

The Shannon Airport Group **Biodiversity Action Plan**

2023-2027



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Executive Summary

According to the WWF, there has been a 68% decline, on average, in global populations of mammals, fish, birds, reptiles, and amphibians since 1970. A 2019 Global Assessment Report reports that one million animal and plant species are now threatened with extinction, which is the highest figure in human history. Of the species that have been assessed in Ireland, one in every fifth species is threatened with extinction here. Within this, a third of our bee species is threatened with extinction. Nature is under immense pressure from human activity; however, efforts are finally being made to fight the decline. The National Parks & Wildlife Service (NPWS), the government agency which protects nature in Ireland, is undergoing a major overhaul, and biodiversity officers are being appointed in local authorities across the country. An ambitious 4th National Biodiversity Action Plan is due to be published later in 2023, and a recent Citizens' Assembly on Biodiversity Loss has put forward a range of recommendations for the Irish government to act on.

The Shannon Airport Group commissioned this Biodiversity Action Plan in the summer of 2022, which is designed to cover the five-year period of 2023-2027. The Plan was prepared by Flynn Furney Environmental Consultants, who liaised closely with the Sustainability Team at The Shannon Airport Group throughout the process. A series of field surveys were carried out by Flynn Furney over four days, in July and September 2022, across the Shannon Campus at Shannon, Co. Clare. Detailed desk studies and consultation with various stakeholders were also undertaken during this period. Stakeholders were contacted and included the airport ornithologist and representatives from the National Parks & Wildlife Service (NPWS), Birdwatch Ireland and the Heritage Office of Clare County Council. The consultants were mindful of The Shannon Airport Group's emphasis on balancing biodiversity enhancement with airport safety throughout.

The Shannon Campus lies in a unique location on the Shannon Estuary, County Clare. The array of flora and fauna in the area is particularly rich, notably in relation to the Lower River Shannon Special Area of Conservation (SAC) and River Shannon and River Fergus Estuaries Special Protection Area (SPA). Rineanna 'Peninsula' and the airport's lagoon or 'Western Drainage System', lie within the SAC. The airport lagoon is also an SPA and a proposed National Heritage Area (pNHA). Boundary areas between the airport lands and estuary contain Atlantic salt marshes and mudflats, which are in themselves important ecological habitats. The lands north of the SAC boundary also contain pockets of semi-natural and species-rich calcareous grasslands, which continue to be under threat nationally. A significant area of Annex I calcareous, species-rich grassland was recorded at Thady's Hill during the habitat surveys. There is also an extensive network of native hedgerows, patches of Willow/Gorse scrub, small wetlands and wooded areas across the Shannon Campus in general, that each have their own ecological importance. In addition to the open landscape, the airport and business parks have opportunities to become more biodiversity friendly.

The overall mission for this Plan is for The Shannon Airport Group to become a biodiversity friendly airport and business campus. The key aims of this biodiversity action plan are to grow the knowledge of the biodiversity present across the Shannon Campus and to protect and conserve it using the most appropriate and eco-friendly methods available. The Group's biodiversity objectives include protecting and enhancing the areas highlighted for improvement. To achieve this, The Shannon Airport Group will strive to undertake targeted actions to enhance habitats already present and create new ones where possible. Actions include adopting a reduced mowing regime across specific areas of the campus, pollinator-friendly planting, woodland enhancement/creation, scrub management, phasing out of herbicides/pesticides, eco-friendly hedge maintenance and the installation of bird/bat boxes.

The Shannon Airport Group is eager to raise awareness of biodiversity across Shannon Airport and the business park campus, including campus personnel, visitors and the wider public. They will work closely with the airport ornithologist, NPWS, BWI, Clare County Council's Biodiversity Officer and Heritage Officer, and other relevant parties for support in implementing this Biodiversity Action Plan. This Plan is designed to be ambitious and comprehensive, yet practical and achievable, so that biodiversity across the Shannon Campus can be protected, enhanced and respected going forward.



Image 1 View out to Shannon Estuary from Rineanna 'Peninsula', July 2022



Image 2 Wild Thyme, Lady's Bedstraw and Hawkbit – species-rich grassland - at Rineanna North, July 2022

1. Introduction to The Shannon Airport Group Biodiversity Action Plan

1.1 Background

This Biodiversity Action Plan, prepared by Flynn Furney Environmental Consultants, is designed to protect and enhance the biodiversity present at the Shannon Campus which includes Shannon Airport and the nearby business parks owned by The Shannon Airport Group. The Plan will span a 5-year period (2023-2027), after which progress can be reviewed and the document renewed where appropriate. The Shannon Airport Group is in a favourable position to lead the way in terms of biodiversity, due to its unique location on the Shannon Estuary, which is an SAC and SPA due to the presence of protected habitats and species. In addition, The Shannon Airport Group owns and manages a substantial area of land, not only in relation to the airport itself and business parks, but also large tracts of agricultural land. Some of this land has excellent potential in terms of the improvement of semi-natural and species-rich calcareous grasslands. This Plan was developed following a series of field surveys, detailed desk studies and consultation with the client and other stakeholders, including the airport ornithologist, conservation rangers and a grassland specialist from National Parks & Wildlife Service (NPWS), Birdwatch Ireland - Surveys & Monitoring Team and the Heritage Officer from Clare County Council.

1.2 The Biodiversity Crisis

The 2020 Living Planet Report by the World Wildlife Fund (WWF) found an average 68% decline in global populations of mammals, fish, birds, reptiles, and amphibians since 1970. The landmark 2019 Global Assessment Report by the Intergovernmental Platform on Biodiversity and Ecosystem Services reported that one million animal and plant species are now threatened with extinction, which is the highest figure in human history. In Ireland, around 31,000 species are known to occur, yet the conservation status of only about 10% has been assessed. This means we have a fundamental knowledge gap in how biodiversity is changing in Ireland. Of the species that have been assessed, one in every fifth species is threatened with extinction here. Within this, a third of our bee species is threatened with extinction.

1.3 Biodiversity Legislation

Wildlife Act 1976 (as amended 2000)

The aims of the Wildlife Act, 1976, are to provide for the protection and conservation of wild fauna and flora, to conserve a representative sample of important ecosystems, to provide for the development and protection of game resources and to regulate their exploitation, and to provide the services necessary to accomplish such aims. The 2000 Amendment broadened the scope of the Wildlife Acts to include the statutory protection for Natural Heritage Areas (NHAs) and most species, including the majority of fish and aquatic invertebrate species which were excluded from the 1976 Act.

Planning & Development Act 2000

Development must include mandatory objectives for the conservation of natural heritage and for the conservation of European sites and any other sites which may be prescribed.

EU Habitats Directive (92/43/EEC)

The Habitats Directive ensures the conservation of a wide range of rare, threatened or endemic animal and plant species. Some 200 rare and characteristic habitat types are also targeted for conservation in their own right. Adopted in 1992, the Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora aims to promote the maintenance of biodiversity, taking account of economic, social, cultural and regional requirements. It forms the cornerstone of Europe's nature conservation policy, along with the Birds Directive, and establishes the EU wide Natura 2000 ecological network of protected areas, safeguarded against potentially damaging developments. Natura 2000 sites

consist of Special Areas of Conservation (SACs), which cover a variety of habitats/species and Special Protection Areas (SPAs) which cover particular bird species.

EU Birds Directive (2009/147/EC)

The Birds Directive was first adopted by the EU Member States in 1979 and is the European Union's oldest piece of nature legislation. The directive provides a comprehensive framework for the protection, management and control of all wild birds naturally occurring in the EU. The Directive instructs Member States to take measures to maintain populations of all bird species naturally occurring in the wild state in the EU (Article 2). Such measures may include the maintenance and/or re-establishment of habitats in order to sustain these bird populations (Article 3). This Directive also puts in place general protection for all species of wild birds in the EU. In particular, the following are banned: deliberate destruction or capture of wild birds; damage to nests; taking or keeping eggs; deliberate disturbance which put conservation at risk, and; trading or keeping live or dead birds, the hunting of which is banned.

The Birds Directive does allow Member States to make derogations from its protective measures where certain wild bird species are causing damage to crops, livestock and fauna or represent a threat to public health and safety or to air safety (Article 9 - Derogations). A countrywide Declaration was signed in respect of air safety covering the period 1st August 2022 until 30th April 2023. This outlines certain species, under the First Schedule of the Air Safety Declaration that may, where "no other satisfactory solution exists", be "captured or killed" or "captured and killed or otherwise interfered with" for the purposes of air safety. Further, specific information is available on the NPWS website [here](#).

Special Areas of Conservation (SACs)

SACs are prime wildlife conservation areas in the country, considered to be important on a European level as well as at Irish level. The Habitats Directive is the legal basis for the designation of SACs in Ireland. Most Special Areas of Conservation (SACs) are in the countryside, although a few sites reach into town or city landscapes, such as Dublin Bay and Cork Harbour. The Habitats Directive lists certain habitats and species that must be protected within SACs. Irish habitats include raised bogs, blanket bogs, turloughs, sand dunes, machair (flat sandy plains on the north and west coasts), heaths, lakes, rivers, woodlands, estuaries and sea inlets. There are 25 Irish species which must be afforded protection and these include Salmon, Otter, Freshwater Pearl Mussel, Bottlenose Dolphin and Killarney Fern.

Special Protection Areas (SPAs)

Under the Birds Directive, EU countries must create special protection areas for threatened species and migratory birds, with conditions favourable to their survival, situated in the birds' natural area of distribution (i.e. where they naturally occur). Particular attention is paid to wetlands. The Special Protection Areas (SPAs) form part of the Natura 2000 network of protected ecological sites.

1.4 Biodiversity Policy

National Biodiversity Action Plan

The National Biodiversity Action Plan (2017-2021) was developed in line with EU and International Biodiversity strategies and policies. The Plan sets out actions through which a range of government, civil and private sectors will undertake to achieve Ireland's 'Vision for Biodiversity'. The 4th National Biodiversity Action Plan (2023-2027) is due to be published in 2023.

Clare County Biodiversity Action Plan 2017-2023

The Clare County Biodiversity Action Plan sets out to implement the actions of Ireland's Biodiversity Action Plan 2017-2021, as well as informing planning policy within the county. The Plan aims to raise awareness of biodiversity across County Clare. It promotes the following:

- natural forms of pest and weed control
- protection of water quality and importance of wetlands, including in relation to flood management

- recognising links between biodiversity and climate change
- coastal zone management
- maintaining soil fertility
- All-Ireland Pollinator Plan (key method to supporting the county's pollinators)
- habitat mapping, species recording and reporting to the National Biodiversity Data Centre (NBDC).
- education on biodiversity
- health and wellbeing and the arts
- conservation of County Clare's unique limestone ecosystems - reference to the work of the Burren Farming for Conservation Programme and the Burren and Cliffs of Moher UNESCO Global Geopark.
- significance of trees and hedgerows, with the focus on retention and conservation of existing trees and hedgerows, planting of native species, as well as best practice management of hedgerows.
- raising awareness of grasslands, including calcareous grasslands, and their management
- protection of marine and estuarine habitats such as sand dunes and salt marshes.
- farmland ecosystems, including High Nature Value farming
- nature within urban environments, including the conservation of hedgerows, eco-friendly roadside verge maintenance and the management of gardens and community spaces
- importance of conserving stone walls.

Clare County Development Plan 2017-2023

The Clare County Development Plan is described in its written statement as “the single most important policy document for the County representing an agreed economic, social, cultural and environmental blueprint for the future planning, growth and development of County Clare”. The Plan includes a specific section on Shannon, which lays out the objectives: to actively pursue a low carbon strategy; to protect and enhance the natural and built environment; and to deliver an integrated and coherent green infrastructure strategy, encouraging walking, cycling and recreation. Ensuring the attractiveness of the natural and built environment of Shannon is highlighted as key to creating a sense of place. The Shannon Estuary is referred to in terms of its “rich and varied natural heritage”, in particular the SAC, SPA and pNHA designations, with particular focus on its salt marshes, mudflats and the associated vegetation and birdlife.

All-Ireland Pollinator Plan (AIPP)

A startling one-third of Ireland's bee species are under threat of extinction by 2030. This is very worrying as bees and other pollinators provide essential 'services' to us humans. They pollinate our crops and plants. Without them, we would go hungry – and our world would be a more desolate and colourless place. A very positive project to address this threat was started right here in Ireland, called the All-Ireland Pollinator Plan (AIPP). The AIPP is the largest-scale conservation project in Ireland and one of the first of its kind in the world. It encourages businesses, communities, companies, schools and other organisations to play their part in conservation measures that are urgently needed to conserve our pollinating insects. The AIPP dedicated website, pollinators.ie is a mine of information on pollinators, with amazing facts and resources aimed at helping everyone to take simple actions to protect our precious pollinators.



Image 3 AIPP 2021-2025 cover page

1.5 Mission, Aims & Objectives

Mission

The Shannon Airport Group's overall Mission for this Biodiversity Action Plan is to become a biodiversity-friendly airport and business campus. The Shannon Airport Group will protect, conserve and enhance the valuable habitats and associated species present across the Shannon Campus. This includes not only the EU Natura 2000 sites designated as a Special Area of Conservation (SAC) and Special Protection Area (SPA), and the nationally important proposed Natural Heritage Area (pNHA), but also the undesignated sites which exist within the airport lands and commercial properties.

Aims

The Shannon Airport Group's Aims for this plan are to grow its knowledge of the biodiversity present across its lands and to protect and conserve it using the most appropriate and eco-friendly methods available. By taking targeted actions over the 5-Year timeframe of this plan, The Shannon Airport Group aims to restore and enhance the valuable habitats across its lands and properties. This will contribute to the overall aims for nature conservation, climate change mitigation and sustainable development of the South Clare and Shannon Estuary region.

Objectives

The following are The Shannon Airport Group's objectives for this Biodiversity Action Plan:

- to record the habitats present across the Shannon Campus and their key associated species.
- to become more familiar with the habitats and species present across the Shannon Campus.
- to identify areas for protection and enhancement
- to take targeted actions to enhance habitats already present and create new ones where possible (e.g. adopting a reduced mowing regime across campus, pollinator-friendly planting, woodland enhancement and creation, scrub management, eco-friendly hedgerow maintenance and reduction of herbicide use.
- the management and eradication of invasive species (particularly Japanese knotweed).
- to raise awareness about biodiversity across the Shannon Campus.
- to work closely with the airport ornithologist, NPWS, BWI, Clare County Council's Biodiversity Officer and Heritage Officer, and other appropriate groups going forward for support in implementing this Biodiversity Action Plan.

2. Biodiversity at the Shannon Campus

2.1 Overview

Shannon Airport lies in a unique location on the Shannon Estuary, County Clare. There is a rich history of both natural and cultural heritage in this region. The array of flora and fauna in the area is particularly rich, notably in relation to the Lower River Shannon Special Area of Conservation (SAC) and River Shannon and River Fergus Estuaries Special Protection Area (SPA). The lagoon area is also a proposed National Heritage Area (pNHA).

Shannon Campus: Study Area

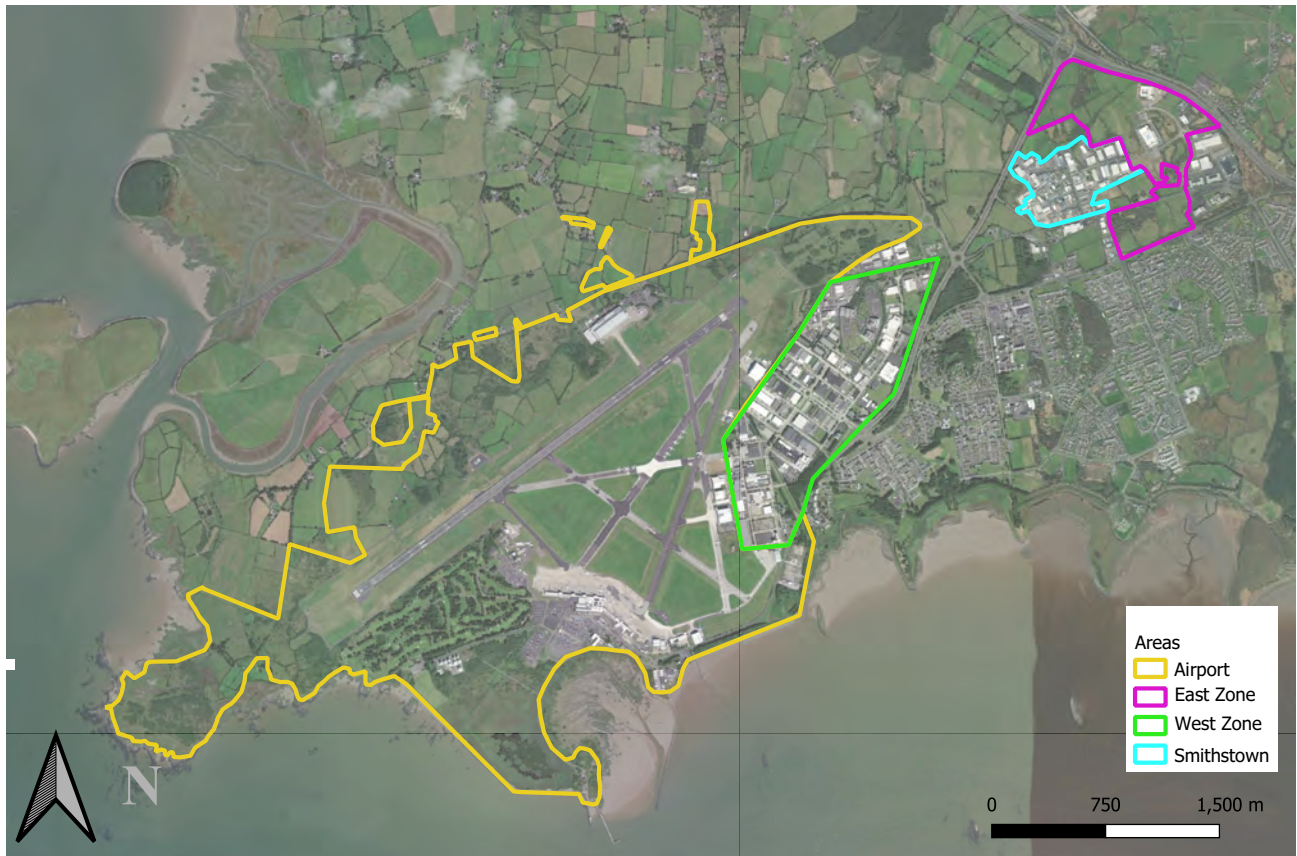


Figure 1 Overview of ecological study area and lands owned by The Shannon Airport Group, Shannon, Co. Clare, 2022.

Two sections of land lie within the SAC to the west of the airport – the lagoon area (also referred to as the Western Drainage System) and the ‘peninsula’ which includes Barley Harbour and Rineanna Point. The lagoon area also currently lies within the SPA. Boundary areas between the lands and estuary contain Atlantic salt marshes and mudflats, which are in themselves important ecological habitats. The airport lands just north of the SAC boundary also contain pockets of semi-natural and species-rich calcareous grasslands, which continue to be under threat nationally. There is also an extensive network of native hedgerows, patches of Willow/Gorse scrub and small wetlands across the lands that each carry their own importance in terms of ecological habitats. Invasive plant species such as Japanese Knotweed, Himalayan Honeysuckle and Smooth Cord Grass are an issue in parts of the airport lands which will need targeted actions to manage and/or remove them if their spread is to be controlled. In addition to the open landscape, the airport and business parks have opportunities to become more biodiversity friendly. As the business park lands continue to be developed, it is important to allow humans to make space for nature and live in harmony with our fellow creatures as much as possible.

2.2 Birds in the Study Area

An extensive bird survey was not carried out for this Biodiversity Action Plan, however bird species were noted and recorded during the habitat surveys in July and September 2022 (full lists available in Appendix E). In addition, data was requested from BirdWatch Ireland, and this was provided for the period 2016 to 2021 (full lists also available in Appendix E). The 2022 surveys carried out by Flynn Furney encompassed the wider area around the Shannon Estuary, including the Shannon Airport lagoon. Communications with the airport ornithologist also provided an insight into bird species and populations in the area, and how this has changed over recent decades. The District Conservation Officer (DCO) and local Conservation Ranger from the NPWS also offered some information on birds in the locality.

From the information gathered, it is apparent that the reedbed cover of the airport lagoon has increased over the last few decades. The number of wader species has decreased while other species have increased, e.g. Sedge Warbler and Reed Warbler, due to the expanded reedbed habitat. Mallards and Gadwall numbers are present in larger numbers. Whooper Swans are now rarely seen at the lagoon, and Mute Swans have also significantly declined in numbers. The ornithologist has been involved in trapping and moving swans to more suitable, safer locations, e.g. Lough Derg, in the past. He has also worked with the airport to manage water levels and monitor bird species since the 1970s. Sedge and Reed Warblers have been ringed in recent years. Wader numbers have decreased over time, including Curlew and Oystercatcher. These species, in addition to Snipe, Wigeon and Water Rail are less of a threat to aircraft than other bird species, such as Black-Headed Gulls, Crows and Herons. The lagoon is in a transitional state, moving from a manmade saltwater lagoon, towards reedbed, and will eventually likely turn into scrub and wet woodland. During this time, the species of bird present will continue to change. The mudflats and sand dunes along the Shannon Estuary here continue to be very important habitats for wader species.

The NPWS DCO recognised the importance of the lagoon and noted that it has reduced in size over the last 20 years. The lagoon was a valuable waterfowl and wader site, but bird numbers have reduced as water levels have dropped. It was acknowledged that the reedbeds and remaining open water are important for a range of bird species, and that Hen Harriers and Marsh Harriers have been recorded here in the past. A number of pools in Rineanna North were also highlighted as being important for waders and waterfowl.

2.3 Mammals in the Study Area

A detailed mammal survey was not carried out for the purposes of this Biodiversity Action Plan. However, it is worth noting that signs of Otter (*Lutra lutra*) in the form of spraint were detected on the road out to Dernish Island. Pine Marten (*Martes martes*) scat was noted on the rocks at the edge of Dernish Island also. The DCO from NPWS communicated that the NPWS has records of Badger (*Meles meles*) and Pine Marten on the airport lands. Hares, most likely Irish Hares (*Lepus timidus Hibernicus*) were also highlighted as being present on the airport lands, according to the Airport Safety, Compliance and Environmental Manager.

3. Habitats at the Shannon Campus

3.1 Habitat Surveys

Field surveys were conducted on the Shannon Campus by Flynn Furney Environmental Consultants' ecologists across four days, on 7th, 8th and 13th July and 16th September 2022. Key guidance documents used to conduct the surveys included the Heritage Council's Best Practice Guidance for Habitat Survey and Mapping (Smith *et al.*, 2011) and Fossitt's Guide to Habitats in Ireland (Fossitt, 2000) – for classification of habitats. From these surveys, it was established what habitat types are present across the lands and in what general state they are in. The airfield and airport building have been excluded from this study. The green areas between the runways are maintained by the airport according to strict airport health & safety practices. Access for surveying and maintenance is limited and grass is kept to a specific height to deter birds and other wildlife from using the areas for hunting, feeding or seeking cover. Buildings in the Campus were excluded from the study, although the nearby grounds, verges and farmland were considered. Some areas across the lands were of particular interest in terms of habitat and associated species and were deemed suitable for various conservation measures. The map below gives an overview of the habitats, classified via Fossitt (2000) across the Shannon Campus. A larger version of the map is available to view in Appendix C.

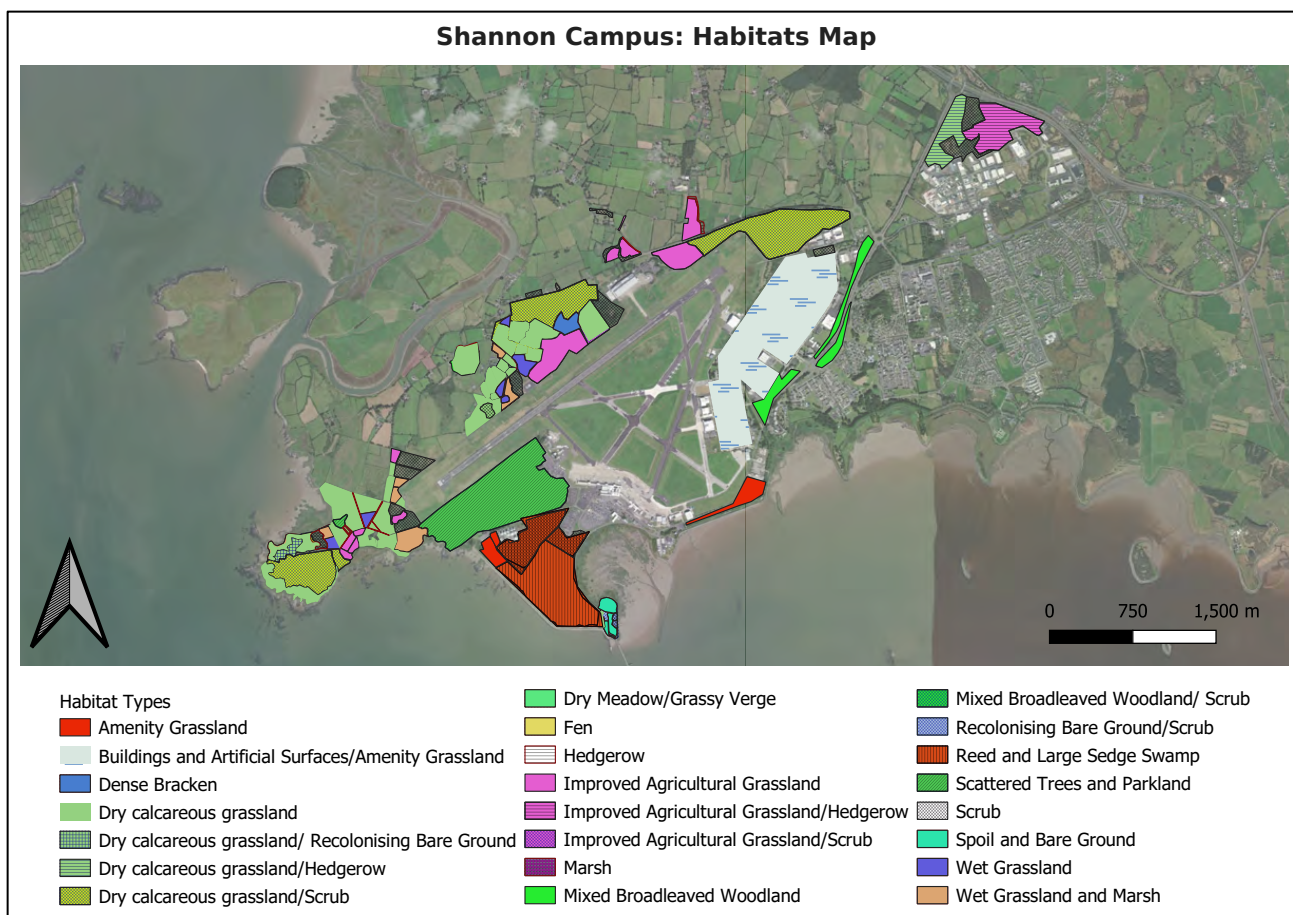


Figure 2 Map showing the habitats present across the Shannon Campus at Shannon, Co. Clare.

3.2 Habitat Assessment

Table 1, below, gives a more detailed description of the habitats identified (as detailed in the above map) during the surveys conducted by Flynn Furney Environmental Consultants, as classified by Fossitt (2000). A full description of each habitat can be viewed in 'A Guide to Habitats in Ireland' (Fossitt, 2000) which is available online.

Table 1 Habitats identified on the Shannon Campus

Fossitt Habitat Classification	Description of Fossitt Habitat
GS1 – Dry, Calcareous and Neutral Grassland	This category is used for unimproved or semi-improved dry grassland that may be either calcareous or neutral, but not acid. It is associated with low intensity agriculture and typically occurs on free-draining mineral soils of various depths. Calcareous grassland is restricted in its distribution in Ireland. Grazing is a characteristic feature; unimproved dry meadows which are rarely grazed should be excluded.
GS2 – Dry Meadows and Grassy Verges	Dry meadows are rarely fertilised or grazed and are mown only once or twice a year. They are now rare in Ireland. This type of grassland is now best represented on grassy roadside verges, on the margins of tilled fields and neglected fields and gardens, etc. They have a high proportion of tall, coarse grasses and tall herbs, e.g. Cow Parsley, Knapweed, Vetches, Pignut and Clovers.
GS4 - Wet Grassland	This type of grassland can be found on flat or sloping ground in upland and lowland areas. It occurs on wet or waterlogged mineral or organic soils that are poorly drained or, in some cases, subjected to seasonal or periodic flooding. Wet grassland often contains abundant rushes and/or small sedges and grasses.
GA1 – Improved Agricultural Grassland	This category is used for intensively managed or highly modified agricultural grassland that has been reseeded and/or regularly fertilised, and is now heavily grazed and/or used for silage making. It includes regularly reseeded monoculture grasslands and rye-grass leys that are planted as part of an arable rotation. Improved agricultural grassland is typically species-poor.
GA2 – Amenity Grassland (improved)	This type of grassland is improved, or species-poor, and is managed for purposes other than grass production. It includes amenity, recreational or landscaped grasslands, but excludes farmland. Most areas of amenity grassland have been reseeded and are regularly mown to maintain very short swards.
GM1 – Marsh	Marsh is found on level ground near riverbanks, lakeshores, and in other places where mineral or shallow peaty soils are waterlogged, and where the water table is close to ground level for most of the year.
WS1 - Scrub	Areas that are dominated by at least 50% cover of shrubs, stunted trees or brambles. Scrub frequently develops as a precursor to woodland and is often found in inaccessible locations, or on abandoned or marginal farmland. In the absence of grazing and mowing, scrub can expand to replace grassland or heath vegetation.
HD1 – Dense Bracken	This category is used for areas of open vegetation that are dominated by Bracken (<i>Pteridium aquilinum</i>). Cover of the fern may be either patchy or continuous, but should exceed 50% overall.
WD1 – Mixed Broadleaved Woodland	Woodland areas with 75-100% cover of broadleaved trees and 0-25% cover of conifers. Trees may include native and non-native species. If a number of different broadleaved tree species contribute significantly to the canopy, the term 'mixed' should be used in the habitat title.
WL1 - Hedgerow	Linear strips of shrubs, often with occasional trees, that typically form field or property boundaries. Most hedgerows originate from planting and many occur on raised banks of earth that are derived from the excavation of associated drainage ditches.
CM2 – Upper Salt Marsh	Atlantic or Mediterranean Salt Meadows. Upper salt marsh is subject to less frequent and less prolonged inundation by the sea than lower salt marshes (CM1). Not as saline in character as lower salt marsh.

Fossitt Habitat Classification	Description of Fossitt Habitat
	Vegetation is typically dominated by rushes, Red Fescue (<i>Festuca rubra</i>) and Creeping Bent (<i>Agrostis stolonifera</i>).
WD5 – Scattered Trees and Parkland	Scattered trees, standing alone or in small clusters, cover less than 30% of the total area, but are a prominent structural or visual feature of the habitat. The proportion of non-native trees is typically high. Usually occurs in areas of cultivated grassland, particularly amenity areas.
FS1 – Reed and Large Sedge Swamp	Species-poor stands of herbaceous vegetation that are dominated by reeds and other large grasses or large, tussock-forming sedges. Usually dominated by one or a small number of species.
FS2 – Tall Herb and Swamp	Tall-herb swamps are comparatively species-rich stands of herbaceous vegetation that occur in wet areas where the water table is above the ground surface for most of the year.
ED2 – Spoil and Bare Ground	This category includes heaps of spoil and rubble, and other areas of bare ground that are either very transient in nature or persist for longer periods of time because of ongoing disturbance or maintenance. Once the disturbance ends, spoil is readily colonised by plants.
BL3 – Buildings and artificial surfaces	This includes all buildings other than derelict stone buildings and ruins. It also includes areas of land that are covered with artificial surfaces of tarmac, cement, paving stones, bricks, blocks or astroturf. Plant cover should not exceed 50%.
PF1 – Rich Fen and Flush	Rich fens and flushes are fed by groundwater or flowing surface waters that are at least mildly base-rich or calcareous and are usually found over areas of limestone bedrock. The substratum is waterlogged and usually has a high mineral content. Rich fen and flush is rich with rushes, sedges and plants such as Lesser Spearwort, Water Mint and Marsh Bedstraw, as well as a moss layer. It can also be an important habitat for wild Orchids.

3.2.1 Shannon Airport Lagoon – Western Drainage System

The Shannon Airport Lagoon was initially a deeper brackish lagoon that was created as part of the 'Western Drainage System' in the late 1930s/early 1940s for the original airport. Based on our findings, the lagoon is now classed as a 'Reed and Large Sedge Swamp' - FS1 (Fossitt, 2000). This is described as 'species-poor stands of herbaceous vegetation that are dominated by reeds and other large grasses or large, tussock-forming sedges'. There were large, dense stands of reedbed leading to shallow, open water areas. Typical species for this habitat include Common Reed (*Phragmites australis*), Common Club-rush (*Schoenoplectus lacustris*) and Reed Canary-grass (*Phalaris arundinacea*), which were noted.

Bird species spotted at the lagoon on survey days included Sedge Warblers, Stonechats, Heron, Hooded Crow, Mute Swan, Little Egret and Cormorant. A full list of bird species is available in Appendix E.



Image 4 Shannon Airport Lagoon, July 2022.

3.2.2 Dernish Island

Dernish Island was originally a small island out on its own in the estuary, before the lagoon was constructed as an attenuation area to collect excess water from the nearby marshy/boggy lands. The lagoon is also known as Shannon Airport's 'Western Drainage System'. A road now runs in a loop around the lagoon, linking the area west of the airport (Knockbeg Point) to the Golf Club. The road is generally only accessed by certain airport personnel, including those working at the Shannon Foynes Port Company fuel jetty at Shannon Airport and the odd local. Dernish comes from the Irish 'Doire Inis', meaning Oak Island, which suggests it was once covered in Oak trees. Based on Flynn Furney's recent survey, Dernish Island is currently a mix between ED2 – Spoil and Bare Ground, WS1 – Scrub and small patches of GS1 – Dry, Calcareous & Neutral Grassland. There are also some small constructions here, for instance the disused prefab in the photo below and a fuel tank. Some of the spoil noted on Dernish Island contains garden plants, for example 'Goldencup' (*Hypericum patulum Thunb*), *Buddleia* and *Cotoneaster*, as well as several areas covered in a layer of stony gravel. Scrub mainly consists of dense Bramble (*Rubus fruticosus agg.*), Gorse (*Ulex europaeus*) and Willow (*Salix spp.*) thickets. Small patches of calcareous grassland were present along the fringes of the scrubby areas and contained a species-rich mix, including Common Spotted Orchids (*Dactylorhiza fuchsia*), Yellow-wort (*Blackstonia perfoliate*), Hawkbit species, Devils' Bit Scabious (*Succisa pratensis*), Teasel (*Dipsacus fullonum*) and Wild Carrot (*Daucus carota*).



Image 5 Unused prefab and vegetation, including scrub, on Dernish Island, July 2022.

3.2.3 Rineanna Point/Barley Harbour – 'Peninsula'

This peninsula ranges from high nature value GS1 – Dry, Calcareous, Neutral Grassland nearest the estuary, to moderate value GS1, becoming a mix of HD1 - Dense Bracken and GS1/WS1 – Calcareous Grassland with Scrub. The plentiful and colourful forb component contains several good calcareous indicators such as *Thymus polytrichus*, *Galium verum*, *Lotus corniculatus*, *Polygala vulgaris*, *Leucanthemum vulgare* and *Pilosella officinarum* (mean forb height = 9.0 cm, n = 357). Other forbs present include *Succisa pratensis*, *Plantago lanceolata*, *Potentilla erecta*, *Centaurea nigra*, *Prunella vulgaris* and *Euphrasia officinalis* agg. The calcicole moss *Ctenidium molluscum* is frequent. The scrub consists mainly of Gorse (*Ulex europaeus*), Bracken (*Pteridium aquilinum*) and Willow (*Salix spp.*). The peninsula lies within the Lower River Shannon SAC and as such is



Image 6 View out to mudflats, Rineanna Peninsula - south.

associated with Atlantic Salt Meadows (along its northern 'coast'). It is surrounded by a 'furoid-dominated' intertidal reef community complex, as well as mudflats and sandflats not covered by seawater at low tide. 'Furoid' is the term used for brown seaweeds, e.g. Bladderwrack that are able to tolerate the extreme conditions of very exposed to moderately exposed rocky shores.

In a 2017-2018 Saltmarsh Monitoring project by the NPWS, both Atlantic and Mediterranean Salt Meadows were recorded at Rineanna Point. For Atlantic Salt Meadows, Common Cordgrass or *Spartina anglica* is noted as a negative indicator species. From our surveys, it was apparent that *Spartina* is quite abundant in sections. This is of concern for this habitat as the *Spartina* is an invasive plant, spreading relatively fast and can dominate existing native species. Positive, native indicator species recorded included Sea-Spurrey (*Spergularia media*), Sea Milkwort (*Lysimachia maritima*), Sea Scurvygrass (*Cochlearia officinalis*), Sea Club Rush (*Bolboschoenus maritimus*), Common Centaury (*Centaureum erythraea*) and Yellow-wort (*Blackstonia perfoliate*). A particularly rare plant species called Sea Wormwood (*Seriphidium maritimum*) was also identified during surveys of this peninsula. Chamomile (*Chamaemelum nobile*) was also present in sections. A perennial, native wildflower, Chamomile has become very scarce and is now classified as being Near Threatened on the Red Data List of Vascular Plants (2016). It grows on sandy grassland, on grass tracks and on roadsides in West Munster mainly, with just a scattering elsewhere in the country.



Image 7 Chamomile plant, near Shannon Airport, September 2022.

3.2.4 Rineanna North - Japanese Knotweed

A large stand of Japanese knotweed (*Fallopia japonica*) was detected in a field in Rineanna North (GPS point: 52.69602, -8.94973), measuring 10m long and 3m wide. Japanese knotweed is one of the most highly invasive plant species in Ireland and of concern both in terms of negative effects on native wildlife and land value. It is listed 477/2011 – EC Birds and Natural Habitats Regulations. Japanese knotweed is a perennial and can easily out compete native species. It spreads extremely rapidly by means of rhizome (underground stem) growth and by spreading of cut stem or root fragment.

Signage must be displayed near to each knotweed stand, warning people not to cut or treat the plant. The relevant landowner is responsible for carefully removing Japanese knotweed. There are a range of chemical and mechanical methods to remove knotweed, but these should be carried out by a trained and accredited contractor. These methods are detailed under Section 4.5.1.



Image 8 Japanese knotweed stand.

3.2.5 Old Quarry - Thady's Hill

The old quarry at Thady's Hill revealed itself to be a very important Annex I calcareous grassland site. Which corresponds to the Priority Annex I Habitat - Dry Calcareous and Neutral Grassland (GS1) (Fossitt, 2000). It can also be classified as an Orchid-Rich Calcareous Grassland site (NPWS, 2013) given the abundance and diversity of Orchid species found on the site. Annex I habitat types are those whose conservation requires the designation of Special Areas of Conservation. Priority habitats, such as this one, are in danger of disappearing within the EU territory. Species lists were taken across the site, including a total of seven transects. Plants such as Hawkbait (*Leontodon spp.*) Quaking Grass (*Briza media*), Fairy Flax (*Linum catharticum*), Greater Knapweed (*Centaurea scabiosa*) and Wild Thyme (*Thymus drucei*) were recorded, along with several wild Orchid species, e.g. Common Spotted (*Dactylorhiza fuchsia*), Pyramidal (*Anacamptis pyramidalis*), Bee Orchid (*Ophrys apifera*) and Marsh Helleborine (*Epipactis palustris*). A full list of species recorded is outlined in the table below.

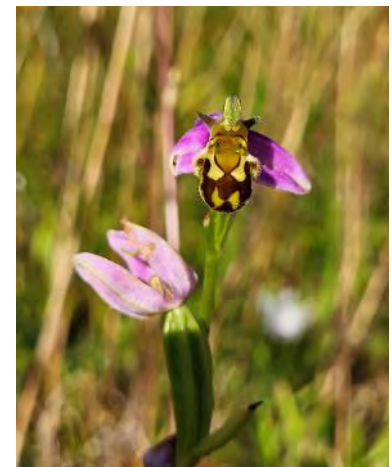


Image 9 Bee Orchid at Thady's Hill, July 2022.



Image 10 Species-rich, calcareous grassland at Thady's Hill, July 2022.

Table 2 Indicator Species recorded at Thady's Hill/Old Quarry site, July 2022.

Indicator Species recorded at Thady's Hill/Old Quarry site (Hamilton <i>et al.</i> , 2020)			
High Quality Indicator Species		Positive Indicator Species	
Common Name	Latin	Common Name	Latin
Quaking grass	<i>Briza media</i>	Glaucous sedge	<i>Carex flacca</i>
Fairy flax	<i>Linum catharticum</i>	Wild Carrot	<i>Daucus carota</i>
Common Spotted	<i>Dactylorhiza fuchsii</i>	Lady's bedstraw	<i>Galium verum</i>
Bee Orchid	<i>Ophrys apifera</i>	Hawkbite spp.	<i>Leontodon spp</i>
Pyramidal	<i>Anacamptis pyramidalis</i>	Common bird's foot trefoil	<i>Lotus corniculatus</i>
Marsh Helleborine	<i>Epipactis palustris</i>	Mouse ear hawkweed	<i>Pilosella officinarum</i>
Marsh Orchid	<i>Dactylorhiza Kerryensis</i>	Wild thyme	<i>Thymus polytrichus</i>

Another highly significant feature of Thady's Hill is an area of base-rich Fen, in a wet depression where groundwater is found close to the surface. Fens are wetlands composed of peat, plants and water, combined together. Peat is the result of the accumulation of partially decayed plants over many years. The dead plants don't rot because they grow in waterlogged conditions where there is little oxygen. Bacteria and fungi - the agents of decay are prevented from working in these conditions. A fen is often a mosaic of different habitats ranging from open-water, reed-beds, small sedge vegetation, to semi-terrestrial woodland. The complex of habitats that can occur within a Fen contributes to the rich diversity of plants and animals. A list of the plant species found in this Fen are detailed below.

Table 3 Species recorded specific to Thady's Hill Fen habitat.

Species Recorded in the Thady's Hill Fen			
Water Horsetail	<i>Equisetum fluviatile</i>	Dwarf Willow	<i>Salix herbacea</i>
Water Mint	<i>Mentha aquatica</i>	Lesser Spearwort	<i>Ranunculus flammula</i>
Common Spotted Orchid	<i>Dactylorhiza fuchsii</i>	Common Reed	<i>Phragmites australis</i>
Wavy Hair-grass	<i>Deschampsia flexuosa</i>	Lesser Water-plantain	<i>Baldellia ranunculoides</i>
Marsh Pennywort	<i>Hydrocotyle vulgaris</i>	Short-fruited Willowherb	<i>Epilobium obscurum</i>
Angelica	<i>Angelica sylvestris</i>	Cut-leaved Water Parsnip	<i>Berula erecta</i>

Species Recorded in the Thady's Hill Fen			
Ragged robin	<i>Lychnis flos-cuculi</i>	Purple loosestrife	<i>Lythrum salicaria</i>
Marsh Helleborine	<i>Epipactis palustris</i>	Devil's-bit Scabious	<i>Succisa pratensis</i>
Marsh-bedstraw	<i>Galium palustre</i>	Bulrush	<i>Typha latifolia</i>
Willows	<i>Salix spp</i>	Fen Pondweed	<i>Potamogeton coloratus</i>
Duckweed	<i>Lemna minor</i>	Hemp-agrimony	<i>Eupatorium cannabinum</i>

The majority of the site is in a transitional state where open Calcareous grassland is becoming rank, heavy grassland and scrub. These habitats are a precursor to woodlands which is developing around the site's northern and western boundary. Scrubby areas were dominated by Bramble with trees and shrubs consisting of Willows, Hawthorn (*Crataegus monogyna*), Blackthorn (*Prunus spinosa*) and Gorse. Cotoneaster (*Cotoneaster spp.*), a non-native plant known to cause significant damage to other calcareous grassland sites, was also found. The site's woodland area consists of emerging Oak, Ash, Hazel Woodland and contains Hazel (*Ulmus spp*), Blackthorn (*Prunus spinosa*), Gorse, Elder (*Sambucus nigra*), Ash (*Fraxinus excelsior*) and Sycamore (*Acer pseudoplatanus*).

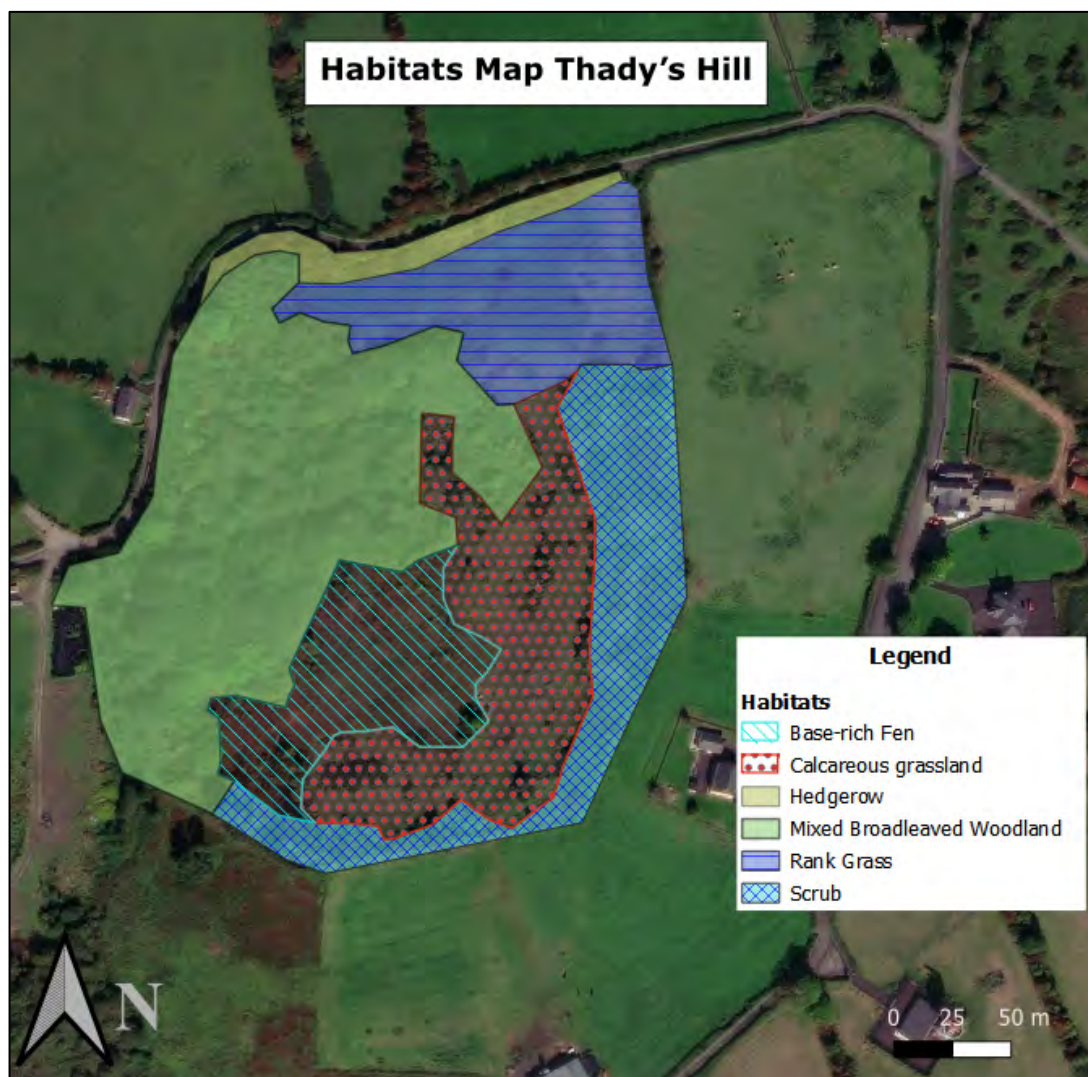


Figure 3 Map of habitats at Thady's Hill

3.2.6 North of Airport Lagoon and Fuel Tank Area

North of the lagoon and south of the fuel tanks and golf club, there is a large area primarily covered in scrub consisting of Willows and dense Bramble thickets, interspersed throughout with Bindweed (*Convolvulus*

spp.). Small patches of grassland containing meadow grasses, Hawkbit, Daisies (*Bellis perennis*), Bird's-foot Trefoil (*Lotus corniculatus*), Tufted Vetch (*Vicia cracca*), Black Medick (*Medicago lupulina*) and Horsetail (*Equisetum arvense*), exist among the scrub, though the scrub dominates.



Image 11 Grassland and scrub near fuel farm area, July 2022.

3.2.7 Knockbeg Point

Knockbeg Point is at the eastern point of the artificial lagoon leading out to Dernish Island. The area off the N19 roundabout leads westwards onto the estuary road. The green space either side of the road at Knockbeg Point is currently composed of manicured lawns, classified as GA2 – amenity grassland, on both sides. Just south of the roundabout, there are a number of industrial buildings and related access lanes (BL3). There are also some pockets of native and non-native, semi-mature, mainly broadleaf trees to the east of the roundabout here (WD1).



Image 12 Knockbeg Point verges, September 2022.

3.2.8 Shannon Golf Club

Shannon Golf Club is mainly composed of manicured, GA2 amenity grassland, interspersed with substantial areas of trees and parkland (WD5) – most of which are relatively mature, non-native species. Non-native tree species noted on a brief survey of a small section of the golf course include Sitka and Norway Spruce (*Picea sitchensis* and *Picea abies*), numerous lodge pole Pines (*Pinus spp.*), Larch (*Larix spp.*), Monterey Cypress (*Cupressus macrocarpa*), Leyland Cypress (*Cupressus × leylandii*), Horse Chestnut (*Aesculus hippocastanum*), Palm (*Cordyline spp.*), Flowering Cherry (*Prunus spp.*) and Poplar (*Populus spp.*). Native tree species noted include Silver Birch (*Betula pendula*), Rowan (*Sorbus aucuparia*) and Oak (*Quercus spp.*). To the north side of the road leading west on entering the golf club, there is a long line of trees which include Willow (*Salix spp.*), Birch (*Betula spp.*), Hawthorn (*Crataegus monogyna*), a mix of Conifers, Oak, Beech (*Fagus sylvatica*) and Rowan, with some thickets of Bramble and flowering plants, e.g. Meadowsweet (*Filipendula ulmaria*), in between.

3.2.9 Shannon Campus West Zone

Shannon Campus West Zone covers an area of approx. 126 ha, of which approx. 105 ha is developed with buildings serving business and industry, classed as BL3 – Buildings and Artificial Surfaces. Much of the remaining area is designated for future development, however there are several green spaces and woodland

or treeline-covered areas that have been marked out for biodiversity enhancement, including Rineanna Biodiversity Garden. There are a number of flowerbeds and borders (mostly planted with pollinator-friendly flowers/shrubs) both within and to the west of the Biodiversity Garden, classed as BC4 – ‘Flower beds and borders’ under Fossitt (2000).

Rineanna Biodiversity Garden



Image 13 Rineanna Biodiversity Garden, September 2022.

Rineanna Biodiversity Garden is located to the rear of the Shannon Gateway Hub building, with an exit/entrance on the N19. It is a pleasant amenity area used by nearby staff and visitors, complete with picnic tables, pollinator friendly planted beds, an extensive Hornbeam (*Carpinus betulus*) hedge and patches of ‘low-mow’ lawn. The pollinator-friendly beds contain flower and shrub species such as *Rudbeckia*, *Verbena*, Catmint, *Geranium spp.* and Lavenders (*Lavandula angustifolia*). Some Japanese Rose (*Rosa rugosa*) is also present, which can become invasive if not maintained regularly. A couple of *Sorbus spp.* trees have been planted recently. Wooden signage depicts images and

information on pollinators and a yellow metal structure is present in the shape of a honeycomb section. A large, long green patch extends north from the biodiversity garden, with a drain/ditch on each side containing mainly *Phragmites spp.* with some Teasel and Thistle in sections. The biodiversity garden and area which it extends into would generally be classed as GA2 (improved amenity grassland).

East and northeast of the biodiversity garden, there is a line of trees composed of a mix of Ash (*Fraxinus excelsior*), Oak and Alder - both Japanese *Alnus japonica* and native Alder *Alnus glutinosa*. A circle of young Apple trees is also planted along the path by the N18, creating a small orchard. The woodland nearby is mainly made up of non-native Sitkas and Pines, edged with broadleaf species like Horse Chestnut (*Aesculus hippocastanum*), Sycamore (*Acer pseudoplatanus*), Hawthorn, Poplar and Beech. The path to the west of the biodiversity garden is edged with a line of very tall Leyland Cypress trees, leading into Ashes and Sycamores. Overall, the wooded here would be classed as WD2 – Mixed Broadleaved/Conifer Woodland. Dogwood (*Cornus spp.*) is present in a planted hedge behind the Gateway Hub building. The green areas along here and in nearby sections of Shannon Campus West Zone are also GA2, which are manicured and mown on a regular basis. Lines of trees across this section of campus are mostly a broadleaf mix of native and non-native species, including Lime (*Tilia spp.*), Spanish Chestnut (*Castanea sativa*), Horse Chestnut, Oak, Birch, Ash, Sycamore and Maple (*Acer spp.*). South of the biodiversity garden and near Starbucks’ Drive-Thru, there are long, planted rectangular beds containing pollinator friendly flowers and shrubs, similar to those in the garden itself (BC4).

3.2.10 Shannon Campus East Zone and Smithstown

Shannon Campus East Zone and Smithstown contain further commercial properties over a smaller area (approx. 94 ha) than Shannon Campus West Zone. Smithstown is relatively fully developed while Shannon Campus East Zone is currently only partially developed, but the buildings are likely to expand quite extensively here in future.

Agricultural Land

Tracts of the remaining land in the Shannon Campus East Zone are currently mainly used for farming, with signs of extensive cattle poaching in patches, visible on the survey day. Access to this farmland was gained via the entrance north of Schenker and Zimmer Biomet. The area of land not marked to be developed here

contains a mix of semi-natural grassland (GS1) and pockets of wet grassland (GS4), hedgerows (WL1), treelines (WL2) and scrub (WS1). The hedgerows were generally dense and rich with birdlife, with the main shrub species being Elder, Hawthorn, Blackthorn, Cherry and Willow, interspersed with thickets of Bramble. The scrub was mainly composed of Gorse and Willow thickets. Large sections of the grassland were rushy, yet contained patches of relatively mixed calcareous species swards, e.g. Devil's-Bit Scabious (*Succisa pratensis*), Ribwort Plantain (*Plantago lanceolata*), Knapweed (*Centaurea*), Yarrow (*Achillea millefolium*), Lesser Stitchwort (*Stellaria graminea*), Thistle (*Cirsium spp.*) and Self-Heal (*Prunella vulgaris*). The land sloped down to a small stream located towards the northeast corner of Shannon Campus East Zone. Here, there were patches of wet grassland species such as Yellow Flag Iris (*Iris pseudacorus*), Meadowsweet and Vetches. The land close to the stream was heavily poached at one point which resembled a hollow where the cattle crossed and possibly stop to drink regularly. The water in the stream was quite muddied and showed signs of sedimentation. Several of the mature and semi-mature Ash trees present here were noted to be affected by Ash Dieback Disease.



Image 14 Agricultural land with grasslands and scrub at Shannon Campus East Zone, September 2022.

4. Focus Areas for enhancing Biodiversity at the Shannon Campus

We have identified the key areas that warrant focus for biodiversity enhancement, including suggested actions that are likely to achieve the best outcome. Actions have been considered in terms of optimising biodiversity while at the same time keeping in mind safety concerns regarding the airport, notably birdstrikes. The airfield and runway have been excluded from this Biodiversity Action Plan as an established grass management regime has been in place for these areas for several years. This regime has a primary focus on public safety and Flynn Furney chose not to recommend any actions for biodiversity here, in agreement with The Shannon Airport Group Sustainability Team.

The approx. total area of the Shannon Campus, including airfield and current built-up areas in Shannon Campus East and West Zones is 1,531.5 hectares (ha). When the airfield and built-up areas at Smithfield, Shannon Campus East and West Zones are removed, this becomes just over 1,000 ha (or 1,001.9 ha). Lands across the Shannon Campus that are identified for biodiversity enhancement in this Plan encompass agricultural land which includes grassland, scrub and woodland, plus green areas and verges within the business parks of the Shannon Campus East and West Zones. Lands identified as particularly suitable for biodiversity enhancement are marked out in colour on the map below however the areas for biodiversity enhancement may change as particular sites are developed or other lands become available. This map is available to view in a larger version in Appendix C.

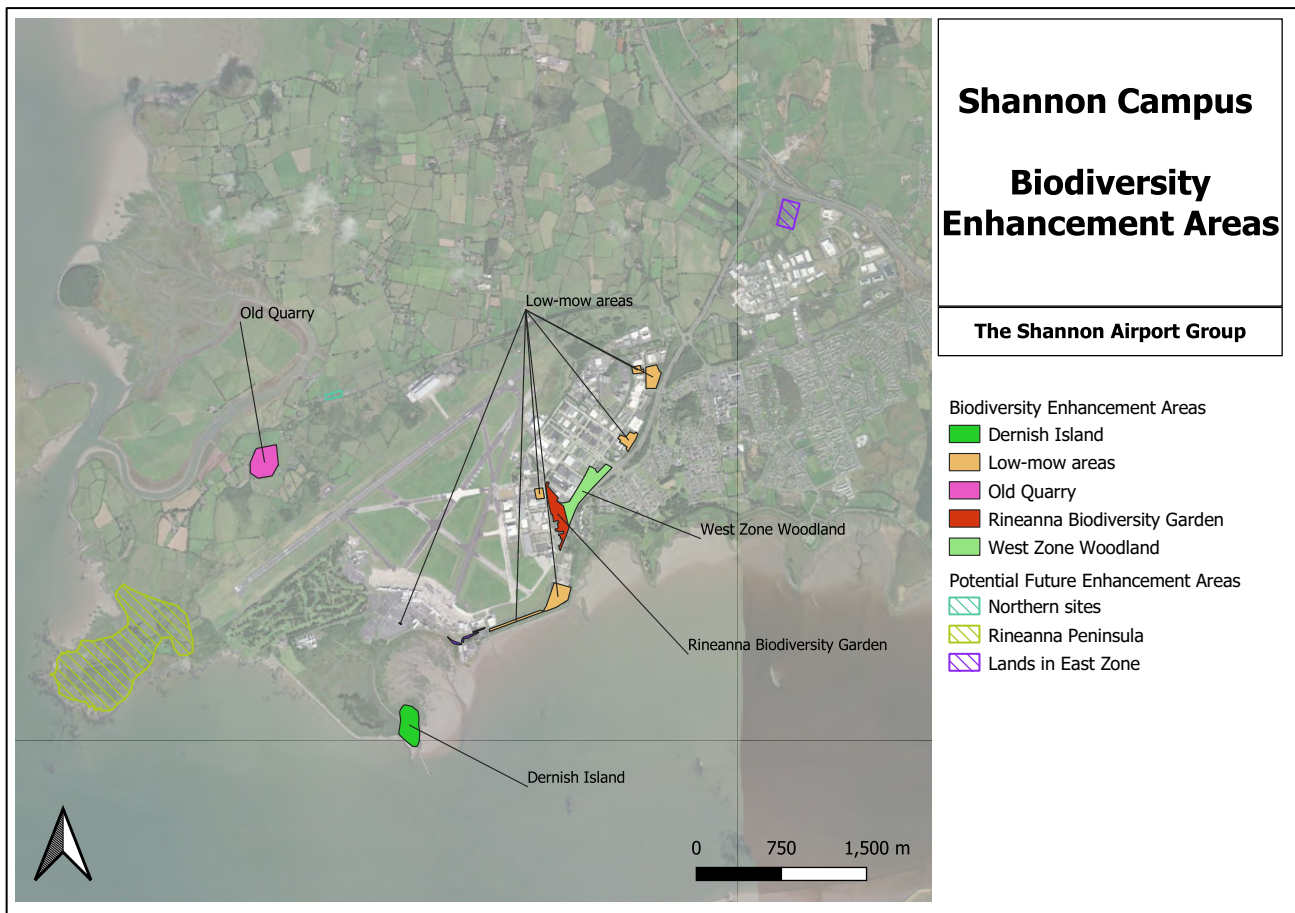


Figure 4 Areas identified for Biodiversity Enhancement at the Shannon Campus.

4.1 Shannon Campus West & East Zone

4.1.2 What Makes this Area Important?

A large area with intermittent green spaces. Opportunities to create ecological corridors throughout the campus, 'greening' spaces and highlighting nature present, in addition to enhancing outdoor space for staff and visitors.

4.1.3 Rineanna Biodiversity Garden and adjoining area

Rineanna Biodiversity Garden is a pleasant space for both local personnel and visitors to enjoy some peaceful green space on a busy, developed business campus. It also benefits pollinators, small birds and mammals, including bats. The existing range of pollinator friendly perennials are of known benefit to bees, which is very positive. The signage and honeycomb sculpture are striking and highlight nature. The dense reeds and long-grass areas are good habitats in themselves. There is potential for leaving more areas unmown or less mown, however, e.g. extending the 'low-mow' verges and cutting paths throughout. This encourages our native wildflowers beneath the soil to emerge, e.g. Clovers, Dandelions and Self-Heal. While commercial packets of wildflowers have been commonly planted across Ireland for a number of years, the All-Ireland Pollinator Plan (AIPP) advises we avoid them where possible as they are often non-native, unsuited to our soil and of less benefit to pollinators. Some mixes contain large amounts of annuals and may only emerge for the first year but fail to grow again. The current bed of planted wildflowers here can still be managed, with wildflowers cut back and the cuttings lifted each autumn, but if they fail to emerge as they did in the first year, pollinator friendly perennials are advised to plant here instead in future.



Image 15 Biodiversity Garden sign, September 2022.

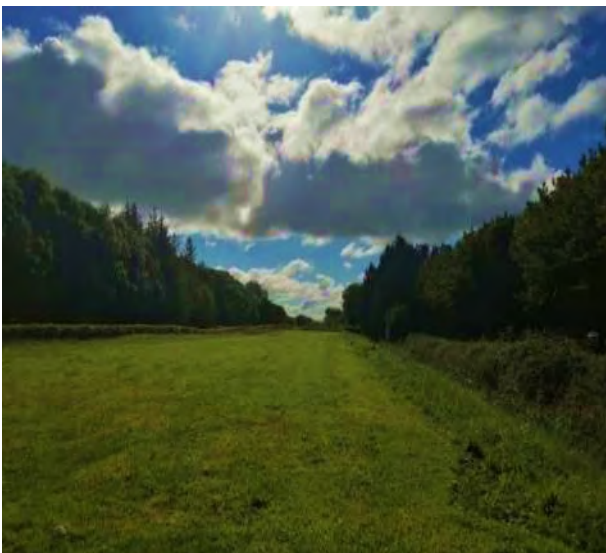


Image 16 Green space near Rineanna Biodiversity Garden, September 2022. This area is now maintained as a 'low-mow' patch for pollinators.

The large green area north of Rineanna Biodiversity Garden is suitable for meadow development. There is a drain/ditch on each side of this area which has naturally filled with reeds over time. It attracts Herons and potentially other smaller birds such as Sedge Warblers. The garden could simply be opened up to allow people access this space. The creation of a meadow would involve cutting some paths through the green space when mowing the main garden. The rest should be allowed to grow and cut just once or twice a year, with the cuttings lifted each time. Yellow Rattle (*Rhinanthus minor*) is an annual wildflower, popular amongst those wishing to create a biodiverse, flower-rich meadow. The secret ability of the Yellow Rattle plant is hinted at by its nickname – 'The Meadow Maker'.

The image on the right shows an example from a public piece of land managed by the Tidy Towns group in Manorhamilton, Co. Leitrim. Wildflower species that appeared for this group after following the new annual mowing regime after 2-3 years included Buttercup, Red and White Clover, Meadowsweet, Self-Heal and Common-Spotted Orchids. A few AIPP signs are strategically placed in the meadow explaining the area is being 'managed for pollinators'. The overall aesthetic looks beautiful and the uncut areas are buzzing with bees, in addition to butterflies, grasshoppers and hoverflies, etc.



Image 17 Meadow in Manorhamilton, July 2022.

Creating Meadows

Instead of mowing lawns and verges on a weekly or fortnightly basis, they can be mown just five to six times per year. The cuttings need to be lifted each time to ensure the soil is not over-fertilised, as this suppresses flowering meadow species. This cutting method creates short-flowering meadow type habitats which support pollinators. It also saves on costly labour and fuel. The floral diversity of the verges should become richer over time, transitioning from a few grasses and flowering species like Dandelion, Buttercup and Daisy, to denser patches containing more of these, plus Clovers, Selfheal, Bird's-foot-trefoil and Ox-Eye Daisy. The type and abundance of species in each piece of land depends on what is contained within the original seedbank in the ground. It may take 2-3 years for flowers to emerge fully, especially if the area has been regularly mown for a long time previously. For a more maintained appearance, leaving a 1m strip more regularly mown can work very well. It often helps to communicate why grass is being cut less often too, with All-Ireland Pollinator Plan (AIPP) signage or similar. A 6-week cutting regime can be carried out as follows. Just remember to cut AND lift!

- First cut after 15th April
- Second cut end of May
- Third cut – mid-end July
- Fourth cut – end August
- Fifth cut – after mid-October

Yellow Rattle

Yellow Rattle is a 'hemiparasite', meaning it is a parasite on grass. It does not kill the grass but weakens and limits grass growth and therefore commonly used as a natural tool to control grass growth amongst wildflowers. As it grows, Yellow Rattle seeks out the roots of grass species close by and attaches itself to them, diverting water and nutrients from the host grass into the Yellow Rattle itself. This allows other wildflowers nearby the chance to germinate and grow with the lessened competition of grass species. The secret ability of the Yellow Rattle plant is hinted at by one of its modern nicknames – 'The Meadow Maker'.

When to seed Yellow Rattle? Yellow rattle must be sown in between September and the end of November as it needs at least 4 months of cold ground temperatures before it will germinate, this is called vernalisation.

How much Yellow Rattle seed do I need? Sow at a rate of 0.5g - 1.5g per square meter.

Preparing the soil for sowing Yellow Rattle: Cut the grass back to 3-6cm in height, removing any grass and thatch. Use a rake to expose bare earth, creating space for the yellow rattle to establish. This is also known as 'scarification'.

How to sow Yellow Rattle? Drop pinches of the seed onto the exposed earth throughout the meadow and press into the soil.

When does Yellow Rattle appear? When will it flower? Yellow Rattle will start to germinate in early Spring when the weather starts to get milder. By late March, the plants will start to grow and produce flowers by July.



Image 18 Examples of 'low-mow' areas (above left and right) at Causeway Hospital, Co. Derry. Source: Donna Rainey.

Monitoring Methods

Biodiversity enhancement can be monitored by the number and abundance of flowering species, in addition to associated pollinators (bees, butterflies, moths) that emerge in the green spaces year-on-year. Simple surveys such as flora transects and Flower-Insect Timed (FIT) Counts can be carried out to monitor biodiversity each year. Records should be kept to study the changes occurring at each survey.



Image 19 'Low-mow' sign at Causeway Hospital (Source: Donna Rainey) and AIPP 'Grow - don't mow' sign, Manorhamilton.

4.1.4 Green Spaces at the Shannon Campus

The lawns and verges in the ownership of The Shannon Airport Group have all been mown on a regular basis up to recently, including the green spaces at Knockbeg Point and the extensive lawns at the 'Shannon Free Zone' sign entering the Shannon Campus West Zone. There is a lot of potential here to gain 'big wins' for biodiversity in an easy manner by adopting a 'low-mow' regime. Since the process to develop this Biodiversity Action Plan has begun, The Shannon Airport Group has identified areas to manage using the 'low-mow', short-flowering meadow method. Some of these are already being managed in this way, with some surprising results, e.g. the appearance of Marsh Orchids!

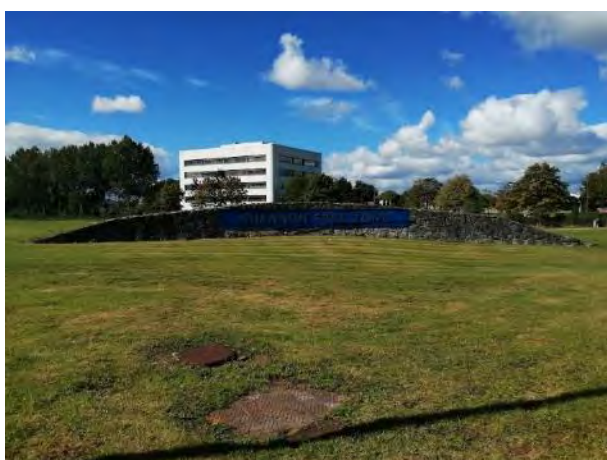


Image 20 Examples of regularly mown areas in the Shannon Campus – West Zone (left) and Knockbeg Point (right).

4.1.5 Installing bat boxes, small bird boxes and bee/bug hotels

To lend nature a helping hand, bat boxes, bird boxes and small bee/bug hotels and/or nesting sites can be installed. It will be important to site these installations correctly so that they are in optimum locations and useful to the wildlife they are targeted to help. Semi-mature to mature trees, over 5m with some cover, e.g. Ivy, are more suited to installing bird boxes. Ensuring boxes are north and south-east facing is generally recommended. Installations can be monitored over time to determine if/how they are being used and the animals' activity. Monitoring will need to be carried out in an ecologically sensitive manner, however, e.g. avoiding nest disturbance. For detailed advice, including specifications for different bird species, see the webpage 'Nestboxes for Garden Birds' at birdwatchireland.ie.

Bat boxes are more likely to be used if they are located where bats are known to feed. Ideally, several boxes should be put up facing in different directions on sunny aspects to provide a range of warm conditions but avoid harsh and prevailing winds (i.e. not south-west) with clear flight lines to the nest box, ideally on trees. Boxes should be put as high as possible to try and avoid predation from cats on the ground or nearby structures. On buildings, boxes should be placed as close to the eaves as possible. Bats use dark tree lines or hedgerows for navigation, so putting boxes near these features could help bats find the box. Bat boxes are available to purchase from organisations such as Birdwatch Ireland.

In summary, locate boxes:

- Where bats are known to feed and navigate (close to hedges and tree lines)
- Ideally at least 4m above the ground (where safe installation is possible)
- Away from artificial light sources (to protect them from predation)
- Sheltered from strong winds and exposed to the sun for part of the day (usually south, south-east or south-west).

Bats need time to find and explore new homes, and it may be several months or even years before boxes have residents – be patient! Once bats find a place they want to live in they can return over and over again. Droppings on the landing area, urine stains around the lower parts of the box and chittering noises from inside on warm afternoons and evenings are signs of occupation.

In addition, bat bricks and tubes can be incorporated into new builds to facilitate roosting bats.

4.1.6 Extend native tree planting

Native tree planting is an option on airport lands away from the airport site. Areas identified include the addition of native fruit trees, e.g. Apple, Pear and Plum varieties, to the circular orchard southeast of the Biodiversity Garden. Further fruit trees and other low-growing native tree species, e.g. Rowan and Cherry, could be planted in the rectangular patch east of the biodiversity garden, which has been pinpointed for biodiversity enhancement, or alternative areas to be identified on the campus.

Irish Whitebeam (*Sorbus Hibernica*) is another species endemic to Ireland, mainly found in central and SE Ireland on calcareous soils in woods, rocky areas and cliffs. It would be well suited for planting on the airport lands to the north. Other tree and shrub species suitable for native woodland establishment and planting hedgerows can be found in Appendix D.

Various grants and schemes are available to aid in the planting of native woodlands, such as the Native Woodland Schemes and the NeighbourWood Scheme, which are detailed below.

The **Native Woodland Schemes** are schemes which aim to establish, promote and protect Irish native woodlands with a focus on maximising the biodiversity value of the site. These schemes provide funding for the establishment of native woodlands on greenfield sites as well as conserving pre-existing native woodlands, both being done with minimal disturbance and long-term management techniques. The grants available for the afforestation schemes generally cover all of the costs associated with the establishment and early management of a forest. The first instalment of the grant (75%) is payable after the planting stage and includes ground preparation, drainage, fencing and planting operations. The Second Instalment (the remaining 25% of the grant) is paid four years after planting, once the trees have become fully established and are free-growing. This payment covers maintenance works that will often be required (e.g. vegetation management, the replacement of failures).

Sites of less than 4 hectares may not receive enough under the grants to cover all fixed costs such as digger hire, manual labour for fencing etc. However, if multiple sites are applied for together under the same scheme then the reviewer may be more likely to grant more given the scale of the impact of the project. However, public consultation for updates to the grant scheme are currently underway. Below details the current scheme but new and more financially incentivised schemes are expected in 2023.

The **NeighbourWood Scheme** scheme is available to both public and private landowners, working in partnership with local communities. It supports the development of attractive close-to-home woodland amenities (or 'neighbourwoods') for public use and enjoyment. Applications from other landowners may be considered on a case-by-case basis. Funding is available under three separate elements:

- **NeighbourWood (NBR) Establishment** funds the establishment of *new* 'neighbourwoods' on open 'greenfield' sites.
- **NBR Enhancement** funds the silvicultural enhancement of *existing* woodland already used as a 'neighbourwood' or proposed for development as a 'neighbourwood'.
- **NBR Facilities** funds the installation and upgrade of appropriate recreational facilities within an area submitted under NBR Establishment or NBR Enhancement, or within an existing woodland suitable for recreation but not submitted under NBR Enhancement. This element can also be combined with [Native Woodland Conservation](#) works.

The NeighbourWood Scheme offers funding of up to 85% of eligible costs (exclusive of VAT) under three separate elements: NBR Establishment, NBR Enhancement and NBR Facilities. Applications are made by submitting a NeighbourWood Scheme Form 1 and accompanying plan and documentation. A registered Forester (see [List of Registered Foresters](#), PDF) is required to complete the application in partnership with the landowner.

4.1.7 Existing Woodland Management

The mixed woodland area east of the Rineanna Biodiversity Garden contains numerous species of both native and non-native conifers and broadleaf tree species, edged with sections of scrub, containing Bramble, which in itself is great habitat for small birds, mammals and pollinators. It was noted however that the Sitka Spruce plantation here is tall and dense, allowing little light to penetrate onto the woodland floor. This suppresses growth of native plants and trees, leaving unfavourable conditions for most species of wildlife. 'Thinning out' of trees is often used as a method to alleviate this issue. An arborist would be best placed to advise on this issue. Some funding programmes may financially support the enhancement of this wooded area, e.g. the Native Woodland Schemes and the NeighbourWood Scheme, as described in Section 4.1.6.



Image 21 Mixed woodland near Rineanna Biodiversity Garden.

4.1.8 Signage on existing walking/running track around site



Figure 5 Walking/ running track route. Source: The Shannon Airport Group.

The Shannon Airport Group have recently installed a walking/running route around the campus for staff and visitors to use. The paths cross through the Rineanna Biodiversity Garden, nearby woodland, orchard and other green spaces. The various biodiversity features, e.g. tree/flower species, bats and pollinators, could be highlighted with signage on the habitats and species along the tracks. People may be curious to pause and read the signs, learning about and recognising the nature present around them. Many uncommon floral species can be found throughout the airport grounds. Encouraging people to observe and engage with nature has many positive benefits, including improvement of wellbeing and stress reduction.

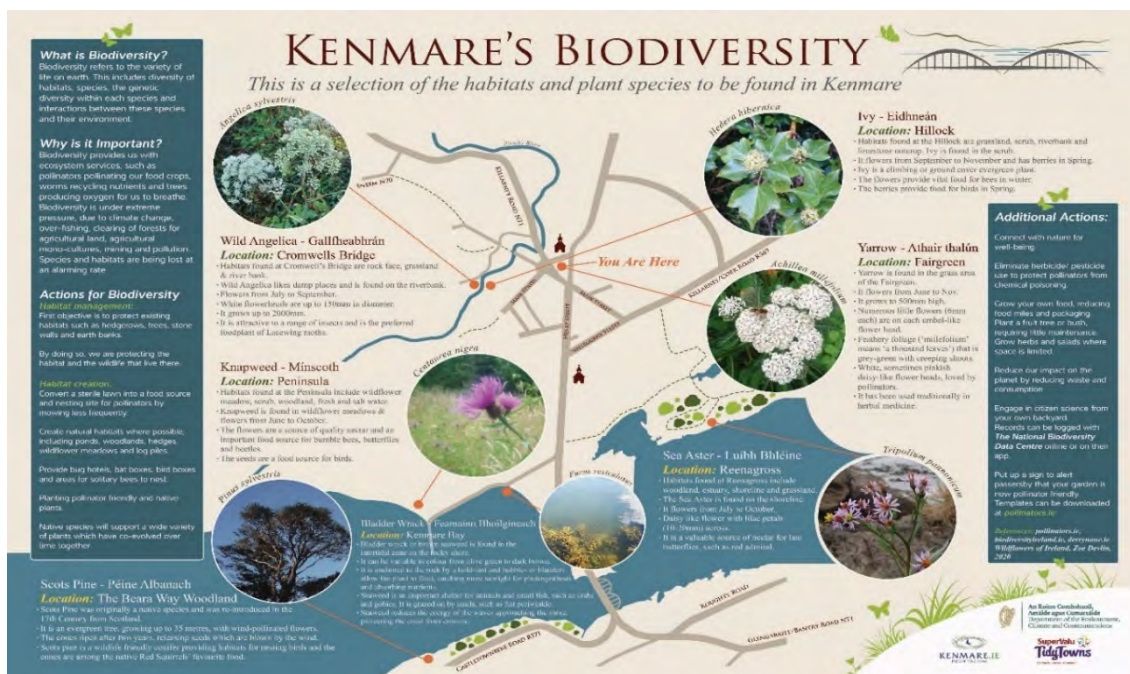


Figure 6 An example of a biodiversity sign that could be used for visitors to describe the various biodiversity viewpoints and species around the airport. Less text and more imagery is recommended.

4.1.9 Reduction/Phasing out of Herbicide Use

Herbicides are chemicals used to kill 'weeds' but are also harmful to wildlife and humans. Their use should be reduced or phased out at Shannon over time. Eco-friendly alternatives such as hot foam spray, mechanical weed removers, among other methods can be trialled and implemented to help keep unwanted growth along paths and roadsides at bay. A certain quantity of herbicide does need to be applied to kill off invasive species such as Japanese knotweed, however, if chemical treatment of this is undertaken.

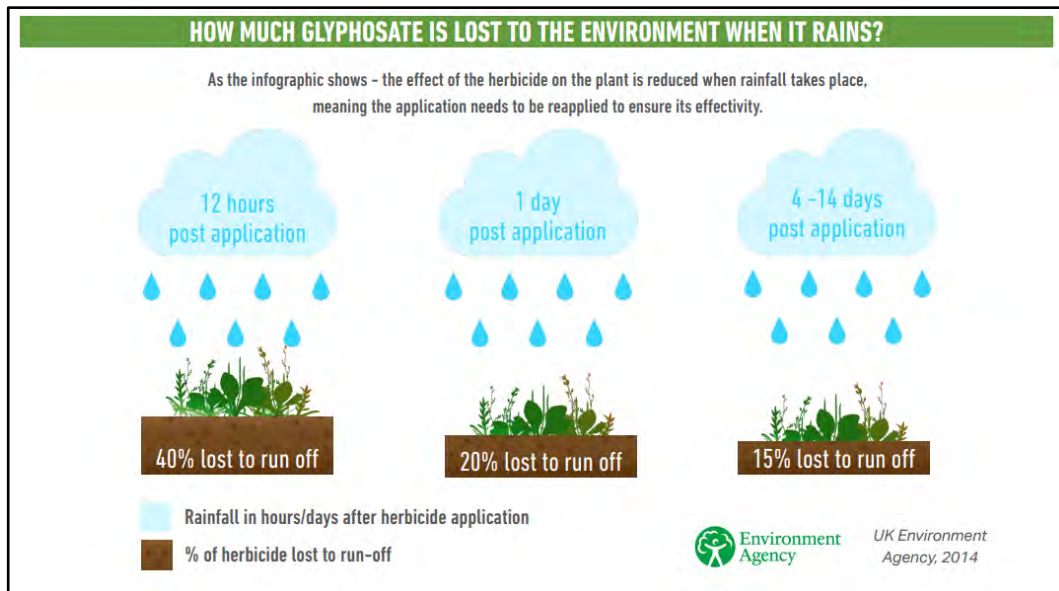


Figure 7 Diagram showing how much Glyphosate is lost to the environment in various scenarios. Source: UK Environment Agency.

Alternatives to herbicide include investing in either professional boiling hot water weed control machines, e.g. Waterkracht, to apply the 'Foamstream' method, or mechanical loaders with rotating weed brushes, e.g. 'MultiOne' Machines could also be hired or a contractor could supply the services on site. Perhaps contractor services could be trialled a few times before investing more permanently in a machine for The Shannon Airport Group. Costings may vary, but they could show that using non-herbicide-based, alternative methods is a more cost-effective method of weed control in the long-term, as opposed to continuing to hire a contractor to regularly carry out the process using harmful chemicals. Looking into eco-alternatives as soon as possible is recommended, as the EU is continuing to move further towards outright pesticide/herbicide bans.

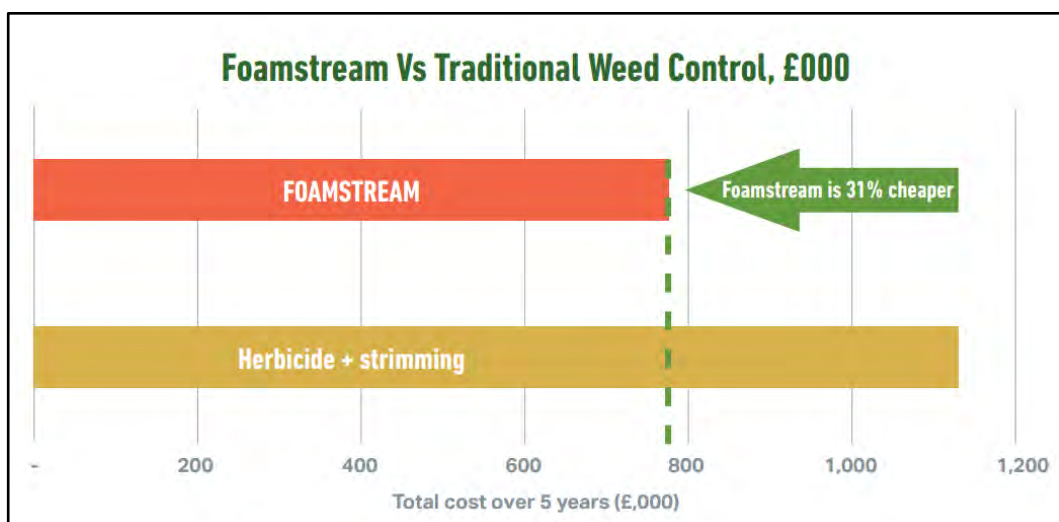


Figure 8 Cost comparison between foam stream and traditional herbicide treatment methods from the UK. Source: weedingtech.com.

4.1.10 Preparing for Ash Dieback Disease

Ash Dieback disease has been spreading across the Irish landscape in recent years. It now affects around 90% of the Ash trees on the island. This is having a devastating effect on both our landscape and biodiversity, as Ash is one of the most common tree species in Ireland. There is no national plan to deal with this issue, however data is building following years of research, particularly in the UK. For the Ash in and around the Shannon Campus, a plan can be implemented based on current guidance. Ash trees currently doing well on site can be highlighted and monitored, while those faring badly might be removed and replaced with suitable native species, for example Oak, Rowan, Cherry. The type of tree chosen would depend on the location and soil type, etc. An Ash tree affected by Ash Dieback Disease, pictured right, was noted on the Shannon Campus East Zone farmland. While many healthy Ash trees were seen in the West Zone, the East Zone contained greater instances of the disease.



Image 22 Ash tree with Ash Dieback, Shannon Campus East Zone, September 2022.



Image 23 AIPP Planting Code Guide.
Source: pollinators.ie

4.1.11 Biodiversity for future developments – area-wide approach

There are several plots of land within the Shannon Campus East & West Zone that are to be developed in the short- to medium-term. To ensure that biodiversity is made a priority across the site and that ecological networks are maintained, it is advisable to stipulate that certain actions are included in the planning and landscaping for each development, e.g. establishing native hedgerows and trees, pollinator-friendly planting schemes and 'low-mow' regimes. The Pollinator-Friendly Planting Code Guide is a brilliant resource from the All-Ireland Pollinator Plan, which can be viewed [here](https://www.pollinators.ie). This outlines advice on what plants are suitable for pollinators and when they come into bloom. Planting a variety of perennial shrubs and flowers that emerge throughout the seasons, providing pollen and nectar for insects and berries for birds, are ideal. It will also be important to phase out the use of chemical herbicides and pesticides across the campus.

4.1.12 Scrub & Grassland Management – Shannon Campus East Zone farmland

The undeveloped lands at Shannon Campus East Zone are currently used for farming and consist of calcareous/wet grassland, scrub, treelines and dense hedgerows. A section of this land has been ear marked as not undergoing development. As for the remaining land, it is not clear exactly the extent of development, nor when it will occur across this expanse of land.

As a long-term project, it is recommended that anyone leasing the land in Shannon Campus East Zone, notably the section of land which is not to be developed, would adopt a land management regime using mechanical and/or controlled grazing methods. Conservation grazing would alleviate some of the existing issues such as extensive soil poaching, overgrazing and scrub encroachment. Some simple fencing along the stream would reduce sedimentation of the watercourse. Livestock could be provided with an alternative drinking water source (if the stream is indeed their only water source). Some of the Ash treelines affected

with Ash Dieback Disease may need to be removed in the near future and could be replaced with native tree species such as Oak, Birch, Cherry or Whitebeam.

4.2 Rineanna South (Lagoon) and Dernish Island (included under SAC)

4.2.1 What makes this site important?

It is within the Lower River Shannon SAC (Site code 002165) and River Shannon and River Fergus Estuaries SPA (Site code 004077) boundaries. It is also a pNHA (Site code 002408). Wetland bird life has reduced over time due to lowering of the lagoon, however there is potential in terms of the transitioning habitat here, from lagoon to reedbed and eventually, possibly to wet woodland.



Image 24 Overview of Shannon Airport Lagoon and Dernish Island. Source: Google Maps.

4.2.2 Scrub Encroachment

Scrub encroachment is an issue south of the golf club and at Dernish Island. Remnants of species-rich calcareous grassland remain and with careful scrub management, these could successfully return. Garden escapees and soil/gravel heaps should be removed. The lagoon is now a transitional habitat, moving from attenuation pond/brackish lagoon to reedbed and may eventually become scrub/wet woodland. It is still an interesting area for birdwatching and monitoring and these activities should be encouraged among local bird /wildlife enthusiasts. Bird ringing (e.g. of Sedge Warblers) and monitoring of wader numbers should continue by the airport ornithologist, with records maintained and updated each year. Two main methods are available for the management of scrub encroachment: Mechanical Removal and Conservation Grazing, which are discussed below.

4.2.3 Mechanical Removal

This is usually carried out using hedge cutters, chainsaws and mulchers. Mechanical cutting is usually the quickest method and can be an excellent first step in a long-term scrub management plan. Key with this method is ensuring that if heavy machinery, like a tractor, is being used, that this doesn't damage the habitat that we are trying to protect/maintain. In addition, with hedge cutters, it is important to ensure that as much plant material is removed as possible to avoid nutrient enrichment. The best method of mechanical scrub management is with chainsaws and a jeep-towed mulcher. This allows more discrete removal and ensures more complete nutrient export. It also allows specific actions to be taken, like the removal of a particular invasive species. As a first step, mechanical management allows scrub encroachment to be stopped in its tracks. It is not, however, a suitable long-term solution as it doesn't tackle the root causes of the problem, which are generally under-grazing and land abandonment.

4.2.4 Conservation Grazing and Heritage Breeds

Grazing by farmed livestock is an essential management tool for most of our semi-natural habitats in Ireland. These habitats have evolved along with the animals that have grazed them, which are our heritage breeds of

cattle, goats, sheep and horses. Their particular feeding, foraging and resting habitats have shaped our native managed landscapes and are the key for their continued survival and also their restoration. Most livestock breeds in Ireland today are based on European and British breeds and have become accustomed to feeding on highly palatable and easily digestible forage that is grown and provided to them from improved grasslands or grain-based rations. Native Irish, Scottish and English breeds are accustomed to changes in forage quality throughout the year and can thrive on poorer quality, tougher grasses and plants that other breeds cannot. They are also usually lighter animals that 'poach' the ground less than heavier continental breeds. They are more capable of dealing with Ireland's wet and cold weather.

Conservation grazing involves using our native breeds of cattle, sheep, goats or horses to manage our landscapes by creating tailored grazing plans to meet the needs of the site. This requires choosing the appropriate species, number of animals and timings for livestock grazing to achieve the conservation goals of the site while ensuring animal welfare. Generally speaking, conservation grazing provides a cheaper alternative to managing large areas of land than mechanical means. A successful conservation grazing project is happening at Howth, Co. Dublin, with Old Irish Goats. See oldirishgoat.ie for more details. Dexter and Moiled breeds of cattle are old Irish breeds and popular for grazing more challenging landscapes. Dexter cattle are popular for grazing farms on the sensitive but wild Burren landscape, Co. Clare. Seven Dexter cattle are now being employed to graze the grounds at Áras an Uachtaráin for a few months each year, with the aim of enhancing biodiversity on the 130-acre site.



Image 25 Old Irish Goat in Howth. Source: oldirishgoat.ie



Image 26 Dexter cattle in the west of Ireland. Source: dextercattlesociety.ie

Current land users should be encouraged to adopt conservation grazing methods, employing more traditional livestock, where possible. A project can be trialled in a small area (e.g. Thady's Hill) first during the timeline of this Biodiversity Action Plan, while any larger-scale projects (e.g. Rineanna Peninsula or lands at Shannon Campus East Zone) might be better to pursue over a longer timeframe. A stipulation could be included in future leases to implement conservation grazing techniques. This might motivate farmers to experiment with alternative methods which are less intensive, eco-friendlier and more suitable to the local landscape. A **'Farming for Biodiversity'** handbook could be created for tenants to provide a set of guidelines or rules in order to be able to lease plots of land. This would outline biodiversity strategies and conditions for farmers renting lands, such as livestock units (rate of stocking per hectare), fencing requirements (to protect hedgerows and water courses) and guidelines on when and how to cut hedgerows or maintain treelines. See farmingfornature.ie for more information on the various strategies for farmers to work alongside wildlife and nature.

4.2.5 Agri-Climate Rural Environmental Scheme (ACRES)

Eligibility for the [Agri-Climate Rural Environmental Scheme \(ACRES\)](#) should be investigated. ACRES was launched in early 2023 under the EU's reformed CAP (Common Agricultural Policy). There are two ACRES schemes available: 'General' and 'Co-operation'. 'General' is available nationally (outside of the high priority geographical area defined for the ACRES Co-operation approach) and offers a range of actions for individual farmers, both targeted and general. 'Co-operation' is available to farmers in defined high priority geographical areas and involves results-based payments as well as bespoke farm and landscape actions. It would be worth investigating what schemes would be best for Rineanna Peninsula in particular.

4.3 'Peninsula' at Rineanna Point and Barley Harbour (included under SAC)



Image 27 Overhead view of Rineanna Peninsula. Source: Google Maps, 2022.

4.3.1 What makes this site important?

This small peninsula is within the Lower River Shannon SAC (Site code 002165) boundary. Scrub has been encroaching here over the years, in addition to land poaching from cattle. There is some beautiful grassland and salt marsh habitat remaining which has the potential to be enhanced through various measures. Stunning views over the estuary exist here.

4.3.2 Scrub Encroachment

A scrub management plan, including scrub removal and targeted grazing should be considered for Rineanna Peninsula in future (possibly outside the timeline of this Biodiversity Action Plan). Scrub encroachment and poaching have affected the semi-natural grasslands negatively over time. There may also be a risk of wildfires

occurring. Liaison with current land users or agreement with anyone renting the land here in future would be required for this to be a success. Inclusion of a stipulation to adhere to species-rich grassland management methods in the next lease agreement may be an option. 'Measuring' biodiversity enhancement will include monitoring of the gradual retraction of scrub, reduction in soil poaching and an increase in semi-natural grassland and species over time. Reference was made to the ACRES scheme in Section 4.2.5, which is definitely worth exploring for Rineanna Peninsula in particular. Towards the estuary, Smooth Cord-Grass (*Spartina anglica*) is present in the salt marshes. This is harmful to native species as it creates monoculture and spreads fast. Horse grazing has been effective elsewhere, e.g. Harper's Island, Cork, and this could be a measure to adopt along the edge of the peninsula in future years.



Image 28 Land meets salt marsh along the Shannon Estuary near Barley Harbour, July 2022.

4.4 Former Quarry at Thady's Hill

4.4.1 What makes this site important?

We have identified this as a Priority Annex I Habitat - Dry Calcareous and Neutral Grassland (GS1) site (Fossitt, 2000). It could also be called an Orchid-Rich Calcareous Grassland site (Devaney *et al.*, 2013). Annex I Habitat types are those whose conservation requires the designation of Special Areas of Conservation. Priority habitats, such as this one, are in danger of disappearing within the EU territory. The site will require some conservation methods, including the adoption of measures to prevent the significant level of scrub present here from encroaching further. The existence of this species-rich grassland has been reported to NPWS by Flynn Furney Environmental Consultants, due to its rarity.

In addition, this site also contains a good example of a base rich fen. This again is another rare and threatened habitat in Ireland. The degree of habitat heterogeneity within the site makes it highly significant. Scrub encroachment is the main threat to both the grasslands and fen habitat on this site. Suggested actions for the protection and promotion of this site's unique habitat are provided below.

4.4.2 Scrub Encroachment

The old quarry at Thady's Hill is a significant site both in terms of natural and cultural heritage. It would benefit from some targeted conservation management measures in order to protect this rare, Annex I, species-rich, calcareous grassland. Delicate scrub management is recommended via manual or mechanical means, along with livestock, e.g. Old Irish Goats or heritage breed cattle such as Dexters. According to Devaney *et al.* (2013) this type of site would generally be maintained by extensive (as opposed to intensive) grazing. In fact, ongoing succession to scrub caused by the abandonment of pastoral systems is highlighted as one of the main causes for the Bad status of this habitat type, in addition to agricultural intensification (Devaney *et al.*, 2013). Working closely with the NPWS grassland specialist and local NPWS Conservation Ranger may also aid in the successful management of this site to ensure biodiversity enhancement can be achieved in the proceeding years. The outline of a Scrub Management Plan for Thady's Hill is outlined below.



Image 29 Common-Spotted Orchids near Shannon Airport, July 2022.

4.4.3 Scrub Management Plan for Thady's Hill

Thady's Hill is the most significant habitat area found within the whole Shannon Campus site. It contains a number of internationally and nationally important habitats and plant species. Scrub encroachment and invasive species are the main threats to the long-term viability of this habitat area. The following management approach for the site is considerate of both the technical and financial inputs available. It aims to provide a simple and cost-effective method to maintain and expand the site's habitats.

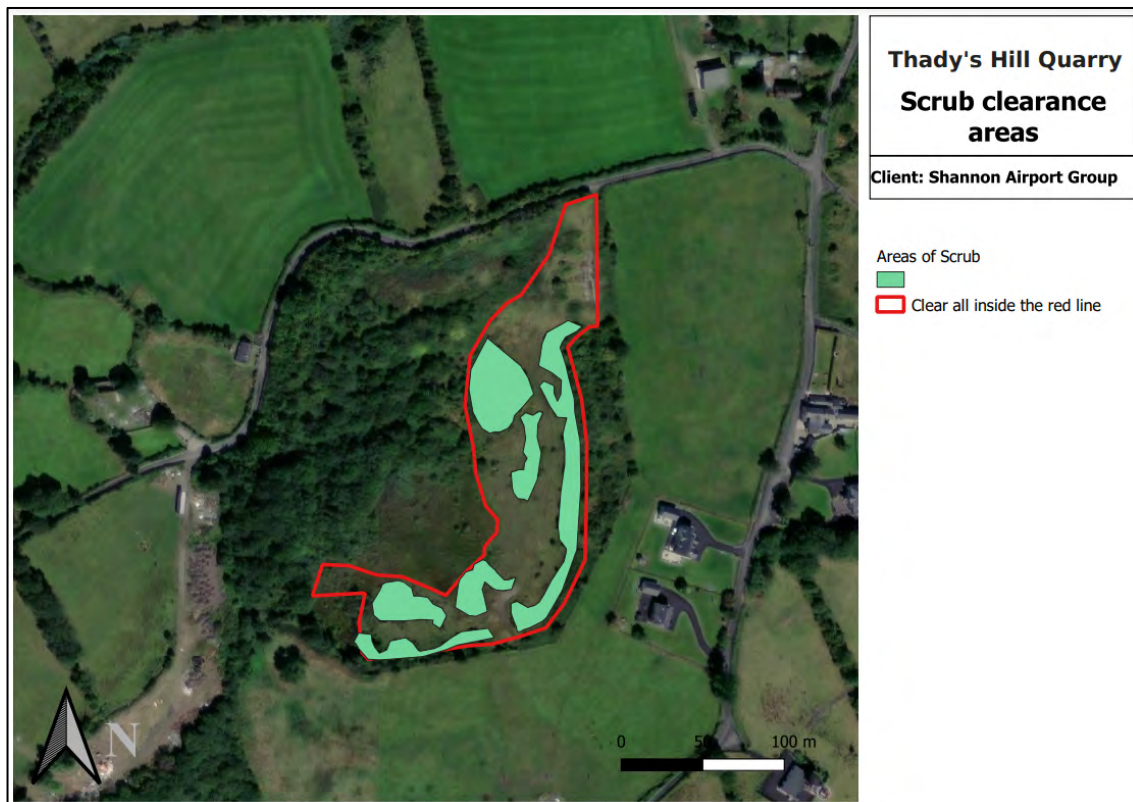


Figure 9 Map indicating areas of scrub to remove at Thady's Hill.

Step 1: Mechanical Scrub Management

To ensure no further scrub encroachment it is proposed that an arborist is employed to remove the majority of the site's scrub. This should be done using chainsaws and mulchers with the mulch being removed from site. The arborist should be made aware of the sensitive nature of the site and should on the first day work alongside an ecologist to mark out areas for clearance and areas to be avoided. It is anticipated that a team of two could clear the site within two days. Alternatively, this could also be a longer-term project for interested Shannon Campus staff who wish to volunteer their time to help clear the scrub.

Step 2: Conservation Grazing

Once the initial scrub clearance has been completed then conservation grazing can begin. This should be carried out using traditional cattle and goat breeds and should only be conducted during the non-growing season (early January – March) and (late September - December). It is proposed that a Low stocking rate of 0.4 LU/ha should be used to graze the site. The length of time should be determined based on the level of forage available and whether any damage, including poaching, is beginning to occur on site. The owner of the stock in conjunction with an ecologist should determine this. Stock should be removed from the site for the growing season and the site's flowering plants left to prosper.

Step 3: Revisit and Review

Following the first round of mechanical clearance and grazing, the suitability of the management plan should be reviewed. For instance, some chemical treatment might be needed to halt the regrowth of established woody plants like Gorse. Discussion with the stock owner may determine that more or less stock should be used on the site in the following year.

4.4.4 Thady's Hill as a Study Site

The sensitivity of the site at Thady's Hill means it would not be suitable for the general public to enter at leisure. However, it would be ideal for a PhD or Masters' student to use as a study site for topics involving botany or zoology, specifically involving Annex I calcareous grassland sites. Perhaps there is even the opportunity to track the progress of the grassland as the scrub is gradually removed over time, in terms of

the plant and insect species that exist there, and any which might emerge more gradually. Third-level institutions such as Munster Technological University (MTU) or University College Cork (UCC) may have students and researchers interested in pursuing a project here.

4.5 Rineanna North

It was noted that a relatively large Japanese knotweed stand is present at corner of a field at Rineanna North, with GPS point: 52.69602, -8.94973. Japanese knotweed stands also extend along the edges of the roadside in the general area of Rineanna North. Signage must be displayed near to each knotweed stand, warning people not to cut or treat the plant. The relevant landowner is responsible for carefully removing Japanese knotweed. The tables below outline ways in which Japanese knotweed can be eradicated.

4.5.1 Managing Japanese Knotweed

Table 4 Physical & Chemical Control Methods for Japanese Knotweed

PHYSICAL AND CHEMICAL CONTROL METHODS		
METHOD	SEASON	FOLLOW-UP
CUT AND INJECT	Late October and November	Regular follow up required for up to 5 years. Labour intensive
DIGGING AND SPRAYING	Digging to be done in winter, chemical treatment as below	Regular follow up required for up to 5 years. Labour intensive*
EXCAVATION	Two weeks after the application of a non-persistent chemical agent	Regular monitoring of site
DEEP BURIAL	Following excavation	Regular monitoring of site
DISPOSAL TO LANDFILL	Following excavation	N/A

*Digging via machinery is only recommended in sites of low ecological value.

Table 5 Chemical Control Methods for Japanese Knotweed

CHEMICAL CONTROL METHODS		
METHOD	SEASON	FOLLOW-UP
GLYPHOSATE	May to early October	Requires repeated applications over a period of 5 years
2,4-D AMINE	May to early October	Requires repeated applications over a period of 5 years

N.B. The use of chemical agents is regulated by S.I. No. 83/2003 European Communities (Authorization, Placing on The Market, Use and Control of Plant Protection Products) Regulations 2003 and as such it is an offence to use any agent in a manner other than indicated on the product label.

5 Other Potential Actions for Biodiversity

5.1 Shannon Golf Club

5.1.3 What makes this area important?

The Shannon Golf Club makes up a significant area of land mainly comprised of amenity grassland (GA2) and scattered trees and parkland (WD5) near the airport, used by locals and visitors, that has the potential to be more biodiversity friendly. The new 'Pollinator-friendly management of Golf Courses' guide is now available at [Pollinators.ie](https://pollinators.ie). It was written to give the keepers of golf courses a science-based list of actions to follow, which clearly explain how to provide food, habitat and safety for our 99 Irish bees, whose numbers are in decline.

5.1.4 Environmental Management Plan

The golf course is managed by its own team; however, The Shannon Airport Group may have some influence in regard to working with the club's management to develop an environmental management plan. This would include targeted measures to enhance biodiversity. The [Geo Foundation](#) for Sustainable Golf offers accreditation to golf courses that meet their various standards. Examples of biodiversity enhancement measures here might be:

- Reducing/optimising chemical use (e.g. fertilisers and pesticide/herbicide) and adopting more eco-friendly versions.
- Keeping sections of long grasses/meadow in under trees and unused patches and verges.
- Gradual replacement of non-native Cypresses and Poplars, etc. with native tree species, both on the course and along the entrance, over time. This would be particularly pertinent for areas of Spruce *spp.* that are to be felled in years to come.

5.2 Hedgerows across the Shannon Campus

5.2.1 What makes this habitat important?

Hedgerows are some of the last vestiges of habitat for a lot of wildlife in the absence of woodland in Ireland. Creatures depending on hedgerows include birds, bats, pollinators and small mammals. They provide excellent ecological corridors.

5.2.2 Maintaining and Replanting Native Hedges

Hedgerows are already present across the Shannon Campus in various states of condition. Some have not been maintained in several years, which is detrimental to hedge health over time. However, limited maintenance is preferable to overcutting, as low, box-cut hedges offer very little for nature. Hedges cut too severely with large mechanical flails means they struggle to flower and fruit again, and are prone to 'knuckling', which is essentially the development of scar tissue after the hedge is cut repeatedly to the same low height every year. Often, regrowth will appear here, but over time it will fail to grow back and the health of the hedge is affected and prone to disease and too much moisture ingress. Incremental cutting is key here, where the hedge is cut slightly higher and slightly wider (at least 10cm or more) at each cut to allow for new growth to emerge.

Maintaining the health of hedgerows across the Shannon Campus is an 'easy win' in terms of actions for biodiversity, yet so important for maintaining local ecological corridors. Healthy hedgerows also act as a barrier to disease between farms, offer shelter to livestock in hot or inclement weather, reduce the impacts of flooding, improve soil health, reduce land subsidence and act as carbon sinks. Adopting a hedgerow

management plan across the Shannon Campus would be beneficial. Eco-friendly hedge maintenance and planting is also a key aspect of many of the agri-environmental schemes on offer to farmers.

Where development is to occur in future, it is important that mature hedgerows are retained as far as possible. It takes decades to build up the biodiversity value of hedges. However, where hedges must be removed, it is advised to replace them either in the same location or nearby in a more suitable location, following construction. It may be an option to make this mandatory for future development across the Shannon Campus. Native species such as Hawthorn, Blackthorn, Hazel, Wild or Bird Cherry, Elder, Guelder Rose and Holly are recommended. Ornamental species such as Laurel and Leylandii should be avoided as they do not benefit biodiversity. While Beech and Hornbeam are preferable to the latter two species, they are non-natives and don't tend to have the same value for nature as a native hedge mix.

5.2.3 Maintaining Hedgerows

Maintain hedgerows using the 3-year 'cutting on rotation' method and aim to encourage anyone leasing land to adhere to this where appropriate. This is where just a third of hedgerows are trimmed each winter. See Farming for Nature's webpage on ['Field Boundaries'](#) for more guidance. Ensure no cutting out of season (1st March to 1st September) takes place and extend into November, if possible. The All-Ireland Pollinator Plan's ['How-to-Guide on Hedgerows for Pollinators'](#) is worth referencing, as is The Heritage Council's ['Conserving Hedgerows'](#) guidance booklet. An overview of Best Practice Guidelines is outlined below.



Image 30 Existing hedgerow on Shannon Campus East Zone farmland, September 2022.

Best Practice Guidelines

Best practice, eco-friendly hedgerow management, involves the following actions:

- Ensure the hedge cutting contractor has the appropriate qualifications: e.g. FETAC 'Hedgerow Management and Mechanical Hedge Cutting' from Teagasc.
- The flail is good for cutting light material, e.g. for trimming every 1-3 years. However, the flail can shatter strong stems, leaving them rough and open to disease.
- The circular saw is good for strong material giving a clean cut, e.g. coppicing at ground level.
- Ensure the saw/flail is always sharp to avoid tearing and damaging, for a clean cut.
- Avoid cutting too low. Hedges should not be cut below 1.5 metres.
- Avoid a tight 'box' shape. Preference is for 'A-shape' or 'top-heavy' hedges.



Image 31 Example of a roadside hedge cut too tightly, into a box shape. This hedge cannot produce flowers/fruit.

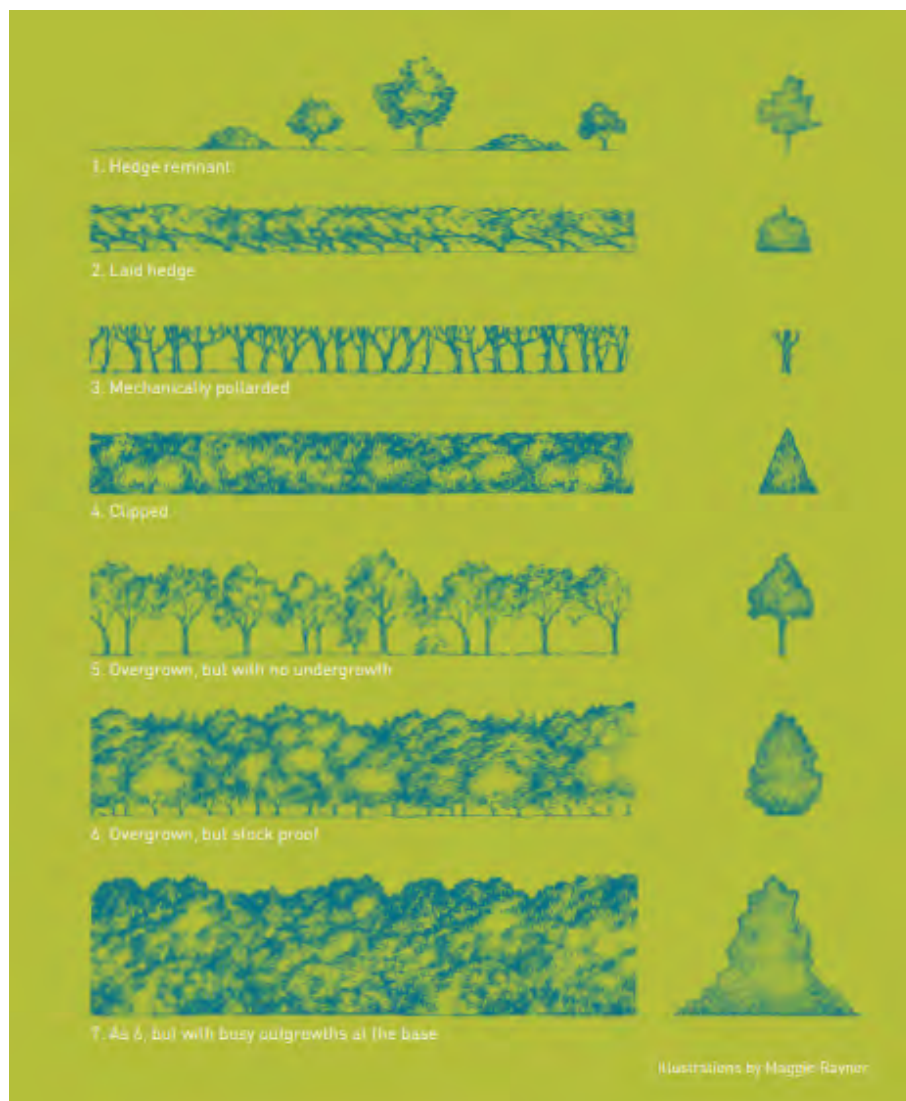


Figure 10 Common variations of hedge maintenance (or lack thereof). Figure: heritagecouncil.ie.

Guidance on hedge cutting

On farms there are mainly two types of hedges: 'topped hedges' and 'escaped hedges'. In terms of roadside hedges, 'topped hedges' are more common than 'escaped hedges'. Best practice for topped hedges is:

- Side trim the hedge from a wide base to a triangular profile, leaving it as high as possible while still possible for the flail to reach the peak to control apical dominance. Hedge must be kept at least 1.5m above ground level or top of bank (if present).
- Retain occasional thorn bushes to mature into standard thorn trees with a full canopy within every topped hedge.



Image 32 Topped hedge side trimmed from a wide base to a triangular profile. Source: Teagasc.

Allowing the verge to grow

- Consider cutting and lifting once a year, 1-2m out from the hedge to encourage native wildflower verges, which will attract pollinators.
- Avoid using chemical pesticides, herbicides and fertilisers. If completely necessary, spray them away from the hedge and verge.

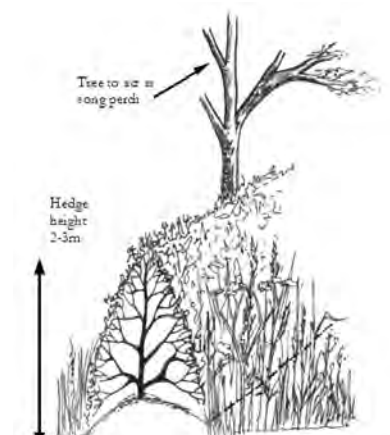


Figure 11 An A-shaped hedge. Source: Suffolk Wildlife Trust.

5.3 Staff/Corporate Awareness

If staff across The Shannon Airport Group are aware of the Biodiversity Action Plan, what is involved and why it is important, there is likely to be increased buy-in and support, which will lead to more successful outcomes for biodiversity, while benefitting those working across the campus on a daily basis. It will also show visitors

and users of Shannon Airport, plus potential business partners, that The Shannon Airport Group is aware of the existing sustainability and biodiversity issues and is actively taking steps to improve in these areas.

5.3.1 Awareness Raising Activities

Awareness raising might be undertaken in the following ways:










- Presentation of the BAP with launch event.
- Publication on The Shannon Airport Group website and social media pages.
- Specific section of website on Biodiversity at the Airport.
- Sign-up of The Shannon Airport Group as AIPP Business Supporter, in addition to Shannon Airport.
- Citizen science days, bio blitzes, school visits.
- Volunteer Days – e.g. Invasive Species, scrub removal and tree planting initiatives.
- Third Level Institution studies of biodiversity across airport lands, e.g. at Thady's Hill.































Image 33 View looking north from Shannon Airport Lagoon embankment, September 2022.


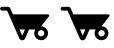








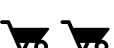

Appendix A - Table of Recommended Actions

The table below outlines the key actions that have been described in this Biodiversity Action Plan, along with the associated area. Expected outcomes and metrics are included for each action, along with Key Performance Indicators (KPIs), and an indication of the extent of time, effort and cost involved in each case.

Target	Action	Outcome	Metric	KPI	Time/Effort/Cost
Airport approach road, Knockbeg Point and specific green areas identified across the Shannon Campus.	'Low-mow' regime across targeted areas that are currently regularly mown. Scarify small sections of lawns and seed Yellow Rattle in October to suppress grass and encourage flowers.	Increase in native wildflowers across sites, benefiting pollinators, namely bees and butterflies.	Record and measure flowering species diversity and abundance each spring/summer using transects. Additionally, measuring pollinator occurrences such as bee/butterfly abundance and diversity.	Wildflower species diversity increased by at least 10% by 2025 and at least 25% by 2027. Bee/butterfly abundance to increase by 2027.	  
Dernish Island and Lagoon area	Clear existing debris, soil heaps and garden escapees. Carry out scrub removal mechanically.	Increase amount of calcareous, species-rich grassland, increasing valuable habitat for wildlife.	Record and measure flowering species diversity and abundance each spring/summer. Additionally, measuring pollinator occurrences such as butterfly abundance and diversity.	Increased area for species-rich grassland to develop by 10% by 2025. Bee/butterfly abundance to increase by 2027.	  
Shannon Airport Lagoon	Monitor habitat transition at Shannon Airport Lagoon each year, along with associated bird life.	Improved understanding and records of habitats and bird species and numbers at the lagoon.	Reports on bird records and photos of the lagoon available on a yearly basis.	Information on birds and habitats available to view and study.	  

Target	Action	Outcome	Metric	KPI	Time/Effort/Cost
Rineanna Biodiversity Garden and nearby woodland	Installation of bird, bat and bee boxes. Choose small, solitary bee boxes over large, prominent ones.	Provision of homes for more garden birds, bats and bees in Shannon Campus West Zone.	Monitor bird, bat and bee activity between spring/early summer to autumn.	20 bird, bat and bee boxes in Shannon Campus East and West Zones installed by 2024. Increase in garden birds, bats and bees present by 2027.	  
Rineanna Biodiversity Garden and nearby woodland	Arborist study and implementation of actions, e.g. tree maintenance and thinning.	Optimisation of light and space in the woodland for wildlife and ground flora. Ensuring trees are properly maintained.	Healthier trees, optimum light entering wood, more ground flora emerging.	Arborist study completed by 2024 and follow up actions by 2025. 10% more emergence of woodland flora by 2027.	     
Extended part of Rineanna Biodiversity Garden	'Low-mow' regime, with potential for planting low-growing trees, e.g. Rowan, Cherry, Crab Apple.	Increased area of grassland, including native wildflowers and trees for pollinators. Joining up Shannon Campus West Zones 'ecological corridor'.	Monitor pollinator activity on this patch each spring/summer. Also monitor the number and species of birds and bats if trees are planted here.	Extended meadow grassland (plus potential native tree planting) carried out by 2025.	   
Thady's Hill (trial project, 2023-2027)	Mechanical/manual scrub removal	Stalling scrub encroachment, leaving space and creating habitat for species-rich grassland and related species to emerge. Reduction of fire hazard.	Measure amount of scrub removal achieved per m ² each year.	Scrub reduced by at least 10% by 2025 and 20% by 2027.	       
Thady's Hill (trial project, 2023-2027)	Grazing regimes with heritage breed livestock (long-term) and existing conventional breeds (short-term)	Reducing ground poaching, suppressing scrub encroachment, creating species-rich grassland habitat.	Monitor grazing along with farmer. Measure scrub pre-grazing and post-grazing.	Scrub reduced by at least 10% by 2025 and 20% by 2027.	      

Target	Action	Outcome	Metric	KPI	Time/Effort/Cost
		Reduction of fire hazard.			
Rineanna Peninsula, (plus other key lands identified as not to be developed)	Explore possibilities for enhancing other species-rich sites in future, especially Rineanna Peninsula.	Aiming to increase the area enhanced for biodiversity across The Shannon Airport Group lands over time.	Opportunities explored in terms of agri-environmental farming schemes, communication with land users and stipulations for biodiversity for future leases.	Actions explored and decided in regard to future leasing and enhanced farming practices in key areas.	⌚ ⌚ ⌚ 🛒 🛒 € €
Japanese knotweed stands at Rineanna North	Remove Japanese knotweed infestation with programme of herbicide application.	Japanese knotweed substantially reduced and eventually eradicated.	Extent of Japanese knotweed (m ²) cover per year (measured in August).	Japanese knotweed stands treated in 2023 and removed by 2025.	⌚ ⌚ 🛒 🛒 € €
Management Plan for Invasive Plant Species	Draw up a management plan for preventing further spread of invasive plant species.	Invasive species managed and controlled by contractors to prevent further spread across airport lands.	Any further spread of invasive plant species has been avoided during development.	Invasive Species Management Plan in place for contractors carrying out works across the Shannon Campus.	⌚ ⌚ 🛒 🛒 € €
Business Supporter of the All-Ireland Pollinator Plan	Supporting organisations are those that have signed up to complete actions for biodiversity in the All-Ireland Pollinator Plan 2021-2025. Details on how to become a Supporter can be found here .	Over the next few years The Shannon Airport Group will improve their lands for pollinators.	Increase the extent of pollinator friendly spaces and increase pollinator friendly planting. Additionally, other targets such as reducing herbicide use will be met.	As Supporters of the All-Ireland Pollinator Plan (AIPP) The Shannon Airport Group will reduce herbicide and increase pollinator friendly spaces in line with the guidelines by 2025.	⌚ 🛒 🛒 €

Target	Action	Outcome	Metric	KPI	Time/Effort/Cost
Businesses across the Shannon Campus	Encourage businesses across the Shannon Campus to sign up to and pledge to follow the 'All-Ireland Pollinator Plan' (AIPP) for businesses (and golf courses, where appropriate).	Businesses which join the AIPP will improve their lands for pollinators.	Increase the extent of pollinator friendly spaces via 'low-mow' regimes and pollinator friendly planting. Additionally, other targets such as reducing herbicide use could be met.	As Supporters of the All-Ireland Pollinator Plan, The Shannon Airport Group has encouraged businesses on its properties to join the AIPP and pledge to improve their lands for pollinators.	  
Rineanna Biodiversity Garden, airport green areas and plots not designated for future development across the Shannon Campus	Organise biodiversity events, e.g. training, information and fun days with staff across the campus. Include local individuals/groups where possible.	Organising biodiversity events involving staff and local people will increase interest in and knowledge of nature in the area.	Increased number of staff and locals aware of the Biodiversity Action Plan and the nature around them.	At least one biodiversity event held per year between 2023-2027.	  
Hedgerows across the Shannon Campus	Conduct a hedgerow survey of native hedges across the Shannon campus and farmland and prepare a hedgerow management plan which all parties should adhere to.	Hedgerows across sites are maintained in a manner which benefits biodiversity. Mature hedgerows are retained where possible and new native hedges planted where removal is required for development.	Actions to conserve and manage native hedgerows has been taken, meaning hedge health has improved across the Shannon Campus and lands. Any native hedges which must be removed for development are replaced.	Health and diversity of native hedgerows has improved and awareness has been raised across the Shannon Campus and lands by 2027.	  
Thady's Hill (and possibly other species-rich areas identified across the lands)	Explore opportunities for collaboration with third-level institutions and NPWS for further study of species-rich grasslands.	PhD (or Master's) student is taken on to study the flora (and possibly fauna) present at Thady's Hill over a period of 2-5 years during scrub clearance.	Thady's Hill has been studied at a more in-depth level, in line with scrub removal efforts between 2023 and 2027.	Data available by 2027 which can be used to track changes in species type/abundance and success of the scrub removal project.	  

Appendix B - Methods of Tracking Biodiversity

High Level/Volunteer tracking

This would include regular monitoring and surveys carried out by volunteers. It involves the recording of flowering species and associated pollinators in terms of presence and abundance. Data collected should be recorded and compared year on year, as well as being submitted to the National Biodiversity Data Centre. For 'low-mow' meadows created, volunteer staff and local enthusiasts could carry out these straightforward surveys following a training session. 'Bioblitzes' and FIT (Flower-Insect Timed) Counts are examples of easy ways to involve interested staff, local groups and interested individuals to take part in tracking biodiversity at Shannon Airport. The following bullet points give an overview of FIT Counts. More information can be viewed at biodiversityireland.ie, including a 'how-to' video.



Image 34 FIT Count image. Source: pollinators.ie

- FIT Counts are open to everyone
- You can do a 10-minute FIT Count at any time between the 1st April and the 30th September
- Your location can be anywhere e.g., garden, farm, park, school, business site
- You don't need to identify the insects to species level, but only to tally within broad groups e.g., bumblebee, butterflies & moths, wasp, beetle
- A new FIT Count app allows you to take a FIT Count and upload the results in one go.

Technical Tracking

For more detailed, technical surveys such as scrub and grassland management at Rineanna Point/ Barley Harbour, Thady's Hill Old Quarry and the Shannon Campus East Zone farmland, expertise would be required from specialists in NPWS and qualified ecologists (or relevant consultants) with knowledge of grassland management and scrub removal. An ecologist's review at end of the current BAP cycle (2027/2028) would determine the progress made on the actions laid out in this Biodiversity Action Plan. It is important to measure scrub at the beginning of the process and again at the end of the process, following implementation of measures, e.g. mechanical removal and conservation grazing.



Image 35 Scrub encroachment and poaching near Rineanna Point, 2022

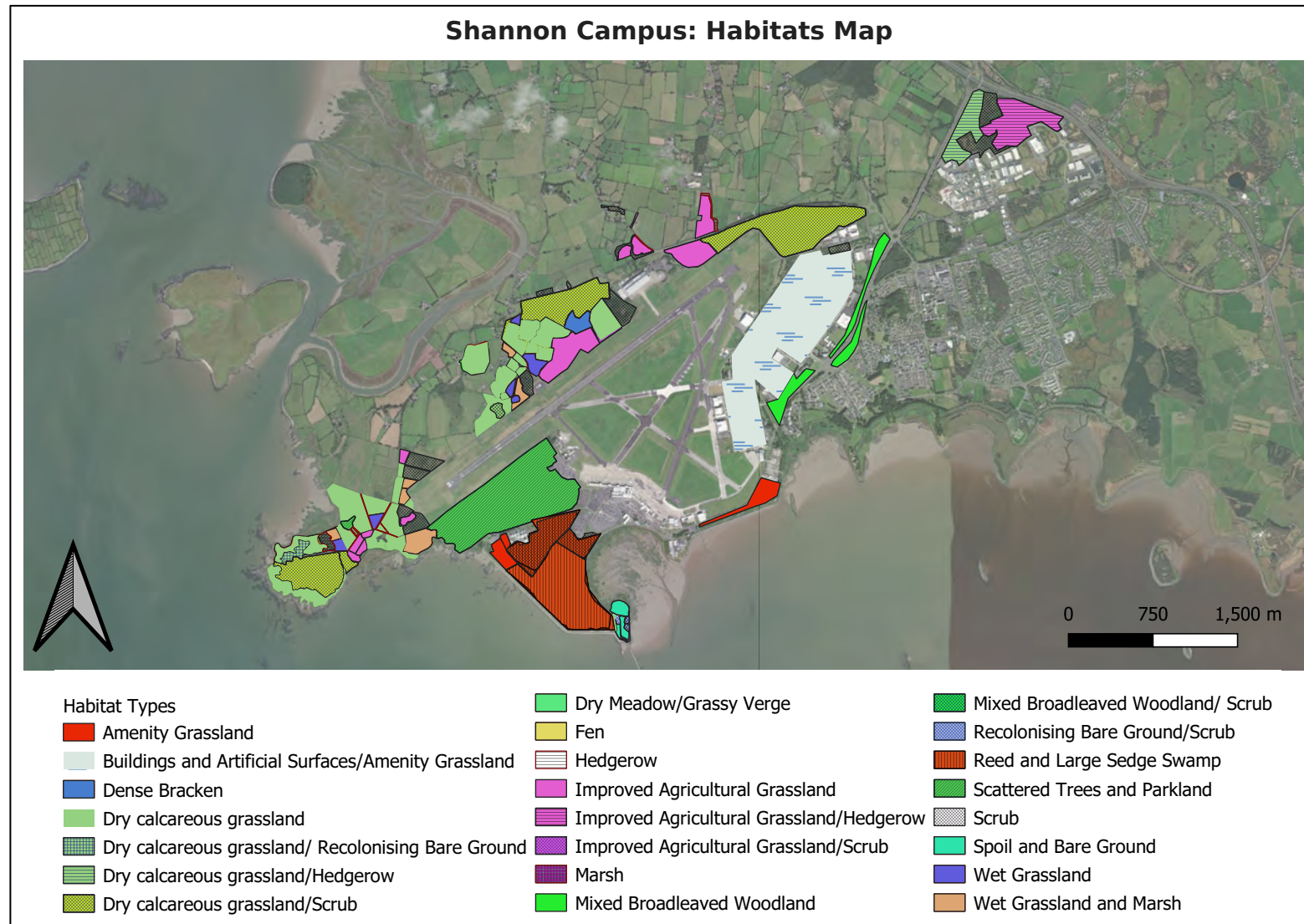


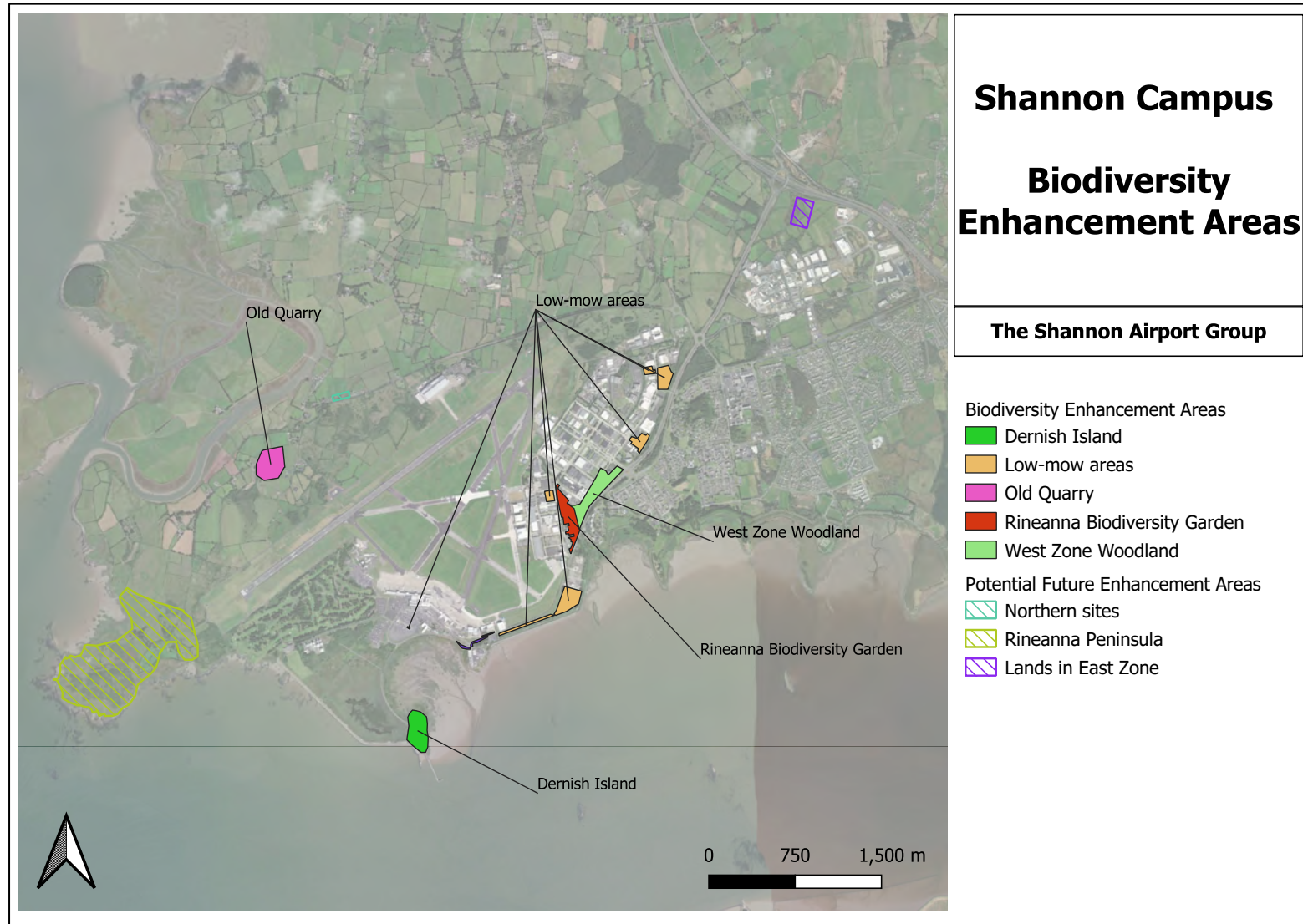
Image 36 Habitat survey at Rineanna North, July 2022.



Image 37 Pyramidal Orchid at Thady's Hill, July 2022.

Appendix C – Maps





Appendix D - Tree and shrub species suitable for planting

Common name	Latin name	Soil preference	Tolerates some shade	Tolerates exposure	Growth rate	Biodiversity value	Attractive features
Alder Buckthorn	<i>Frangula alnus</i>	Moist soils, tolerate clay	Yes	Yes **	M	Birds, insects,	Flowers, berries
Common Alder	<i>Alnus glutinosa</i>	Grows in a wide variety of conditions including wet soils			F	Birds, insects, squirrels, lichens	Cones
Crab apple*	<i>Malus sylvestris</i>	Thrives in most fertile soils			S	Birds, insects	Flowers and fruit
Blackthorn, sloe	<i>Prunus spinosa</i>	Grows in a wide variety of soils		Yes**	M	Birds and insects	Flowers, berries
Wild Cherry*	<i>Prunus avium</i>	Prefers fertile, deep, well-drained soils	Yes		F/M	Birds, insects	Flowers, berries, autumn colour
Dog rose	<i>Rosa canina</i>	Tolerates a wide range of soils			F	Birds, insects	Flowers, berries
Elder	<i>Sambucus nigra</i>	Grows in a wide variety of soils (not acid)			F	Birds, insects	Flowers, berries
Wych Elm*	<i>Ulmus glabra</i>	Prefers fertile free-draining soils	Yes		M	Insects	Flowers
Common gorse	<i>Ulex europaeus</i>	Prefers dry and neutral to acid soils		Yes**	M	Insects	Flowers
Guelder rose	<i>Viburnum opulus</i>	Prefers damp lime-rich soils	Yes		M	Insects. Squirrels, lichens, deadwood	Flowers, berries, autumn colours
Hawthorn	<i>Crataegus monogyna</i>	Grows in a wide variety of soils	Yes	Yes	F/M	Birds and insects	Flowers, berries, autumn colour
Hazel	<i>Corylus avellana</i>	Grows in a wide variety of soils (not acid)	Yes		F/M	Birds, bats, insects, squirrels, lichens	Catkins, nuts
Holly	<i>Illex aquifolium</i>	Grows in a wide variety of soils	Yes	Yes	M/S	Birds, insects, lichens	Evergreen flowers, berries
Honeysuckle	<i>Lonicera periclymenum</i>	Prefers neutral to acid soils	Yes		M	Birds, insects	Flowers, berries
Oak*	<i>Quercus spp.</i>	Grows in a wider variety of soils		Yes	S	Birds, squirrels, lichens, deadwood, bats, insects	Catkins, nuts
Rowan *	<i>Sorbus aucuparia</i>	Grows in a wide variety of soils		Yes	F	Birds, insects, lichens	Flowers and berries
Spindle	<i>Euonymus europaeus</i>	Prefers soils in damp lime-rich soils	Yes		M	Insects	Autumn colours and berries
Whitebeam *	<i>Sorbus aria</i> <i>Sorbus Hibernica</i> (endemic)	Prefers neutral to lime-rich soils	Yes	Yes**	M	Birds, insects	Flowers and berries
Willows	<i>Salix spp.</i>	Generally prefer damp soils with heavy to medium texture		Yes	F	Birds, insects, lichens, fungi, deadwood	Catkins, autumn colour

*Suitable as a hedgerow tree, ** Tolerant of coastal sites, F= Fast, M= Medium, S=Slow

Appendix E - Bird Species recorded on Shannon Airport Lands

Bird Species recorded during July & September surveys, 2022

Common Name	Scientific name	Behaviour	BOCCI Status	Location	Date recorded
7th & 8th July 2022					
Sand Martin	<i>Riparia riparia</i>	Aerial foraging	Amber	52.695382, -8.951267	7 th /8 th July 2022
Swallow	<i>Hirundo rustica</i>	Nest inactive in old farm building Aerial foraging	Amber	52.687390, -8.954740 52.688683, -8.955749 52.701098, -8.936606	7 th /8 th July 2022
Curlew	<i>Numenius arquata</i>	Foraging on mudflats	Red	52.685903, -8.955302	7 th /8 th July 2022
Herring Gull	<i>Larus argentatus</i>	Foraging on mudflats	Red	52.685903, -8.955302	7 th /8 th July 2022
Black headed Gull	<i>Larus ridibundus</i>	Foraging on mudflats	Green	52.685903, -8.955302	7 th /8 th July 2022
Mistle Thrush	<i>Turdus viscivorus</i>	Foraging in grazed grass	Green	52.688683, -8.955749	7 th /8 th July 2022
Sedge warbler	<i>Acrocephalus schoenobaenus</i>	Singing amongst reeds	Green	52.685419, -8.933131	7 th /8 th July 2022
Stonechat	<i>Saxicola rubicola</i>	Perched amongst reeds and grasses	Green	52.682308, -8.928644 52.68146041, -8.920395188 52.700269, -8.935275	7 th /8 th July 2022
Heron	<i>Ardea cinerea</i>	Foraging at lagoon	Green	52.682151, -8.929256	7 th /8 th July 2022
Hooded crow	<i>Cornus cornix</i>	Foraging at lagoon	Green	52.682151, -8.929256	7 th /8 th July 2022
Moorhen	<i>Gallinula chloropus</i>	Foraging at lagoon	Green	52.682151, -8.929256	7 th /8 th July 2022
Mute swan	<i>Cygnus olor</i>	Foraging at lagoon	Amber	52.682151, -8.929256	7 th /8 th July 2022
Little Egret	<i>Egretta garzetta</i>	Foraging at lagoon	Green	52.682151, -8.929256	7 th /8 th July 2022
Cormorant	<i>Phalacrocorax carbo</i>	Foraging at lagoon	Amber	52.682151, -8.929256	7 th /8 th July 2022
Willow Warbler	<i>Phylloscopus trochilus</i>	Song heard amongst willow trees Singing from thicket	Green	52.689808, -8.927552 52.701512, -8.934842	7 th /8 th July 2022
Wood Pigeon	<i>Columba palumbus</i>	Flying over head	Green	52.700445, -8.936606	7 th /8 th July 2022
Rook	<i>Corvus frugilegus</i>	Flying over head	Green	52.700445, -8.936606	7 th /8 th July 2022
Sparrowhawk	<i>Accipiter nisus</i>	Flying from treeline	Green	52.700445, -8.936606	7 th /8 th July 2022
Chiffchaff	<i>Phylloscopus collybita</i>	Singing from trees	Green	52.700445, -8.936606	7 th /8 th July 2022
House Martin	<i>Delichon urbicum</i>	Aerial foraging	Amber	52.701098, -8.936606	7 th /8 th July 2022
Starling	<i>Sturnus vulgaris</i>	Flock in flight	Amber	52.701098, -8.936606	7 th /8 th July 2022
Coot	<i>Fulica atra</i>	Foraging in lake	Amber	52.703804, -8.935057	7 th /8 th July 2022
Goldfinch	<i>Carduelis carduelis</i>	Flying overhead calling	Green	52.701512, -8.934842	7 th /8 th July 2022
Black cap	<i>Sylvia atricapilla</i>	Singing from trees	Green	52.701512, -8.934842	7 th /8 th July 2022

Common Name	Scientific name	Behaviour	BOCCI Status	Location	Date recorded
16 th September 2022					
Swallow	<i>Hirundo rustica</i>	Flying over salt marsh	Amber	52.68604266, -8.922873549 52.70091576, -8.906317949 52.72276763, -8.86949122	16 th September 2022
Mallard	<i>Anas platyrhynchos</i>	Flying over salt marsh Roosting in salt marsh	Amber	52.68440921, -8.922478259 52.6874078, -8.938165829	16 th September 2022
Little Grebe	<i>Tachybaptus ruficollis</i>	In the lagoon	Amber	52.68405983, -8.925531283	16 th September 2022
Coot	<i>Fulica atra</i>	In the lagoon	Amber	52.6838828, -8.92536398	16 th September 2022
Little Egret	<i>Egretta garzetta</i>	Shannon Airport	Green	52.68473542, -8.922515139	16 th September 2022
Robin	<i>Erithacus rubecula</i>	Shannon Airport	Green	52.68184437, -8.920356296 52.68855767, -8.938561454 52.69850245, -8.90032053	16 th September 2022
Wren	<i>Troglodytes troglodytes</i>	Shannon Airport	Green	52.68184437, -8.920356296 52.72403435, -8.873885684 52.69849127, -8.900621943	16 th September 2022
Teal	<i>Anas crecca</i>	Flying over mudflat	Amber	52.68043516, -8.920742534	16 th September 2022
Redshank	<i>Tringa totanus</i>	Shannon Airport	Red	52.68078335, -8.923310414	16 th September 2022
Godwits	<i>Limosa limosa</i>	Feeding on mudflats -likely Black tailed Godwit	Red	52.68131407, -8.922539614	16 th September 2022
Cormorant	<i>Phalacrocorax carbo</i>	Flying over mudflat	Amber	52.68109963, -8.922804482	16 th September 2022
Sparrowhawk	<i>Accipiter nisus</i>		Green	52.68729338, -8.937408105	16 th September 2022
Hooded Crow	<i>Corvus cornix</i>		Green	52.68708222, -8.93752344 52.72236434, -8.868542388 52.70026704, -8.902191371 52.69931618, -8.901337087	16 th September 2022
Linnet	<i>Carduelis cannabina</i>		Amber	52.68754328, -8.937960205 52.72304848, -8.868614472	16 th September 2022
Stonechat	<i>Saxicola rubicola</i>		Green	52.68750941, -8.937678337 52.72282206, -8.868195713	16 th September 2022
Black-headed Gull	<i>Larus ridibundus</i>	Mudflats	Amber	52.68719399, -8.938157782	16 th September 2022
Curlew	<i>Numenius arquata</i>		Red	52.6874019, -8.93870797	16 th September 2022
Lapwing	<i>Vanellus vanellus</i>	Mudflat	Red	52.68752262, -8.938293904	16 th September 2022
Goldfinch	<i>Carduelis carduelis</i>		Green	52.68839895, -8.938410915 52.72237449, -8.86807669 52.70315381, -8.898084573 52.69838846, -8.900493197	16 th September 2022
Starling	<i>Sturnus vulgaris</i>		Amber	52.68855665, -8.938440084 52.70103847, -8.904725052	16 th September 2022
Wood Pigeon	<i>Columba palumbus</i>		Green	52.72458891, -8.873989955	16 th September 2022

Common Name	Scientific name	Behaviour	BOCCI Status	Location	Date recorded
				52.69914896, -8.90179541	
Rook	<i>Corvus frugilegus</i>		Green	52.7246811, -8.873100802 52.70106468, -8.902036473 52.69842869, -8.900792934	16 th September 2022
Great Tit	<i>Parus major</i>		Green	52.7247877, -8.87252178 52.69848884, -8.900913298	16 th September 2022
Pied Wagtail	<i>Motacilla alba yarrellii</i>		Green	52.72234647 -8.86731863 52.70093953, -8.903681673	16 th September 2022
Meadow Pipit	<i>Anthus pratensis</i>		Red	52.72306431, -8.868857883	16 th September 2022
Long-tailed Tit	<i>Aegithalus caudatus</i>		Green	52.70061933, -8.899915852	16 th September 2022
Magpie	<i>Pica pica</i>		Green	52.70311725, -8.89775835	16 th September 2022
House Martin	<i>Delichon urbicum</i>		Amber	52.70091576, -8.906317949	16 th September 2022
Raven	<i>Corvus corax</i>		Green	52.70088183, -8.902551793	16 th September 2022
Chiff Chaff	<i>Phylloscopus collybita</i>		Green	52.70096432, -8.90297994	16 th September 2022
Blue Tit	<i>Cyanistes caeruleus</i>		Green	52.6994005, -8.899727426	16 th September 2022

BirdWatch Ireland Data for Shannon Airport Lagoon (Annual): 2016-2021

SiteCode	Sitename	SubSite_Code	Subsite	Species Code	Species Name	Taxonomy IOC	1% National	1% International	2016/17	2017/18	2018/19	2019/20	2020/21
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	MS	Mute Swan	318	90	100	6	6		9	6
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	WS	Whooper Swan	323	150	340	5				
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	SV	Shoveler	429	20	650	30	35	17	28	35
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	GA	Gadwall	431	20	1200	46	42	32	30	77
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	WN	Wigeon	435	560	14000	120	43		35	99
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	MA	Mallard	457	280	53000	32	46	16	19	7
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	PT	Pintail	478	20	600	2				
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	T.	Teal	479	360	5000	85	62	7	6	12
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	MH	Moorhen	5133			1	1		1	1

OH401	Shannon & Fergus Estuary	OH492	Shannon Airport Lagoon	CO	Coot	5148	190	15500	16	4	3	3	11
OH401	Shannon & Fergus Estuary	OH492	Shannon Airport Lagoon	LG	Little Grebe	5363	20	4700	2	5	6	9	1
OH401	Shannon & Fergus Estuary	OH492	Shannon Airport Lagoon	CU	Curlew	5806	350	7600	2				
OH401	Shannon & Fergus Estuary	OH492	Shannon Airport Lagoon	BH	Black-headed Gull	6089				1	2	1	14
OH401	Shannon & Fergus Estuary	OH492	Shannon Airport Lagoon	CA	Cormorant	6814	110	1200		1			

Birdwatch Ireland Data for Shannon Airport Lagoon (Monthly): 2016-2021

SiteCode	Sitename	SubSite Code	Subsite	Taxonomy IOC	SpeciesName	winter	1% National	1% International	Sep	Oct	Nov	Dec	Jan	Feb	Mar
OH401	Shannon & Fergus Estuary	OH492	Shannon Airport Lagoon	318	Mute Swan	2016/17	90	100	6				2	6	
OH401	Shannon & Fergus Estuary	OH492	Shannon Airport Lagoon	323	Whooper Swan	2016/17	150	340			5				
OH401	Shannon & Fergus Estuary	OH492	Shannon Airport Lagoon	429	Shoveler	2016/17	20	650			27	13	25	30	
OH401	Shannon & Fergus Estuary	OH492	Shannon Airport Lagoon	431	Gadwall	2016/17	20	1200	36		8		46	20	
OH401	Shannon & Fergus Estuary	OH492	Shannon Airport Lagoon	435	Wigeon	2016/17	560	14000	43		80	37	56	120	
OH401	Shannon & Fergus Estuary	OH492	Shannon Airport Lagoon	457	Mallard	2016/17	280	53000	18			8	10	32	
OH401	Shannon & Fergus Estuary	OH492	Shannon Airport Lagoon	478	Pintail	2016/17	20	600						2	
OH401	Shannon & Fergus Estuary	OH492	Shannon Airport Lagoon	479	Teal	2016/17	360	5000	5		2	1	24	85	
OH401	Shannon & Fergus Estuary	OH492	Shannon Airport Lagoon	5133	Moorhen	2016/17			1						
OH401	Shannon & Fergus Estuary	OH492	Shannon Airport Lagoon	5148	Coot	2016/17	190	15500	14		13		5	16	
OH401	Shannon & Fergus Estuary	OH492	Shannon Airport Lagoon	5363	Little Grebe	2016/17	20	4700	2		1				
OH401	Shannon & Fergus Estuary	OH492	Shannon Airport Lagoon	5806	Curlew	2016/17	350	7600						2	

SiteCode	Sitename	SubSite Code	Subsite	Taxonomy IOC	SpeciesName	winter	1% National	1% International	Sep	Oct	Nov	Dec	Jan	Feb	Mar
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	318	Mute Swan	2017/18	90	100	5	6			1		2
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	429	Shoveler	2017/18	20	650		2	13	35	2	2	31
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	431	Gadwall	2017/18	20	1200		6	2			2	42
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	435	Wigeon	2017/18	560	14000		35	24	43		4	4
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	457	Mallard	2017/18	280	53000		46	25	27	10		30
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	479	Teal	2017/18	360	5000		24	40	62			12
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	5133	Moorhen	2017/18				1					
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	5148	Coot	2017/18	190	15500						4	3
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	5363	Little Grebe	2017/18	20	4700	4	5					1
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	6089	Black-headed Gull	2017/18				1	1				
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	6814	Cormorant	2017/18	110	1200		1					
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	429	Shoveler	2018/19	20	650				17			
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	431	Gadwall	2018/19	20	1200		2		32			
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	457	Mallard	2018/19	280	53000	16	13		13			
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	479	Teal	2018/19	360	5000				7			
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	5148	Coot	2018/19	190	15500	2	2		3			
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	5363	Little Grebe	2018/19	20	4700	6						
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	6089	Black-headed Gull	2018/19				2					
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	318	Mute Swan	2019/20	90	100	5	9					
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	429	Shoveler	2019/20	20	650	2	28					

SiteCode	Sitename	SubSite Code	Subsite	Taxonomy IOC	SpeciesName	winter	1% National	1% International	Sep	Oct	Nov	Dec	Jan	Feb	Mar
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	431	Gadwall	2019/20	20	1200		30					
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	435	Wigeon	2019/20	560	14000	10	35					
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	457	Mallard	2019/20	280	53000	19	14					
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	479	Teal	2019/20	360	5000	2	6					
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	5133	Moorhen	2019/20			1						
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	5148	Coot	2019/20	190	15500	3	3					
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	5363	Little Grebe	2019/20	20	4700	4	9					
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	6089	Black-headed Gull	2019/20				1					
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	318	Mute Swan	2020/21	90	100	4		6				
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	429	Shoveler	2020/21	20	650	1	18	35	25	17	24	2
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	431	Gadwall	2020/21	20	1200	31	54	77	56	15	59	1
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	435	Wigeon	2020/21	560	14000	2	38	99	30		13	5
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	457	Mallard	2020/21	280	53000	5	5	7		1	4	
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	479	Teal	2020/21	360	5000	12		1			11	
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	5133	Moorhen	2020/21									1
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	5148	Coot	2020/21	190	15500	4	10	11		1	1	1
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	5363	Little Grebe	2020/21	20	4700	1	1	1				
0H401	Shannon & Fergus Estuary	0H492	Shannon Airport Lagoon	6089	Black-headed Gull	2020/21						7			14

Appendix F – References

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