Measures

6.2.1.1 Drainage Measures

Drain blocking is proposed as the primary hydrological restoration measure for Ballylynan. Ecological surveys analysed within the collected LiDAR and available photogrammetry, have shown a few areas where drain measures would be beneficial for the water balance improvement to consequently reduce scrub encroachment while promoting favourable conditions for the development of the 7230 Alkaline fen habitats.

Drain blocking measures are proposed in three areas at Ballylynan: at a small drain located at the southwest corner of the site, at a drain located at the northwest of the site, which ultimately discharge to one of the water outflows of the site and at a drain that represent the main water outflow of the site, located within the eastern site boundary and which discharges to Bennetsbridge Stream. At this location drain measures will provide the establishment of high-roughness vegetation and help slow surface water movement and encourage more widespread sheet flow across the fen.

By increasing water retention and reducing drainage-related drawdown, these measures are expected to promote the development and maintenance of favourable wetland conditions for Annex I habitats, including the 7230 Alkaline fens present at Ballylynan.

Monitoring programme

Regular groundwater and surface water monitoring will be undertaken through a proposed network of piezometers and surface water monitoring points to establish baseline conditions, assess the need for restoration interventions, and evaluate the effectiveness of restoration measures. Monitoring will focus on changes in groundwater levels, surface water levels, and hydrological connectivity resulting from the proposed drain-blocking measures.

Surface water monitoring will be undertaken at the principal inflow, at the north-western, outflow drains located in the north-western and south-eastern areas, and additionally within the well, aiming to assess water levels and flow conditions. Piezometers will be installed at four locations across the site, within areas of high ecological value and groundwater dependence, to monitor changes in water levels and support the assessment of site hydrological conditions over time.

Proposed on-site hydrological measures are presented in Figure 6-1.

6.2.2 Off-site Hydrology Measures

Engage adjacent landowners, particularly to the east, to discuss the implementation of drainage measures along the eastern boundary of the site. Consent will be required for any works affecting boundary drains. The eastern boundary of the site adjoins improved grassland on reclaimed fen, which may be hydrologically connected to the drainage network influencing the site. Engagement with adjacent landowners is proposed to prevent further drainage or deepening of existing drains and to maintain water levels. This will reduce the risk of additional drainage pressures acting on the fen, protect restored hydrological conditions, and minimise future water table drawdown.

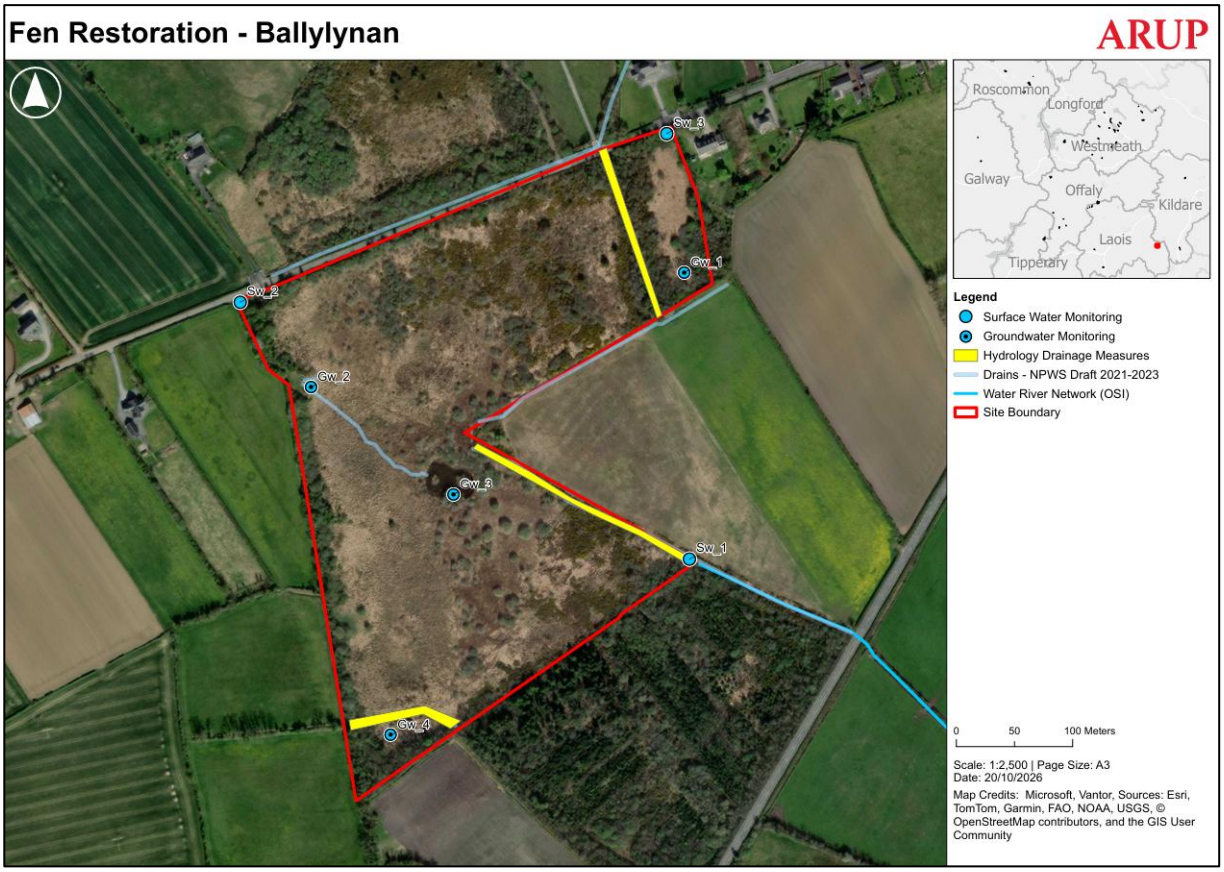


Figure 6-1: Proposed hydrological restoration measures and monitoring for Ballylynan

6.3 Nutrient Measures

6.3.1 On-site Nutrient Measures

Water Quality Monitoring

On-site nutrient measures include the monitoring of water quality within the site to assess the effectiveness of proposed off-site nutrient measures and identify any changes in water quality within the site which may require a modification of measures. Monitoring of habitats, drainage channels and springs for water quality parameters including nutrients (Nitrate and phosphate), electrical conductivity and pH is proposed.

Piezometers will be installed within the fen in areas where nutrients and productivity is high. Additionally, surface water monitoring will also be completed as part of the monitoring programme.

6.3.2 Off-site Nutrient Measures

Agricultural measures outlined under the farming for Water EIP or novel approaches under NPWS Farm Plans are categorised depending on if they address the source, pathway, or receptor. Suitable measures for Ballylynan may include:

Source control measures:

- **M2 Farmer Training.** Course for farmers in the fen catchment.
- **M3 Nutrient Management Plan**. This plan helps farmers apply slurry efficiently, optimise nutrient uptake, and prevent excessive nutrient use.
- **M5. Multi-species swards**. This measure decreases the requirement for fertiliser application and is advised for regions designated as PIP N 1-4, including the area's located to the western (where the well is located) and eastern (where the pond is located) of the site boundary.

Pathway interception measures:

- **M19 Management of Critical Source Areas**: CSAs are parts of farmland with strong connectivity to the drainage network where surface runoff accumulates, increasing the risk of sediment and nutrient losses to rivers and streams. These areas are typically low-lying and should be identified using EPA PIP maps, alongside consideration of field slope and local drainage conditions.

Receptor measures:

- **M38 Vegetated bunded drain**. Slowing the outflow stream in wet conditions may improve sediment deposition and boost nutrient attenuation.

6.4 Vegetation Measures

6.4.1 On-site Vegetation Measures

Conservation grazing management: The introduction of a low-intensity conservation grazing regime using appropriate livestock (e.g. Irish moiled or Droimeann) is proposed to improve vegetation structure and reduce the dominance of rank vegetation and competitive species within the fen. The relatively flat topography and firm ground conditions indicate that the site is suitable for grazing by cattle under controlled stocking densities.

Grazing should be prioritised in the western part of the site, where rank vegetation and tussock formation are most pronounced. This will reduce biomass and litter accumulation, improving light availability and facilitating the recovery of characteristic fen vegetation. Over time, grazing can be extended across the wider site to maintain structural diversity and prevent further degradation, including within the eastern areas supporting 7230 Alkaline fen.

The implementation of grazing will promote a more heterogeneous sward structure through a mosaic of vegetation heights and microhabitats, supporting typical alkaline fen species and improving habitat condition. This will contribute to the restoration of favourable structure and function of the 7230 Alkaline fen habitat.

Conservation grazing may also provide secondary benefits for 1016 *Vertigo moulinsiana*, which is associated with humid fen habitats supporting structurally diverse vegetation. However, records for this species are historical (1933) and at a 10 km grid scale, and its presence within

the site is unconfirmed. The primary objective of this measure is therefore the restoration of fen habitat, with any benefits to this species considered secondary and dependent on appropriate hydrological conditions.

Targeted scrub and invasive removal and monitoring of scrub encroachment: Localised scrub encroachment is present within the site, particularly in drier areas to the south. Monitoring of scrub extent is proposed, alongside targeted removal where necessary to prevent further establishment. Monitoring Point 5 recorded localised scrub development, including willow and bramble, highlighting the need for targeted scrub monitoring and removal where encroachment threatens open fen habitat.

Targeted scrub removal will reduce shading and competition from woody species, helping to maintain open fen conditions and supporting the persistence of characteristic alkaline fen vegetation. However, should the proposed drain-blocking measures successfully restore more appropriate hydrological conditions across the site, rewetting may reduce the suitability of conditions for scrub establishment and expansion. In this case, the extent of active scrub removal required may be reduced and should be determined through ongoing monitoring of vegetation response following hydrological restoration.

Should the proposed drain-blocking measures successfully restore more appropriate hydrological conditions across the site, rewetting may reduce the suitability of conditions for scrub establishment and expansion. In this case, the extent of active scrub removal required may be reduced and should be determined through ongoing monitoring of vegetation response following hydrological restoration.

7 Additional Considerations

7.1 Drainage Management Plan

Arterial Drainage Schemes were carried out under the Arterial Drainage Act, 1945 to improve land for agriculture and to mitigate flooding. Rivers, lakes weirs and bridges were modified to enhance conveyance, embankments were built to control the movement of flood water and various other work was carried out under Part II of the Arterial Drainage Act, 1945. The purpose of the schemes was to improve land for agriculture, to ensure that the 3 – year flood was retained in bank this was achieved by lowering water levels during the growing season to reduce waterlogging on the land beside watercourses known as callows. Flood protection in the benefiting lands was increased as a result of the Arterial Drainage Schemes.

Drainage Districts were designated by the Commissioners of Public Works to improve land for agriculture and to mitigate flooding. Channels and lakes were deepened and widened, weirs removed, embankments constructed, bridges replaced or modified and various other work was carried out. Local authorities are charged with responsibility to maintain Drainage Districts. The Arterial Drainage Act, 1945 contains a number of provisions for the management of Drainage Districts in Part III and Part VIII of the act.

The drain located at the northwest of Ballylynan, which is flowing out of the site at this direction is part of a Drainage District managed Laois County Council. However, measures are only being proposed at an internal drain which is connected to this one, therefore consultation within the Laois County Council is not required. The Bennetsbridge Stream is an EPA water feature (River Waterbody CODE IE_SE_14B011900), however, the eastern drain which discharge to this stream was not identified under the EPA maps. Therefore, consultation is not required.

The preliminary drainage management plan for Ballylynan is presented in Appendix C

7.2 Peat Stability Assessment

Restoration activities have the potential to introduce additional risk of peat stability issues. The combination of additional loading (e.g. when excavators are used) and a higher water table has the potential to increase risk. At present, no specific guidance is available in Ireland detailing how peat stability risks should be managed in restoration projects.

Undertaking detailed geotechnical assessments is beyond the scope of the FRP. However, preliminary peat stability analysis was undertaken to inform the level of assessment required prior to the implementation of restoration actions. This includes a review of the landslide susceptibility map and historic landslide events produced by the Geological Survey of Ireland (GSI). The GSI landslide susceptibility map provides a preliminary indication of the susceptibility of a landslide based on several contributing factors, including where previous landslides have occurred and what caused them (slope, soil type and the impact of the flow

of water in an area). The area surrounding the site and within the site has low landslide susceptibility.

The GSI landslide susceptibility map for Ballylynan is presented in Figure 7-1.



Figure 7-1: Geological Survey of Ireland Landslide Susceptibility mapping for Ballylynan

7.3 Archaeology

No recorded archaeological sites are located within the site boundary.

Several archaeological sites occur to the west and south of Ballylynan, however, these are situated approximately 700 m to 1 km from the site. A historic road/trackway is located approximately 300 m north of the site, but no restoration measures are proposed in this area and therefore no impacts are anticipated. These features are shown in Figure 7-2.

A desktop constraint assessment was conducted using the National Monuments Service (NMS) Historic Environment Viewer to evaluate the site boundary and immediate surrounding buffer zones against the statutory Record of Monuments and Places (RMP) and the Sites and Monuments Record (SMR). The assessment confirmed that there are no recorded archaeological monuments, protected heritage features, or statutory "zones of notification" overlapping with or situated within a relevant proximity to the proposed restoration footprint. Consequently, statutory requirements under the National Monuments Acts are determined to be not applicable to this project as follows:

- Section 12 Notification: Not required, as no works will take place at, or in the immediate vicinity of, an RMP-listed site.
- Section 14 Consent / Licensing: Not required, as the project does not impact any designated National Monument or site subject to a Preservation Order.

Proactive Risk Mitigation (Chance Finds Protocol)

While no recorded features exist, the waterlogged and anaerobic conditions of fen environments possess a high potential for preserving previously unrecorded organic archaeological materials (e.g., wooden trackways, ancient implements, or environmental deposits). To ensure complete compliance with the spirit of the National Monuments Acts, a standard "Chance Finds" Protocol will be maintained throughout the duration of the restoration works. In the highly unlikely event that any sub-surface archaeological features or artefacts are exposed during ground disturbance or rewetting activities, works in the immediate area will cease immediately, and the National Monuments Service and the National Museum of Ireland will be notified within the statutory 72-hour window.

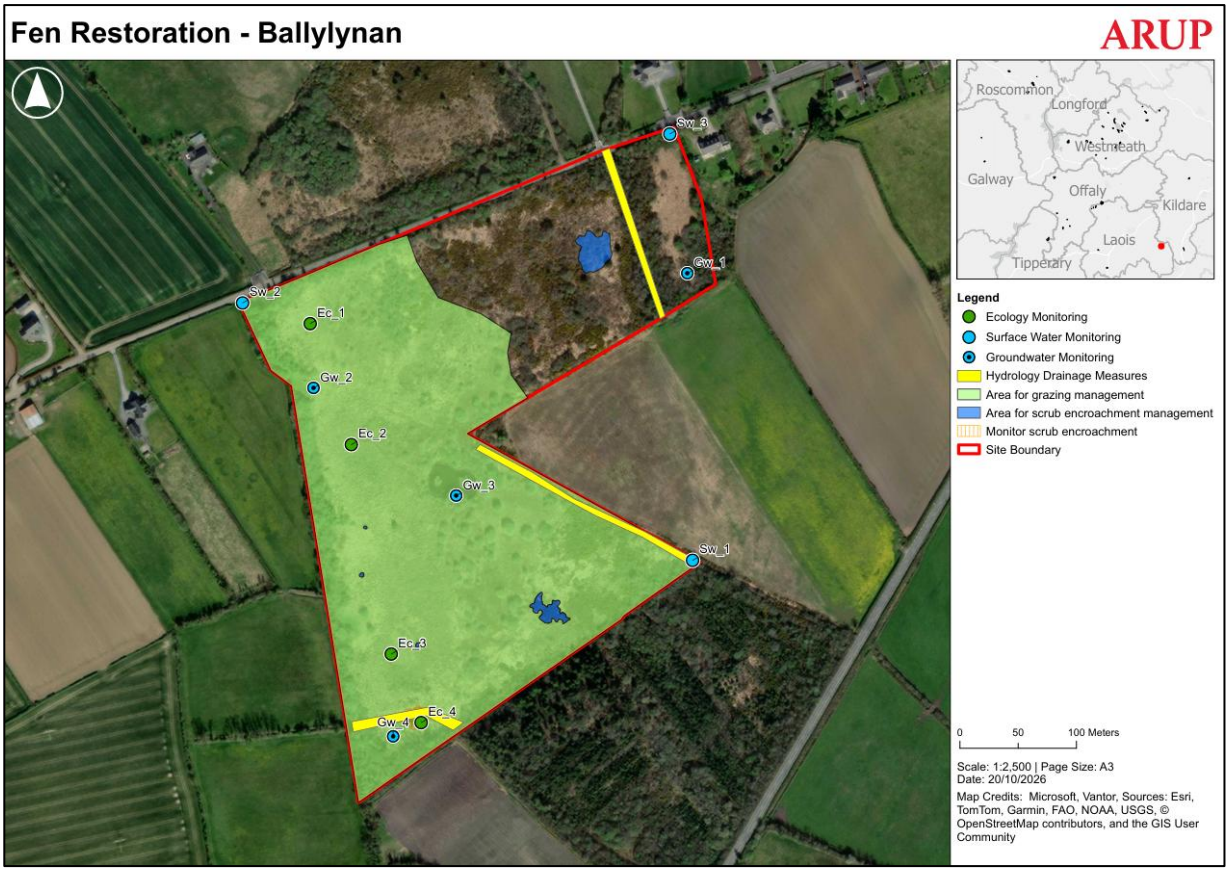


Figure 7-2: Archaeological Sites for Ballylynan (NMS, 2025)

8 Summary of Fen Restoration Plan Actions

Prior to proceeding with the implementation of the restoration measures outlined in the FRP, consultation with landowners and key stakeholders with an interest in the site is essential (Table 8-1). While this FRP identifies the key pressures and actions to be implemented, consultation with landowners and stakeholders may identify the need to amend or alter restoration actions. There may also be opportunities to provide additional benefits to the wider community. Consultation with local NPWS staff will be crucial to informing implementation planning.

Table 8-1: Role players in fen restoration plan

Measures	Stakeholder	Description
On -site	Landowners	Parts of Ballylynan are under ownership by private individuals (three induvial owners)
Off - site	Landowners & farmers	Engagement for uptake of catchment measures.
Capacity building	NPWS	NPWS engaging in community education and events

This section provides the summary of the Fen Restoration Plan Actions for Ballylynan (Table 8-2).

Table 8-2: Implementation plan for Ballylynan Restoration

	Activity	Location	Monitoring/ implementation indicator	Timeframe	Key role player			Possible funding source
					National	Regional/ Local	Other	
1	**Required preliminary actions**							
1.1	**Screening for Appropriate Assessment report.**							
	This report must outline all restoration measures that shall be undertaken as part of the project at Ballylynan. The Screening for AA must conclude whether a likely significant effect is anticipated to arise from the implementation of the project.	Sitewide	Screening report	Pre-restoration	NPWS			NPWS
1.2	**Drainage management plan**							
	Consultation with Kildare Co.Co on the drainage management plan is required to ensure compliance with legislation and local authority objectives.	Sitewide	Drainage management plan	Pre-restoration	NPWS	Laois Co. Co	Arup	Within Tóchar project scope
1.3	**Archaeological assessment**							
	Consultation with National Monuments Service on the archaeology is required to ensure compliance with legislation and local authority objectives.	Sitewide	Archaeological assessment report	Pre-restoration	NPWS	Laois Co. Co	Arup	Within Tóchar project scope
2	**Enabling Works**							
2.1	**Pre-restoration Works Surveys**							

	Activity	Location	Monitoring/ implementation indicator	Timeframe	Key role player			Possible funding source
					National	Regional/ Local	Other	
	Pre-site walkover with Ecologist/Ecological Clerk of Works (ECoW) to ensure proposed measures are appropriate and whether alterations are required. Surveys should also include identifying habitats for 1016 *Vertigo moulinsiana* which are within the areas for restoration measures. Where 1016 *Vertigo moulinsiana* habitats overlap with areas for restoration, alternative measures will be discussed with the project team.	Sitewide	ECoW report	Pre-restoration			Arup	Within Tóchar project scope
2.2	**Implementation of Mitigation Measures**							
	Ecological Impact Assessment Considerations – identification of necessary mitigation measures. Such measures may include, but are not limited to, the utilisation of hand machinery to avoid impact on sensitive habitats	Sitewide	ECoW report	Pre-restoration			Arup	Within Tóchar project scope
2.3	**Breeding Bird Considerations**							
	Prior to restoration works, where any restoration measures are identified to have the potential to interfere with breeding birds e.g. scrub removal, these works shall occur outside the breeding bird season (1 March – 31 August inclusive).	Sitewide	ECoW report	Pre-restoration			Arup	Within Tóchar project scope
2.4	**Good Practice Recommendations and CEMP**							

	Activity	Location	Monitoring/ implementation indicator	Timeframe	Key role player			Possible funding source
					National	Regional/ Local	Other	
	Good Practice Recommendations – Includes, but not limited to, avoidance of sensitive ecological receptors, pollution prevention procedures, biosecurity measures etc. The preparation and provision of a Construction Environmental Management Plan (CEMP).	Sitewide	ECoW report	Pre-restoration			Arup / Contractor	Within Tóchar project scope
3	**On-Site Restoration measures**							
3.1	**Hydrology measures**							
	Drainage measures Drainage measures are proposed to enhance water retention within the fen, within a drain in the south-eastern corner of the site, a drain in the northwest of the site and the main water outflow drain at the eastern site boundary of the site.	Water management balance	Restoration in 2027	NPWS to facilitate	Laois Co. Co		Arup/ Contractor	Within Tóchar project scope
3.2	**Vegetation measures**							

	Activity	Location	Monitoring/ implementation indicator	Timeframe	Key role player			Possible funding source
					National	Regional/ Local	Other	
	Proposed measures to address vegetation succession and scrub encroachment include: • Implementation of a low-intensity conservation grazing regime to reduce biomass accumulation, limit dominance of competitive graminoids, and promote a structurally diverse fen sward. • Targeted monitoring and removal of scrub in localised areas, particularly where encroachment is associated with drier conditions, to maintain open fen habitat and reduce shading and evapotranspiration pressures. • Phased implementation of vegetation management measures following hydrological restoration (e.g. drain blocking), to ensure that vegetation interventions are aligned with recovering water table conditions and maximise ecological response	Sitewide	Site records / habitat surveys	Restoration 2026	NPWS		Arup / Contractor	
4	**Off-Site Restoration measures**							
4.1	**Hydrology measures**							
	Engagement with landowners Agreements should be established to prevent drainage activities on neighbouring lands that could adversely affect the hydrological regime and water balance of Ballylynan .	Surrounding landowners	Update of measures by landowners/farmers	Long-term	NPWS			NPWS

	Activity	Location	Monitoring/ implementation indicator	Timeframe	Key role player			Possible funding source
					National	Regional/ Local	Other	
	Rainfall and evaporation monitoring using site-specific or nearby stations.	Surrounding areas	Rainfall and evaporation levels	Long-term	NPWS			NPWS
4.2	**Nutrient measures**							
	Targeted nutrient management measures should be implemented across the catchment to reduce phosphorus and nitrogen inputs to the fen. These measures may include promoting best-practice nutrient management, avoiding drainage works that could increase nutrient transport pathways, and implementing targeted interception measures for surface water and shallow groundwater flows where monitoring identifies a risk of nutrient delivery to the fen.	Surrounding landowners	Uptake of measures by landowners	Long-term	NPWS, LAWPRO, Farming for Water EIP		Landowners	Catchment measures to be funded through Farming for Water EIP/ other similar
5	**Monitoring progress**							
5.1	**Hydrology monitoring**							

	Activity	Location	Monitoring/ implementation indicator	Timeframe	Key role player			Possible funding source
					National	Regional/ Local	Other	
	Groundwater Piezometers will be installed to monitor groundwater levels and inform the interpretation of groundwater flow pathways together with groundwater quality. The data will support the assessment of fen conditions across the site. **Surface water** Surface water points will be monitor at selected locations along the site, within the water inflow, outflow and the well. be analysed along the eastern drain. This will help to evaluate the water quality and efficiency of drainage measures proposed.	Allocated locations with the site	Nitrate, Phosphorus, EC, Temperature and pH	Long term	NPWS to facilitate site access			NPWS
5.2	**Nutrient monitoring**							
	Water quality monitoring includes measuring nutrients (nitrate and phosphate), electrical conductivity, pH and temperature at the defined groundwater and surface water monitoring locations	Various locations within the site	Nutrients (Nitrate and phosphate), electrical conductivity and pH	Long term	NPWS to facilitate	Laois County Council		Within Tóchar project scope
5.3	**Vegetation monitoring**							
	Habitat condition assessments will be included to track restoration progress.	Sitewide	Habitat condition	Long-term	NPWS/ Bord na Móna to facilitate site access			NPWS
6	**Capacity building and training**							

	Activity	Location	Monitoring/ implementation indicator	Timeframe	Key role player			Possible funding source
					National	Regional/ Local	Other	
	Public meeting: To engage stakeholders on developments and results from the restoration measures.			Long-term	NPWS			NPWS
	Farmer training: Training such as that provided by the Farming for Water EIP will provide farmers with knowledge of alternative and habitat sensitive measures			Long-term	NPWS/ Farming for Water EIP / LAWPRO / Teagasc			Farming for Water EIP / other similar

8.1 Habitats Benefiting from Implementation of Restoration Actions

The restoration measures proposed in Section 6 are expected to deliver significant ecological benefits to a range of fen and associated wetland habitats across the site. By improving hydrological conditions, reducing nutrient pressures and supporting more appropriate vegetation structure, the proposed measures will contribute to the recovery and long-term resilience of fen and associated wetland habitats.

Annex I quality 7230 Alkaline fen: Implementation of the restoration measures outlined in Section 6 is expected to improve hydrological function, nutrient status and vegetation structure across areas supporting 7230 Alkaline fen. Restoration of more stable water levels and groundwater influence will support the ecological processes required to maintain alkaline fen habitat, while reduced nutrient inputs and the reinstatement of conservation grazing will promote conditions favourable for characteristic fen species and brown moss communities. Collectively, these measures are expected to improve habitat quality, increase ecological resilience and support the recovery of favourable structure and function of the habitat.

Annex I quality 6430 Hydrophilous tall-herb swamp: Improved hydrological stability and reduced nutrient pressures are expected to support the maintenance of structurally diverse tall-herb communities. The proposed restoration measures will help maintain suitable moisture conditions, reduce the risk of habitat degradation and support the long-term persistence of this habitat within the site.

Annex I quality 91E0 Alluvial forests: Restoration measures are expected to support the maintenance of favourable hydrological conditions required by Alluvial forests communities. Improved hydrological connectivity and reduced drying pressures will help maintain ecological functioning, support regeneration processes and enhance the long-term resilience of these woodland habitats.

Annex I quality 4010 Northern Atlantic wet heath: Restoration of more appropriate site hydrology is expected to support the maintenance of suitable moisture conditions within transitional wet heath areas. This will help maintain habitat integrity and reduce the risk of further degradation or transition towards drier vegetation communities.

Local occurring wetland habitats: Local wetland habitats, including PF1 Rich fen and flush, FS1 Reed and large sedge swamps and FS2 Tall-herb swamps, are expected to benefit from restoration measures targeting Annex I quality 7230 Alkaline fen due to their shared hydrological and ecological requirements. Improved water retention, reduced nutrient enrichment pressures and appropriate vegetation management are expected to enhance habitat structure, reduce competitive graminoid dominance and support characteristic wetland vegetation across the wider fen mosaic. Restoration measures will also help maintain habitat heterogeneity and support the continued presence of structurally diverse wetland communities throughout the site.

8.2 Species Benefiting from Implementation of Restoration Actions

The restoration measures outlined in Section 6 are expected to improve habitat quality and ecological resilience across Ballylynan. Improvements in hydrological condition, water quality and vegetation structure will provide benefits for species associated with alkaline fen and other wetland habitats by supporting more stable and suitable ecological conditions.

Vertigo moulinsiana: Records indicate the presence of 1016 Vertigo moulinsiana within the surrounding 10 km grid; however, this record is historical (1933) and its presence at Ballylynan remains unconfirmed. If present, the species is expected to benefit from restoration measures that maintain high soil moisture levels and promote a structurally diverse vegetation sward. Conservation grazing and hydrological restoration may help create suitable conditions for the species by increasing habitat heterogeneity and maintaining humid fen vegetation.

Golden plover may benefit indirectly from restoration measures that maintain open vegetation structure and prevent succession to scrub and woodland. The implementation of conservation grazing and management of scrub encroachment will help retain open habitat conditions associated with foraging opportunities within the wider landscape surrounding the site. More broadly, a range of wetland and fen-associated species are expected to benefit from hydrological restoration, conservation grazing and the management of competitive vegetation. These measures will help maintain structurally diverse and hydrologically suitable habitats, supporting species associated with alkaline fen and related wetland communities.

9 References

Alm, J., Shurpali, N. J., Minkkinen, K., Aro, L., Hytönen, J., Laurila, T., ... & Laine, J. (2007). Emission factors and their uncertainty for the exchange of CO2, CH4 and N2O in Finnish managed peatlands.

Brophy, J.T., Devaney, F.M., McNutt. K.E. & Perrin, P.M. (In prep.). National Fen Survey 2021-25: Final Report. Irish Wildlife Manuals, No. 1XX. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland.

CIEEM (2021). Good Practice Guidance for Habitats and Species. Version 3 May 2021. Chartered Institute of Ecology and Environmental Management

Copernicus (2025) Land Monitoring Service Data Viewer. Available: https://land.copernicus.eu/en/map-viewer (Accessed September 2025)

EPA (2025a) EPA Maps. Available: https://gis.epa.ie/EPAMaps/ (Accessed September 2025)

European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272 of 2009). Department of the Environment, Heritage and Local Government, Ireland

Fossitt, J.A. (2000). A guide to habitats in Ireland. The Heritage Council, Kilkenny.

Geological Survey Ireland (2025) Data and Maps. Available at: https://gsi.ie/en-ie/data-and-maps/pages/default.aspx (Accessed September 2025).

Gilbert G, Stanbury A and Lewis L (2021). Birds of Conservation Concern in Ireland 2020 –2026. Irish Birds 9: 523—544.

Met Eireann (2025) Athy weather Station. Rainfall Data. Available at: https://data.gov.ie/dataset/athlone-opw-rainfall-data (accessed March 2026)

NMS (2025). Archaeological Sites for Ballylynan. Historic Environment Viewer

National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland.

National Parks & Wildlife Service (2025) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments, Volume 2.

National Parks & Wildlife Service (2025) The Status of EU Protected Habitats and Species in Ireland. Species Assessments, Volume 3.

Tailte Éireann Historical mapping (2025). Hitorical Maps National Irish Historic Maps Dashboard

Wheeler, B.D., Shaw, S. & Tanner, K. (2009). Wetland functional mechanisms: a synopsis of WETMECs. Environment Agency, Bristol, UK. Science Report SC030232/SR2.

NatureScot 2022. Peatland ACTION - Technical Compendium. Peatland ACTION sharing good practice for peatland restoration techniques. Available online at:

https://www.nature.scot/doc/peatland- action-technical-compendium. Accessed November 2024.

Waddington, J. M., & McNeil, P. (2002). Peat oxidation in an abandoned cutover peatland. Canadian Journal of Soil Science, 82(3), 279-286.

Wilson, D., Dixon, S.D., Artz, R.R., Smith, T.E.L., Evans, C.D., Owen, H.J.F., Archer, E., & Renou-Wilson, F. (2015). Derivation of greenhouse gas emission factors for peatlands managed for extraction in the Republic of Ireland and the UK. Biogeosciences Discuss., 12, 7491–7535.

Wilson, D., Renou-Wilson, F., Farrell, C., Bullock, C. and Muller, C. (2012). Carbon Restore – the potential of restored Irish peatlands for carbon uptake and storage; CCRP Report. EPA Wexford.

Appendix A – Non-Technical Summary

NPWS Tóchar Midlands Wetland Restoration Scheme Fen Restoration Plan Non-Technical Summary			
Site Name	Ballylynan	**NFS site no.**	109001
County	Laois	**Designations**	*None*
Fen habitats present (area)	7230 Alkaline fens (2.94ha)	**Species of note**	*Epipactis palustris, Neottia ovata, charophytes, Gymnadenea conopsea, Dactylorhiza maculata, Dactylorhiza fuchsii*

Site Description

Ballylynan is a relatively small site situated on level terrain between two roads, approximately 1 km north of Ballylynan village, at Laois County Council.

The site is currently ungrazed and comprises approximately 5.5 ha of rich fen habitat. Of this area, only 1.5 ha has been classified as Alkaline Fen (Annex I habitat 7230), with the remaining fen vegetation lacking characteristic brown moss species. Additional habitats present on the site include scrub dominated by grey willow, bramble and gorse; wet heath; reed swamp; tall-herb swamp, portions of which qualify as Hydrophilous Tall-Herb Fringe Communities (Annex I habitat 6430); and areas of wet woodland of qualifying 91E0 conservation value. A stone well is present on the site, from which several channels originate, including one that flows to an approximately 700 m² mesotrophic pond. Many of the channels and drains support abundant growth of green algae.

Conceptual Site Model (CSM)

The site sits in a basin with higher surrounding areas to the east, at approximately 120 mOD. Under the WETMEC framework defined by Wheeler, Shaw & Tanner (2009), Ballylynan is classified as a groundwater-fed-valley-bottom fen, where hydrological inputs are dominated by groundwater emerging from adjacent elevated terrain and moving through the site that represents a discharge zone.

A drain flows along the southeastern, towards the southeast, boundary and connects with the Barrow_140 waterbody. There is a well located within the northwestern area of the site, which reaches multiple channels, which connect to a pond in the eastern part of the site. A drain is located to the northeastern site boundary and is flowing so the centre of the site.

Key Pressures

Hydrology Pressures	Drainage in the eastern, southern and northern area is disrupting hydrological connectivity, lowering water levels, and degrading alkaline fen habitats while promoting scrub encroachment. Additional pressures include fluctuating and reduced water levels, evidenced by extensive dry, degraded areas adjacent to the drain.
Nutrient Pressures	High nutrient levels in Ballylynan occurs mainly in the well, the drains surrounding the well and the marl pond. These features are all fed by groundwater.
Ecology Pressures	Scrub encroachment along the eastern, northern and southern drain contribute to drying conditions and altered hydrology. These pressures reduce peat saturation, suppress wetland species, and promote succession towards scrub and woodland,

NPWS Tóchar Midlands Wetland Restoration Scheme Fen Restoration Plan Non-Technical Summary	
	diminishing the extent and quality of wetland habitats.
Objective of Restoration Plan	
The objective of the Ballylynan Fen Restoration Plan is to protect and enhance the existing fen habitats while creating conditions that facilitate their natural expansion where feasible. It is acknowledged that fen restoration may not be achievable or appropriate in all areas due to site-specific constraints. In such locations, efforts will focus on improving the ecological condition, resilience, and overall conservation value of the existing habitats.	
Restoration Measures	
Hydrology Measures	**On-Site Measures**: Drain blocking at three locations: a small drain in the southeast corner, a drain within the eastern site boundary and an internal drain at northwest. This will help to restore hydrological conditions and reduce water loss from the fen system **Off-Site Measures**: Engaging with landowners to avoid the creation of new agricultural drains and deepening of existing drains where hydrological connectivity to Ballylynan.
Nutrient Measures	**On site Measures:** Surface water and groundwater monitoring, including nitrate, phosphate, electrical conductivity, pH and temperature. **Off-Site Measures**: Source control through nutrient management planning, pathway interception to reduce nutrient transport.
Ecology Measures	**On-Site Measures**: Ecological monitoring and removal of scrub
Monitoring Progress	
Hydrology Monitoring	Groundwater and surface water monitoring through a network of four piezometers and four surface water monitoring locations.
Nutrient Monitoring	Ongoing monitoring of habitats and drainage channels for water quality parameters within the fen.
Ecology Monitoring	Ecology monitoring of habitats and habitat condition assessments to track restoration progress.
More information	
Fen Restoration Plan Report Tóchar website: https://www.tocharwetlands.ie/fen-restoration/	



Figure 1: Site Habitat Map

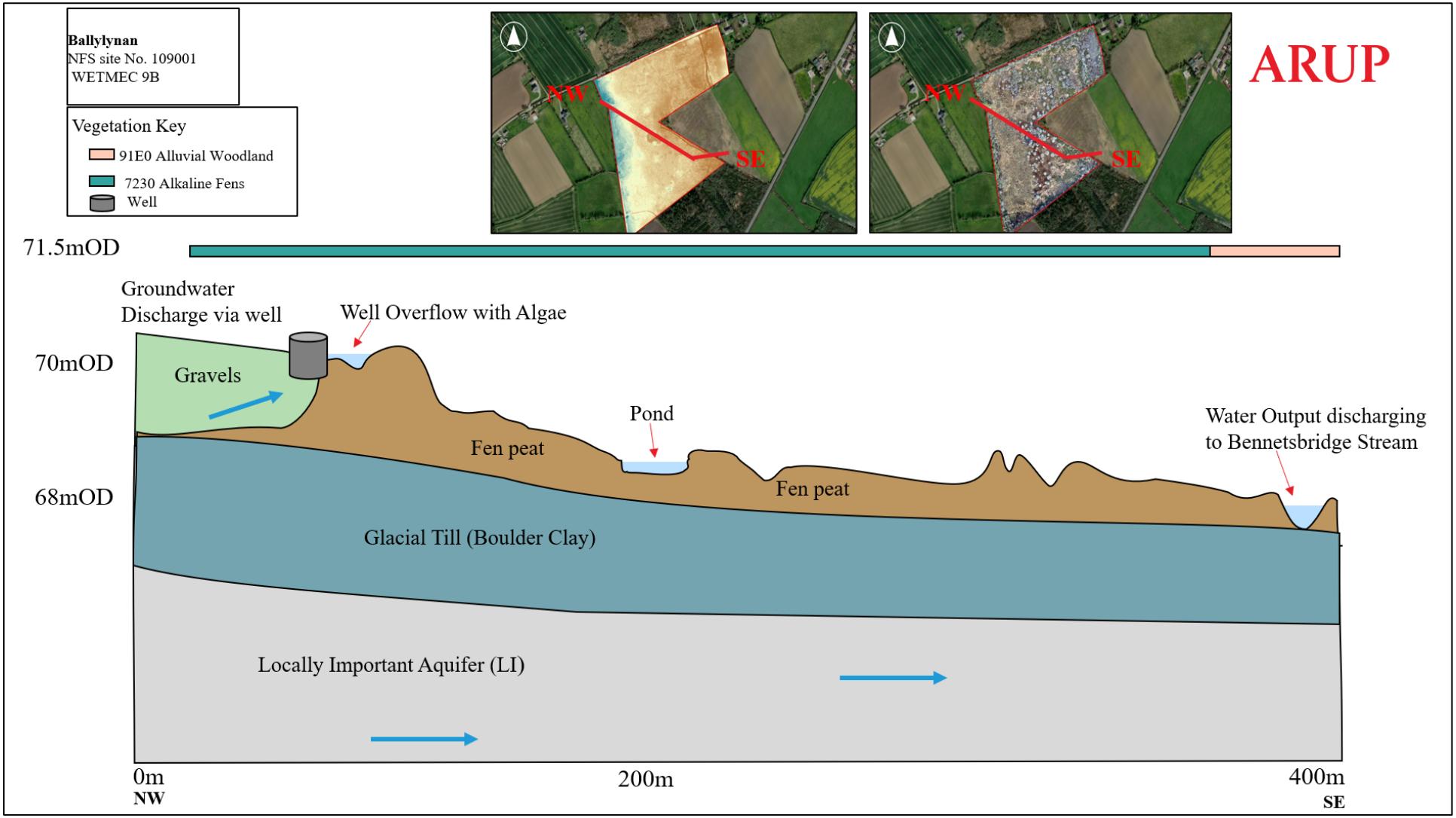


Figure 2: Conceptual site model of Ballylynan

Appendix B – Ecological Survey Maps



Figure 9-1 Habitats recorded and classified according to the Fossitt Habitat Classification system as part of the 2022 NFS Surveys. For full habitat names, please refer to Table 9-1.

Table 9-1 Annex I habitat and Fossitt habitat code directory

Annex I habitat code	Annex I habitat name	Fossitt Habitat Code	Fossitt Habitat Name
3110	Oligotrophic Isoetid lake habitat	FL1	Dystrophic lakes
3130	Slender Naiad-type lakes	FL2	Acid oligotrophic lakes
3140	Hard-water lakes	FL3	Limestone/marl lakes
3150	Rich pondweed lake habitat	FL4	Mesotrophic lakes
3160	Acid oligotrophic lakes	FL5	Eutrophic lakes
3180	Turloughs	FL6	Turloughs
3260	Vegetation of flowing waters	FL7	Reservoirs
3270	Chenopodion rubri	FL8	Other artificial lakes and ponds
4010	Wet heaths	FW1	Eroding/upland rivers
4030	Dry heaths	FW2	Depositing/lowland rivers
4060	Alpine and subalpine heath	FW3	Canals
5130	Juniper scrub	FW4	Drainage ditches
6130	Calaminarian grasslands	FP1	Calcareous springs
6210	Orchid-rich calcareous grassland	FP2	Non-calcareous springs
6230	Species-rich Nardus grassland	FS1	Reed and large sedge swamps
6410	Molinia meadows	FS2	Tall-herb swamps
6430	Hydrophilous tall-herb swamp	GA1	Improved agricultural grassland
6510	Hay meadows	GA2	Amenity grassland (improved)
7110	Raised bog (active)	GS1	Dry calcareous and neutral grassland
7120	Degraded raised bogs	GS2	Dry meadows and grassy verges
7130	Blanket bog (active)	GS3	Dry-humid acid grassland
7140	Transition mires	GS4	Wet grassland
7150	Rhynchosporion depressions	GM1	Marsh
7210	Cladium fens	HH1	Dry siliceous heath
7220	Petrifying springs	HH2	Dry calcareous heath
7230	Alkaline fens	HH3	Wet heath
8110	Siliceous scree	HH4	Montane heath
8120	Calcareous scree	HD1	Dense bracken
8210	Calcareous rocky slopes	PB1	Raised bog
8220	Siliceous rocky slopes	PB2	Upland blanket bog
8240	Limestone pavement	PB3	Lowland blanket bog
8310	Caves	PB4	Cutover bog
8330	Sea caves	PB5	Eroding blanket bog

Annex I habitat code	Annex I habitat name	Fossitt Habitat Code	Fossitt Habitat Name
91A0	Old oak woodland	PF1	Rich fen and flush
91D0	Bog woodland	PF2	Poor fen and flush
91E0	Alluvial woodland	PF3	Transition mire and quaking bog
91J0	Yew woodland	WN1	Oak-birch-holly woodland
		WN2	Oak-ash-hazel woodland
		WN3	Yew woodland
		WN4	Wet pedunculate oak-ash woodland
		WN5	Riparian woodland
		WN6	Wet willow-alder-ash woodland
		WN7	Bog woodland
		WD1	(Mixed) broadleaved woodland
		WD2	Mixed broadleaved/conifer woodland
		WD3	(Mixed) conifer woodland
		WD4	Conifer plantation
		WD5	Scattered trees and parkland
		WS1	Scrub
		WS2	Immature woodland
		WS3	Ornamental/non-native shrub
		WS4	Short rotation coppice
		WS5	Recently-felled woodland
		WL1	Hedgerows
		WL2	Treelines
		ER1	Exposed siliceous rock
		ER2	Exposed calcareous rock
		ER3	Siliceous scree and loose rock
		ER4	Calcareous scree and loose rock
		EU1	Non-marine caves
		EU2	Artificial underground habitats
		ED1	Exposed sand, gravel or till
		ED2	Spoil and bare ground
		ED3	Recolonising bare ground
		ED4	Active quarries and mines
		ED5	Refuse and other waste
		BC1	Arable crops
		BC2	Horticultural land
		BC3	Tilled land
		BC4	Flower beds and borders
		BL1	Stone walls and other stonework

Annex I habitat code	Annex I habitat name	Fossitt Habitat Code	Fossitt Habitat Name
		BL2	Earth banks
		BL3	Buildings and artificial surfaces

Appendix C – Restoration measures and monitoring

Point	Measure	Objective	Timeframe	Frequency of monitoring
Gw_1	Hydrological	Groundwater levels and quality monitoring	Long-term	Quarterly for year 1 Annual for year 2-5
Gw_2				
Gw_3				
Gw_4				
Sw_1				
Sw_2		Monitoring of surface water levels and quality	Long-term	Quarterly for year 1 Annual for year 2-5
Sw_3				
Ec_1	Ecological	Monitoring areas with Scrub encroachment	Long-term	Seasonal for year 1 Every 3 years for year 2-5
Ec_2				
Ec_3				
Ec_4				
Ec_5				

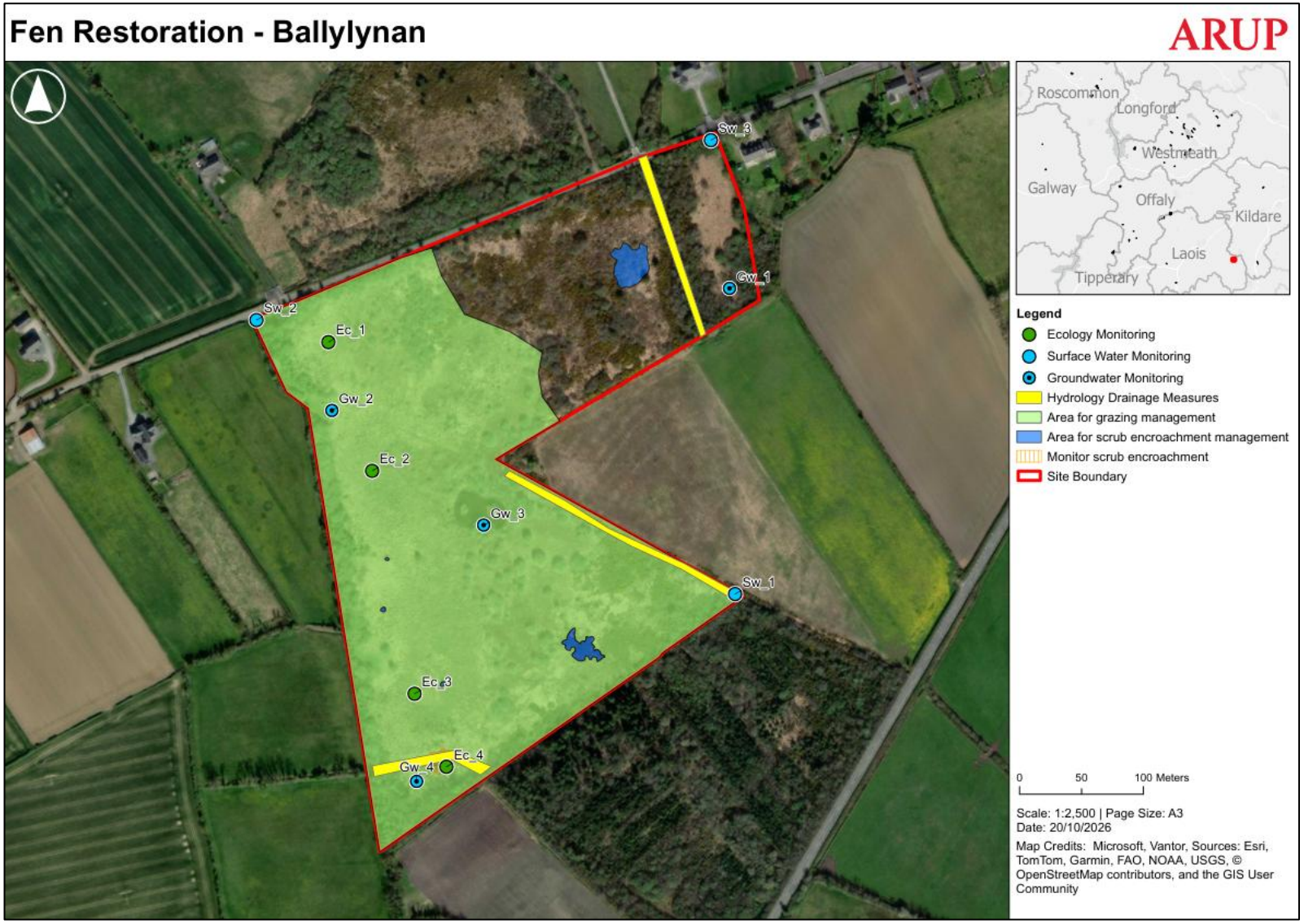


Figure 9-2: Restoration map for Ballylynan

Appendix D – Drainage Management Plan

NPWS Tóchar Midlands Wetland Restoration Scheme Fen Restoration Plan: Drainage Management Plan					
Site name	Ballylynan				
County	Laois		NFS site No.	109001	
Catchment overview:					
Ballylynan sits at an elevation of approximately 70mOD. Higher elevation is located to the east of the site, at approximately 120mOD.					
WFD catchment	Barrow		WFD Sub-catchment	Barrow_SC_070	
Drainage Area	Yes		Drainage District	Yes	
Responsible authority	Laois County Council and OPW		Maintenance date	TBD	
Surrounding landowners	Landowners				
Wetland drainage					
Historical maps indicate that the area is associated with wet vegetation and shows a district drain north of the site. The main drain along the eastern perimeter of the site is the Bennetsbridge stream which flows south and connects to the River Barrow. There are also two springs located north of the site and a well located win the western are of the site. An inflow drain is located in the northwest of the site and crosses the site to the southeast. There are other filed drains located within the site.					
Surface water inflow	Drain flowing from northwest to southeast		Surface water outflow	Darin on the eastern perimeter of the site, which is the Bennetsbridge stream	
Groundwater inflow	Groundwater input through the well on the western boundary				
Internal drains	Field drains located in the western and southwestern areas of the site. A District drain is located in the north of the site		Perimeter drains	Along the eastern perimeter	
On site hydrology measures					
On-site measure	Drain Blocking in the northwestern, eastern and southwestern area of the site		Role player	NPWS	
Off-site hydrology measures					
Off-site measure	Avoid creating new drainage channels		Role player	NPWS	
Water Monitoring					
Groundwater and surface water monitoring in a network of piezometers at selected locations within the site to monitor changes to water to establish if onsite measures area required such as drain blocking.					
Indicator	Water level	Location	Various locations across site	Role players	NPWS

NPWS Tóchar Midlands Wetland Restoration Scheme Fen Restoration Plan: Drainage Management Plan
A hydrological monitoring programme will be implemented, including the installation of piezometers. The network will include four piezometers located across the centre, southwestern, western and northwestern area to observe the water level within the site and the water quality. Surface water monitoring will form part of the monitoring programme and will be undertaken at locations along the outflow and inflow drain. The monitoring data will be used to assess changes in drain water levels and evaluate the effectiveness of the proposed drain-blocking measures in raising water levels within the site. Rainfall and evaporation monitoring is proposed using the nearby Met Eireann weather station at Athy.



Figure 1: Mapped drainage network of Ballylynan

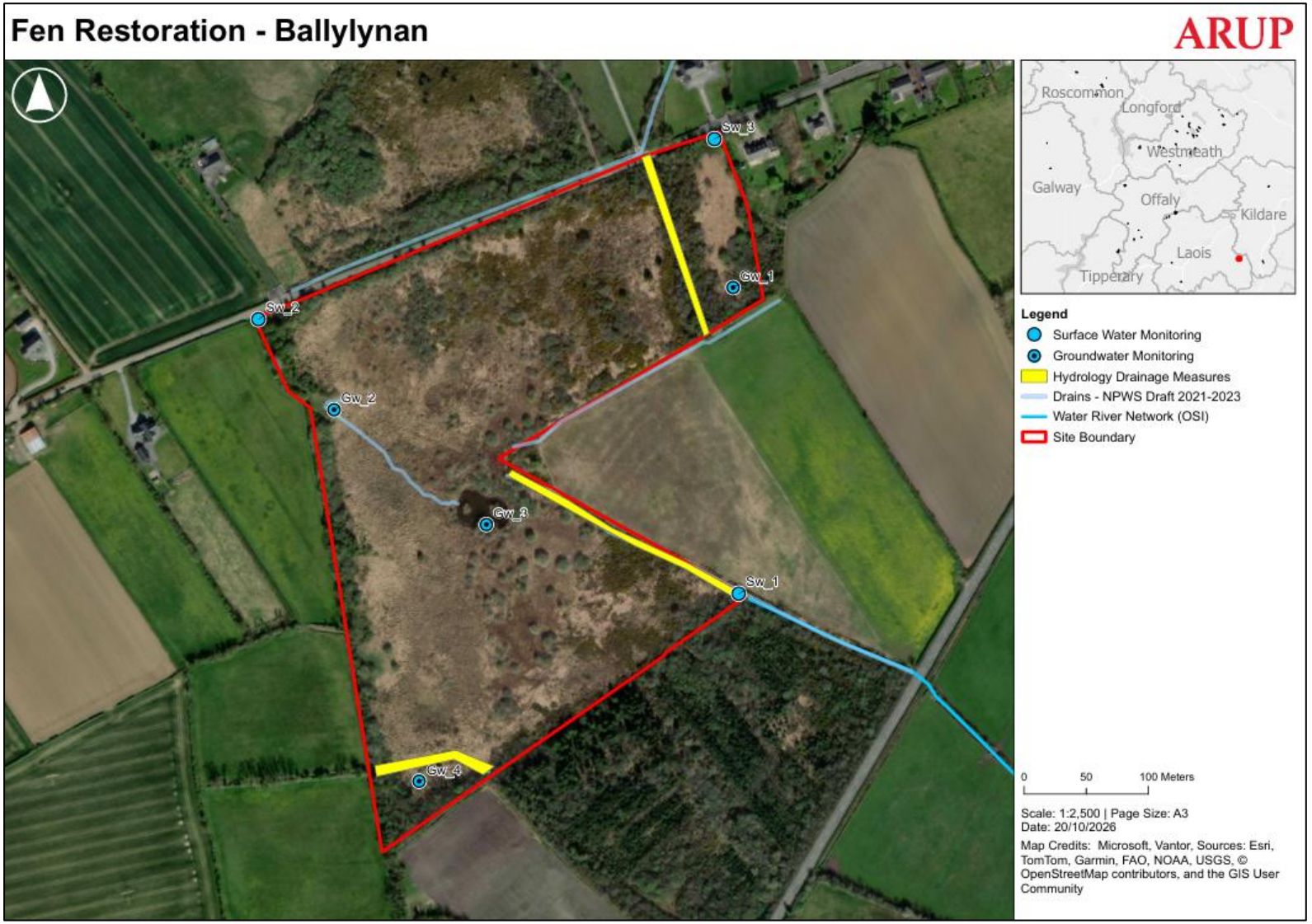


Figure 2: On-site hydrology measures at Ballylynan