

Kildare Habitat Mapping

Maynooth and Environs Habitat Mapping Report

WS Atkins Ireland Limited

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Contents

Chapter	Page
1. Introduction	6
1.1. Scope of the Project	6
1.2. Objectives and Outputs	21
1.3. Methods	23
2. Maynooth	25
2.1. Overview of lands in Kildare	25
2.2. Overview of lands in the Maynooth Environs, County Meath	45
3. Green Infrastructure	56
3.1. Defining Green Infrastructure in County Kildare	56
3.2. Maynooth's Green Infrastructure	57
4. Recommendations	68
4.1. Planning	68
4.2. Kildare Hedgerow Survey	70
4.3. Management	74
4.4. Education	85
4.5. Site Specific Measures	85
5. References	87
Appendices	89
Appendix A. Habitat Classification According to Fossitt (2000)	90

Tables

Table 1.1	Wetland sites within a 7km radius of the Maynooth Study Area.
Table 4.1	Frequency and abundance of woody shrub species occurrence in sampled hedges.
Table 4.2	Frequency and abundance of woody tree species occurrence in sampled hedges.
Table 4.3	Ecological Planning Guidance Measures.
Table 4.4	Native Trees and Shrubs (from Table 15.1 (a) of KCC County Development Plan 2023-2029).

Figures

Figure 2.1	Habitat Map for the Maynooth Study Area.
Figure 2.2	Linear woodland (hedges and treelines) within the Maynooth Study Area.
Figure 2.3	Habitat Map for lands in Maynooth Environs (Moygaddy, County Meath).
Figure 3.1	Green Infrastructure within Maynooth (County Kildare).
Figure 3.2	Green infrastructure within Maynooth Environs (Moygaddy, County Meath).

Plates

- Plate 1.1** Treelined walkway within the grounds of St. Patrick’s College, Maynooth.
- Plate 1.2** Riparian vegetation along the Royal Canal, Maynooth.
- Plate 1.3** Stretch of the Royal Canal near Bond Bridge, Maynooth.
- Plate 2.1** Maynooth Castle: historic buildings in Maynooth with surrounding mature trees offer suitable habitat to animals such as bats.
- Plate 2.2** Building and gardens are a common feature in Maynooth, e.g. St Patrick’s College, Maynooth.
- Plate 2.3** Building, gardens and amenity grassland characterise suburban areas of Maynooth, Castlepark Estate.
- Plate 2.4** Stone walls (BL1) are a common feature in Maynooth.
- Plate 2.5** Bridge over the Royal Canal in Maynooth.
- Plate 1.6** Improved agricultural grassland located on the boundary of the Maynooth study area.
- Plate 1.7** An example of buttercup dominated semi-improved agricultural grassland.
- Plate 1.8** Artificial ponds at Mariavilla, Maynooth.
- Plate 1.9** Royal Canal.
- Plate 2.10** Lyreen River downstream of Mill Street Bridge.
- Plate 2.11** River Rye.
- Plate 2.12** Small unnamed stream with heavily overgrown banks.
- Plate 2.13** Example of dry meadows and grassy verges (GS2) on roadside verge.
- Plate 2.14** Areas of rough grassland surrounding Lyreen wetlands.
- Plate 2.15** Very large areas of semi-natural grassland also occur around Maynooth Castle and grounds of St Patrick’s College, Maynooth – these offer significant opportunities for habitat enhancement.
- Plate 2.16** Areas of amenity grassland dominate suburban estates in Maynooth.
- Plate 2.17** Areas of amenity grassland on pitches at Maynooth GAA.
- Plates 2.18** Areas of amenity grassland along the Royal Canal.
- Plate 2.19** Small areas of willow woodland which forms part of the wetland complex at Lyreen (in background).
- Plate 2.20** Area of young Ash woodland in St. Patrick’s College campus, showing signs of ash-die-back.
- Plate 2.21** Orchard, which offers woodland cover and represents an important pollinator resource.
- Plates 2.22** Small areas of scrub are dotted around the landscape.
- Plates 2.23** Nettle, briar and umbellifer dominated narrow bands of scrub bordering an informal path.
- Plates 2.24** Small areas of scrub (bramble, elder, sycamore etc.) also line the canal and towpath in places.
- Plate 2.25** Disturbed ground which appears to have been cleared for development, with signs of it being recolonised.
- Plate 2.26** Heavily box-cut hedgerow characterise many areas of the agricultural landscape close to Maynooth.
- Plate 2.27** Hedges / treelines also line the rail corridor.
- Plate 2.28** Example of diverse hedge around patch of semi-natural grassland.
- Plate 2.29** Trees also characterise the built landscape of Maynooth.
- Plate 2.30** Areas of Parkland are also common in the Maynooth landscape.
- Plate 2.31** Mature treeline / parkland in Maynooth Castle / St Patrick’s College, Maynooth grounds.
- Plate 2.32** Trees represent an important part of the landscaping of suburban areas.

- Plate 2.33** Example of urban treeline (*Photo: K. McCaffrey*).
- Plate 2.34** Mature roadside treelines (*Photo: K. McCaffrey*).
- Plate 2.35** Expansive improved agricultural grassland located north of the local road serving the Moygaddy Lands in the Maynooth Environs (*Photo: E. Delaney*).
- Plate 2.36** Young mixed broadleaved plantation woodland located south of the local road serving the Moygaddy Lands in the Maynooth Environs (*Photo: E. Delaney*).
- Plate 2.37** Open understorey of mixed broadleaved woodland north-west of Carton House (*Photo: E. Delaney*).
- Plate 2.38** Bramble scrub and mixed broadleaved conifer woodland west of Carton House (*Photo: E. Delaney*).
- Plate 2.39** Rye Water_040 watercourse located along the western fringes of the mixed broadleaved woodland west of Carton House (*Photo: E. Delaney*).
- Plate 2.40** Maintained hawthorn hedgerow located underneath an ESB overhead line (*Photo: E. Delaney*).
- Plate 2.41** Local road with adjoining hedgerows serving the Moygaddy Lands (*Photo: E. Delaney*).
- Plate 2.42** Local road serving the Moygaddy townland with adjoining treelines (*Photo: E. Delaney*).
- Plate 2.43** Japanese knotweed located on the southern verge of mixed broadleaved woodland (*Photo: E. Delaney*).
- Plate 2.44** Japanese knotweed located within the unmanaged gardens / mixed broadleaved conifer woodland west of Carton House (*Photo: E. Delaney*).
- Plate 3.1** Royal Canal near Maynooth Train Station.
- Plate 3.2** Royal Canal – showing aquatic habitats, edge vegetation, towpath and bordering hedge line station.
- Plate 3.3** Royal Canal – Rail corridor.
- Plate 3.4** Areas of significant aquatic plant growth, such as yellow water-lily and mare's-tail.
- Plate 3.5** Maynooth University and St Patrick's College; built land and gardens.
- Plate 3.6** Maynooth University and St Patrick's College; tree line avenue.
- Plate 3.7** Maynooth University and St Patrick's College; grassland.
- Plate 3.8** Tree cover at Maynooth Business Campus
- Plate 3.9** Tree cover at Maynooth Business Campus
- Plate 3.10** Landscape corridor on the M4 bordering the southern side of Maynooth.

1. Introduction

1.1. Scope of the Project

The value of natural and semi-natural habitats in Ireland is widely recognised, if not always fully appreciated. Natural areas provide homes for wildlife, trees, and wildflowers, but they also provide a wide range of benefits for the humans that live and work in and near them, including opportunities for recreation and relaxation, protection of soil and water quality, flood regulation, carbon sequestration, and sustainable production of food and fuel. Lately, we have come to recognise that habitats in and around urban areas can be just as important in many ways as larger, wilder areas in the country (Miller and Hobbs, 2002; Dearborn and Clark, 2010). Suburban gardens can provide nectar for bees and butterflies, bats can roost in old buildings, and urban trees can clean the air and provide shelter from sun and wind.

The primary aims of this project were to survey, map and assess habitats within Maynooth, to identify Green Infrastructure, and to raise awareness about the natural heritage in the town. Achieving these aims is necessary if semi-natural habitats are to be managed for the benefit of people, animals, and plants. Information on habitat quality and location permits identification of a Green Infrastructure network for Maynooth: i.e. interconnected green spaces that conserve biodiversity and provide ecosystem services to people. Understanding the location, extent and characteristics of Green Infrastructure is essential for managing it sustainably. The main mechanisms for doing this are strategic plans, such as county development plans, local area plans, and practical management plans and strategies that will be developed in the future.

The project study areas are defined by the development boundaries of the Maynooth town development boundary (Figure 1.1). Included in the survey are lands in the Maynooth Environs (Moygaddy, County Meath) to the north of the existing built-up area of Maynooth.

1.1.1. Habitat Surveying

A Guide to Habitats in Ireland (Fossitt, 2000) defines habitats as “...the basic building blocks of the environment that are inhabited by animals and plants, and which are important as units for site description and conservation management”. Habitats are defined by the living things that are found there, mainly plants, and also by environmental conditions, such as geology, water, topography, and human management. *A Guide to Habitats in Ireland* (Fossitt, 2000) classifies Irish habitats in a number of types in a hierarchy under a few broad categories, such as grasslands, freshwater bodies, cultivated and built land, peatlands, and woodlands.

Information on the type, location and extent of habitats is collected during a habitat survey. This can be used to prepare a habitat map, as has been previously carried out for Maynooth, which can clearly and simply outline the spatial characteristics of habitats in an area, particularly any linkages amongst them. Depending on the reasons why a survey is being carried out additional information on habitats is often collected, such as a habitat’s main plant species or its conservation status. Information collected on habitats in Maynooth included: conservation value, threats, abundant and characteristic plant and animal species, presence of invasive exotic species (see Box 2), connectivity with other habitats, and notes on current and past management.

As with many habitat surveys, our habitat survey data have been stored and manipulated in a Geographical Information System (GIS), a computer-based information system tailored to store, process and manipulate spatial data. Use of GIS allows easy production of habitat maps and the ability to interrogate geographical datasets to answer particular questions. In the habitat survey of Maynooth, GIS was used to determine the most abundant habitats in each town and to help identify important areas of Green Infrastructure.

More information on how habitats were surveyed and mapped is given elsewhere in this report.

1.1.2. Habitat Evaluation and Site Designation

One piece of information on habitats that is frequently collected during surveys is the ecological value of a particular habitat. Habitats are evaluated on a number of criteria, including their rarity, the abundance and diversity of species they support, how natural or modified by humans they are, their fragility, and their size. Habitats of greater nature conservation importance should be offered greater protection than those of lesser value.

The EU has identified a number of habitat types that are most important across Europe. Fifty-nine of these internationally valuable habitats are found in Ireland. These habitat types are listed in Annex I of the EU Habitats Directive (92/43/EEC), and the Habitats Directive also requires member states to identify sites that contain representative examples of these habitat types. These are known as Special Areas of Conservation (SACs)¹. The Rye Water Valley / Carton Demesne Special Area of Conservation is located less within the east of the study area, in the Maynooth Environs.

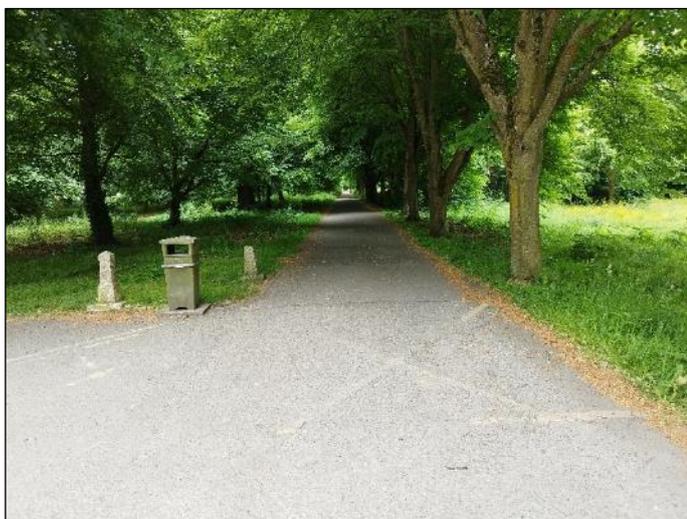


Plate 1.1 – Treelined walkway within the grounds of St Patrick’s College, Maynooth (Photo: K. McCaffrey).

At the next level of designation, sites that are of national ecological importance because of the habitats, species, or geological features they support are designated as Natural Heritage Areas (NHAs). The Royal Canal proposed Natural Heritage Area (pNHA; 002103) is located within the Maynooth study area and traverses the southern half of Maynooth. Rye Water Valley / Carton is also a pNHA (001398).

¹ For further information on SACs see: - <http://npws.ie/protectedsites/>



Figure 1.1 Maynooth Study Area

1.1.3. Green Infrastructure

Ecological Networks

Once habitats have been surveyed and mapped, the next question is how best to manage them. One approach is the establishment of *ecological networks*. Ecological networks are made up of core areas of high biodiversity value connected by corridors or stepping stones. Corridors are more or less linear avenues of habitats that link larger areas of habitats and allow animals, birds and plants to move among them. Examples of corridors could be hedgerows linking areas of woodland or rivers and riverside habitats connecting larger areas of wetlands or natural grasslands. Stepping stones are more isolated habitat patches located in built-up areas or intensive farmland that allow animals and plants to jump between core habitat areas. Stepping stones could include small wetlands or ponds in farmland, grasslands that have developed on abandoned quarries, or even urban parks. The importance of corridors and stepping stones is that they reduce ecological fragmentation in the landscape. Increasing connectivity among habitats gives plants and animals greater access to living space and other resources, allows them to recolonise areas where they may have been lost, and maintains their health by reducing inbreeding.



Plate 1.2 – Riparian vegetation along the Royal Canal, Maynooth (Photo: K. McCaffrey).

Under the Article 10 of the Habitats Directive planning and development policies must endeavour to conserve and manage sustainably corridors and stepping stone habitat features essential for the migration, dispersal and genetic exchange of plants and animals. Improving the connectivity and coherence of the network of SACs and SPAs is a particular objective of the Habitats Directive.

Green Infrastructure

The idea of ecological networks has recently been expanded into the concept of *Green Infrastructure*. Rather than focusing solely on biodiversity, Green Infrastructure also takes into account the benefits that green areas can provide for humans. According to the report, *Creating Green Infrastructure for Ireland* (Comhar, 2010): -

Green Infrastructure is a strategically planned and managed network featuring areas with high quality biodiversity (uplands, wetlands, peatlands, rivers, and coast), farmed and wooded lands, and other green spaces that conserve ecosystem values which provide essential services to society.

The concept of Green Infrastructure highlights both the intrinsic importance of natural habitats and also the ecosystem services they provide to humans. Ecosystem services performed by Green Infrastructure can include a wide range of things, such as: -

- Providing clean water
- Providing food, both directly and also indirectly, such as by supporting populations of bees to pollinate crops
- Controlling surface water and flooding
- Regulating local climate, such as providing shade or shelter from wind, and global climate through carbon sequestration
- Conserving soil and soil nutrients
- Conserving historic landscapes and built and cultural heritage

- Providing spaces for recreation and sport, improving the physical well-being of people
- Improving the mental and spiritual well-being of people, enhancing quality of life and providing a connection between people and nature

The Green Infrastructure concept is primarily a planning tool (see also Box 1). Identifying the location and characteristics of Green Infrastructure is essential if the ecosystem services they provide are to be managed in a sustainable fashion. Key pieces of Green Infrastructure can be identified and taken into account when preparing plans, such as local development plans, biodiversity plans and tourism strategies. Similar to habitat survey and mapping, Green Infrastructure can be mapped using existing data sources supplemented by field survey where required. In fact, a habitat map is a critical piece of baseline information required for Green Infrastructure mapping.



Plate 1.3 – *Stretch of the Royal Canal near Bond Bridge, Maynooth* (Photo: K. McCaffrey).

Box 1.1: Kildare Plans & Policy on Green Infrastructure and Natural Heritage.

The following policies protecting and promoting biodiversity are outlined in the **Kildare County Development Plan 2023-2029**

Biodiversity

Policy

BI P1 - Integrate in the development management process the protection and enhancement of biodiversity and landscape features wherever possible, by minimising adverse impacts on existing habitats (whether designated or not) and by including mitigation and/or compensation measures, as appropriate.

Objectives

BI O1 –Require, as part of the Development Management Process, the preparation of Ecological Impact Assessments that adequately assess the biodiversity resource within proposed development sites, to avoid habitat loss and fragmentation and to integrate this biodiversity resource into the design and layout of new development and to increase biodiversity within the proposed development.

BI O2 - Encourage and promote the retention and creation of green corridors within and between built up urban areas and industrial scale developments to protect wildlife habitat value including areas that are not subject to public access.

BI O3 - Actively support the implementation of national biodiversity initiatives such as the All-Ireland Pollinator Plan 2021-2026

BI O4 - Promote increased public participation in biodiversity conservation by supporting and encouraging community-led initiatives such as native tree planting, the removal of invasive species and the continued preparation of Local Biodiversity Actions Plans for settlements in County Kildare.

Natura 2000 Network

Policy

BI P2 - Protect and maintain the favourable conservation status and conservation value of all-natural heritage sites designated or proposed for designation in accordance with European and national legislation and agreements. These include Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Natural Heritage Areas (NHAs), Ramsar Sites and Statutory Nature Reserves.

Objectives

BI O5 - Avoid development that would adversely affect the integrity of any Natura 2000 site located within and immediately adjacent to the county and promote favourable conservation status of habitats and protected species including those listed under the Birds Directive, the Wildlife Acts and the Habitats Directive, to support the conservation and enhancement of Natura 2000 Sites including any additional sites that may be proposed for designation during the period of this Plan and protect the Natura 2000 network from any plans and projects that are likely to have a significant effect on the coherence or integrity of a Natura 2000 Site.

BI O6 - Ensure an Appropriate Assessment, in accordance with Article 6(3) and Article 6(4) of the Habitats Directive and with DEHLG guidance (2009), is carried out in respect of any plan or project not directly connected with or necessary to the management of a Natura 2000 site to determine the likelihood of the plan or project having a significant effect on a Natura 2000 site, either individually or in combination with other plans or projects and to ensure that projects which may give rise to significant cumulative, direct, indirect or secondary impacts on Natura 2000 sites will not be permitted (either individually or in combination with other plans or projects) unless for reasons of overriding public interest.

BI O7 - Support the establishment of conservation measures and the preparation and implementation of management plans for the conservation of Natura 2000 sites by NPWS, as required by Article 6(1) of the Habitats Directive.

Natural Heritage Areas (NHAs) and Nature Reserves

Policy

BI P3 - Protect and maintain the favourable conservation status and conservation value of all natural heritage sites designated or proposed for designation in accordance with European and national legislation and agreements. These include Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Natural Heritage Areas (NHAs), Ramsar Sites and Statutory Nature Reserves.

Objectives

BI O8 - Require the preparation of an Ecological Impact Assessment (EiA) by a suitably qualified professional for proposals for development within or adjacent to a Natural Heritage Area (NHA) to ensure the development is designed and sited to minimise its impact on the biodiversity, ecological, geological and landscape value of the site, particularly plant and animal species listed under the Wildlife Acts.

BI O9 - Support the establishment of conservation measures and preparation and implementation of management plans for the conservation of NHA sites by NPWS.

Protected Habitats and Species

Policy

BI P4 – Ensure that any new development proposal does not have a significant adverse impact, incapable of satisfactory mitigation on plant, animal or bird species which are protected by law.

Objectives

BI O10 - Ensure that any new development proposal does not have a significant adverse impact on rare and threatened species, including those protected under the Wildlife Acts 1976 and 2012, the Birds Directive 1979 the Habitats Directive 1992 and the Flora Protection Order species.

BI O11 - Ensure appropriate species and habitat avoidance and mitigation measures are incorporated into all new development proposals.

BI O12 - Possibly require a derogation licence, issued by the DHLGH, in the event of a proposed development impacting on a site known to be a breeding or resting site of species listed in the Habitats Regulations or the Wildlife Acts 1976 -2012.

BI O13 - Require all applications for new developments to identify, protect and sensitively enhance the most important ecological features and habitats, and incorporate these into the overall open space network, keeping free From development and to provide links to the wider Green Infrastructure network as an essential part of the design process and by making provision for local biodiversity (e.g. through provision of swift boxes or towers, bat roost sites, hedgehog highways, green roofs, etc.).

County Biodiversity Sites

Policy

BI P5 - Identify and conserve locally important biodiversity sites in the county which contribute to the overall ecological network of County Kildare.

Objectives

BI O14 - Protect, in co-operation with the relevant statutory agencies and other relevant groups, sites of local biodiversity importance (County Biodiversity Sites), not otherwise protected by legislation.

Trees, Woodlands, and Hedgerows

Policy

BI P6 - Recognise the important contribution trees and hedgerows make to the county biodiversity resource climate mitigation, resilience, and adaptation

Objectives

BI O15 - Prevent, in the first instance, the removal of hedgerows to facilitate development. Where their removal is unavoidable, same must be clearly and satisfactorily demonstrated to the Planning Authority. In any event, removal shall be kept to an absolute minimum and there shall be a requirement for mitigation planting comprising a hedge of similar length and species composition to the original, established as close as is practicable to the original and where possible linking to existing adjacent hedges. Native plants of a local provenance should be used for any such planting. Removal of hedgerows and trees prior to submitting a planning application will be viewed negatively by the planning authority and may result in an outright refusal

BI O16 - Promote the integration of boundary hedges within and along development sites into development design so as to avoid “trapped hedges” located to the boundary of houses within the development layout. Encourage the planting of woodlands, trees, and hedgerows as part of new developments and as part of the Council’s own landscaping works using native plants of local provenance.

BI O17 - Require the undertaking of a comprehensive tree survey carried out by a suitably qualified arborist where development proposals require felling of mature trees; the tree survey shall assess the condition, ecological and amenity value of the tree stock proposed for removal as well as mitigation planting and a management scheme. It

should be noted that rotting and decaying trees are an integral part of a woodland ecosystem and can host a range of fungi and invertebrates, important for biodiversity. While single or avenue trees that are decaying may be removed, others that are part of group or cluster may be subject to retention.

BI O18 – Ensure a Tree Management Plan is provided to ensure that trees are adequately protected during development and incorporated into the design of new developments.

BI O19 - Restrict the cutting of hedges during the bird-nesting season (1st March until 31st August), except in certain legally defined circumstances, in accordance with the provisions of the Wildlife (Amendment) Act 2000.

BI O20 - Protect trees which are the subject of Tree Preservation Orders (see Table 12.3 of Kildare County Development Plan 2023-2029) and the 57 Champion and Heritage Trees in Kildare, which are identified on the Tree Register of Ireland.

Inland Waters: Lakes, Rivers, Streams, and Groundwater

Policy

BI P7 - Protect rivers, streams, and other watercourses and, wherever possible, maintain them in an open state capable of providing suitable habitats for fauna and flora while discouraging culverting or realignment.

Objectives

BI O21 –Ensure the protection of rivers, streams, and other watercourses and, wherever possible, maintain them in an open state capable of providing suitable habitats for fauna and flora while discouraging culverting or realignment. Endeavour to re-open previously culverted streams and watercourses through any future development/redevelopment proposals.

BI O22 – Require the preparation and submission of an Ecological Impact Assessment (EclA) including bat and otter surveys for developments along river or canal corridors.

BI O23 – Consult with Inland Fisheries Ireland (IFI) in relation to any development (greenfield development or redevelopment of brownfield sites) that could potentially impact on the aquatic ecosystems and associated riparian habitats while taking account of ‘Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites’ (IFI, 2004) and ‘Planning for Watercourses in the Urban Environment’ (IFI, 2020).

BI O24 - Have regard to the riparian buffer zones and potential uses as identified in Table 12.4 when considering potential development and proposed development layouts within or adjacent to waterways.

BI O25 –Consult with Inland Fisheries Ireland (IFI) in relation to any structures designed for crossing fisheries waters. In this regard consideration must be given to the following biological criteria: -

- species of fish required to safely pass.
- size of fish required to pass (life stage).
- time of year in which fish passage is required.
- high and low design passage flows etc.

BI O26 – Require that expert advice is sought from a suitably qualified bat expert, in developing lighting proposals along river and stream corridors, to mitigate impacts of lighting on bats and other species. The use of artificial lighting shall be avoided in streamside zones and artificial lighting should be restricted unless absolutely necessary in the middle zone. LEDs should, where permitted, be warm white to minimise disturbance to wildlife

BI O27- Ensure that any runoff from developed areas does not result in any deterioration of downstream watercourses or habitats and require that pollution generated by a development is treated within the development area prior to discharge to local watercourses.

BI O28 – Generally, prohibit infilling of land adjacent to rivers, including natural floodplains, prior to or during any development. This will only be permitted, where, in the opinion of the planning authority, there is an over-riding public interest in order to provide a key public infrastructure or to provide a more coherent design approach (in line with an approved urban design strategy) but it will be subject to ensuring that adequate compensatory flood storage (if necessary) is provided elsewhere.

BI O29 - Ensure the protection, improvement, or restoration of riverine floodplains and to promote strategic measures to accommodate flooding at appropriate locations including nature-based solutions, in order to protect ground and surface water quality and build resilience to climate change.

BI O30 - Avoid developing walking/cycling trails through sensitive ecological habitats. A multi-disciplinary team including an ecologist and flood risk expert shall review all riverine sites to determine the appropriate zonation and permissible uses.

Wetlands and Ramsar Sites

Policy

BI P8 - Ensure that Kildare’s wetlands and watercourses are retained for their biodiversity and flood protection values and maintain good ecological status of wetlands and watercourses in support of the provisions of the Water Framework Directive and Ramsar Convention.

Objectives

BI O31 – Protect wetland sites that have been rated A (International), B (National) C+ (County) and C (Local) importance as identified in the County Kildare Wetlands Survey 2012-2014.

BI O32 – Prevent infilling and drainage, where possible, of wetlands identified as part of the County Kildare Wetland Survey 2012-2014.

BI O33 - Ensure that an ecological assessment undertaken in conjunction with proposals involving drainage or reclamation of wetland. Impact assessment of all developments on peatlands shall consider peatland stability, carbon emissions balance, Hydrology and Ecology.

BI O34 - Support the implementation of the recommendations of the National Peatlands Strategy 2015, as they relate to County Kildare.

Invasive Species And Noxious Weeds

Policy

BI P9 - Support measures for the prevention and/or eradication of invasive species within the county and the control of noxious weeds.

Objectives

BI O35 – Require all development proposals to address the presence or absence of invasive alien species on proposed development sites and (if necessary) require applicants to prepare and submit an Invasive Species Management Plan where such species exist, in order to comply with the provisions of the European Communities (Birds and Natural Habitats) Regulations 2011-2015.

BI O36 - Encourage, through Citizen Science, the public’s awareness in the identification and eradication of invasive species and to provide training with respect to potential threats caused by invasive species, particularly their methods of dispersal and appropriate control and removal measures in association with relevant authorities.

Geology

Policy

BI P10 - Maintain and protect the conservation value of geological sites of national or local importance and seek the sustainable management of the county’s geological heritage resource as listed in Table 12.7 (see Kildare County Development Plan 2023-2029).

Objectives

BI O37 – Consult with the Geological Survey of Ireland regarding any development proposals within or likely to have an impact on Sites of Geological Importance.

BI O38 - Contribute towards the protection from inappropriate development of Geological Natural Heritage Areas that become designated during the lifetime of this Plan.

Green Infrastructure general

Policy

BI P11 - Recognise the importance of Green Infrastructure in Kildare and to put measures in place to protect this valued biological resource

Green Infrastructure approach to spatial planning

Policy

BI P12 - Recognise the importance of Green Infrastructure in Kildare and protect this valued biological resource, the ecosystem services it provides and the contribution to climate resilience.

Objectives

BI O39 – Ensure the protection, enhancement, and maintenance of Green Infrastructure in Kildare

BI O40 – Support the development of a Regional Green Infrastructure Strategy and the identification, management, development, and protection of strategic GI connections in co-operation with Kildare’s neighbouring counties and the Midland and Eastern Regional Assembly.

BI O41 – Develop a strategy, to identify a series of greenbelt/green spaces (in addition to those identified in this CDP) between the growing settlements within Kildare during the lifetime of the Plan with particular attention to the undeveloped areas between Celbridge, Leixlip and Maynooth and to collaborate with South Dublin County Council, where appropriate.

BI O42 – Require that all Local Area Plans protect and manage the Green Infrastructure network in an integrated and coherent manner and add additional local Green Infrastructure corridors where possible.

BI O43 – Provide for the incorporation of underpasses and/or Green Bridges at ecologically sensitive locations on the county’s road and rail corridors (including those along disused railway corridors) that will facilitate the free movement of people and species through the urban and rural environment

BI O44 – Promote a network of paths and cycle tracks to enhance accessibility to the Green Infrastructure network across the County, while ensuring that the design and operation of the routes respect, and where possible, enhance the ecological potential of each site.

A Joint Local Area Plan will be prepared, in conjunction with Meath and Kildare County Councils, for Maynooth town, including the Maynooth Environs.

RPO 4.35 of the Regional Spatial and Economic Strategy (RSES) states as follows: ‘*A cross boundary Joint Local Area Plan (LAP) shall be prepared by Kildare County Council and Meath County Council to provide a co-ordinated planning framework for the Maynooth area. The Joint LAP shall identify a boundary for the plan area, strategic housing and employment development areas and infrastructure investment requirements and promote greater co-ordination and sequential delivery of serviced lands for development.*’

The regional policy objectives set down specifically for Maynooth in the RSES include the following:

RPO 4.33: Support the continued development of Maynooth, co-ordinated with the delivery of strategic infrastructure including pedestrian and cycle linkages within the town and to the Royal Canal Greenway, DART expansion and road linkages forming part of the Maynooth Outer Orbital Route in a manner which supports future development and population growth and builds on synergies with Maynooth University promoting a knowledge-based economy.

RPO 4.34: Support Maynooth as a key town to act as an economic driver for north Kildare and provide for strategic employment at key locations to improve the economic base of the town and provide for an increased number of local jobs.

Box 1.2 (overleaf) outlines policies set out in the Meath County Development Plan 2021-2027² in relation to the Maynooth Environs.

² Meath County Development Plan 2021-2027 - [Volume 2 Written Statement for Settlements .pdf \(meath.ie\)](#)

Box 1.2: Meath Plans & Policy on Green Infrastructure relevant to Maynooth Environs.

The following policies protecting and promoting biodiversity are outlined in the **Meath County Development Plan 2021-2027**.

Policy

MAY POL 1:

To prepare, as a priority, in conjunction with Kildare County Council a joint Local Area Plan for Maynooth, over the period of the Plan.

MAY POL 2:

To ensure that the development of the Maynooth Environs is accommodated in an environmentally sensitive manner that will:

1. Create a centre of excellence for innovation and employment.
2. Protect the existing natural environment and built heritage and utilise it to frame new development.
3. Build a distinctive and attractive mixed-use place to work and live.

Objectives

MAY OBJ 1 (Master Plan 16)

A Design Statement outlining the evolution of the design process for the proposed development. An emphasis on exemplar sustainable design and aesthetic quality shall be required.

MAY OBJ 6

To ensure the provision of improved cycle and walking connections to Maynooth Town Centre.

MAY OBJ 8

To require the implementation of cycle lanes and associated cycle infrastructure upgrades as identified within the Greater Dublin Area Cycle Network Plan, in the area in partnership with the National Transport Authority and other relevant stakeholders.

MAY OBJ 9

To ensure that all development proposals provide for a permeable network that promotes direct linkage and encourages the use of alternative modes of transport and contributes to enhanced linkages to the train station.

MAY OBJ 10

To require that any development in the Maynooth Environs respects the built and natural heritage of the area, its landscape quality, protected structures, historic demesne, archaeological heritage, natural heritage, and general landscape character.

MAY OBJ 11

To ensure all development in the area has no negative impact on the Rye Water Valley/Carton SAC site or on the environmental characteristics of the area including woodland, rivers, and tributaries.

MAY OBJ 12

To encourage the sympathetic re-use or rehabilitation of Moygaddy House and outbuildings and encourage their sensitive conversion to residential or tourist accommodation or other appropriate use in accordance with the land use objective applicable to the said lands.

MAY OBJ 13

To facilitate the provision of community facilities including a hospital and/or associated educational/research and residential facilities.

MAY OBJ 14

To promote a high standard of architectural design, and quality of materials utilised throughout the Development Framework area, that is appropriate in scale, and form to its location.

1.1.4. Wetlands / Water dependant habitats

A total of 23 wetland sites lies within a 7 km radius of the Maynooth study area boundary, only 1 of which lies within the boundary itself, Lyreen Angling Centre -Lyreen River (site code: WMI_KE55) (Table 1.1)³.

Rye Water Valley/ Carton SAC (Meath) (site code: WMI_MH03) is located in the east of the Maynooth Study Area. See Table 1.1 overleaf for details of wetland sites within the vicinity of the proposed works.

³ Source: Wetlands Survey Ireland – *Map of Irish Wetlands*: -
<https://wetland.maps.arcgis.com/apps/View/index.html?appid=e13b75c3bcab4932b992aa0169aa4a32&extent=-12.6266,51.3236,-3.2168,55.4102>

Table 1.1 Wetland sites within a 7km radius of the Maynooth Study Area.

Site Name	Site Code	Distance from Maynooth town (over land)	Hydrologically connected to LAP?	Wetland type	Description
Lyreen Angling Centre - Lyreen River	WMI_KE55	Within	Yes – Rye Water River	Artificial Pond, Reed Swamp	Series of artificial ponds used as a fishing amenity, with numerous platforms and mown paths around edge. Extensive reed beds around northern most pond and middle pond. Extensive infestation of the invasive Fringed Water Lily in two southern most ponds. D Rating: Local Conservation Value (moderate value).
Lyreen River	WMI_KE118	Within	Yes	River, Riparian woodland	Rated as - C Rating: Local conservation value (high value). (Source: Kildare Wetland Survey, 2012).
Rye Water Valley/Carnton SAC (Meath)	WMI_MH03	Within	Yes- Rye Water River	Calcareous Spring, Reed Swamp, Marsh, River, Fen, Wet Woodland (Oak Ash or Willow Alder)	The Rye Water in Carton Estate is dammed at intervals, creating a series of lakes. The marsh, mineral spring and seepage area found at Louisa Bridge supports a good diversity of plant species. A Rating: International.
Kilwoghan Wetland	WMI_KE123	Ca. 1.7km	No	Reed Swamp, Wet Grassland	Site comprises a central area of <i>Typha</i> and <i>Schoenoplectus</i> reed swamp surrounded by a margin of <i>Juncus</i> dominated wet grassland. Much of the site has been infilled in the past and now contains dry grassland. C Rating: Local conservation value (high value).
Celbridge Pond	WMI_KE122	Ca. 1.8km	No	Lake, Reed Swamp, Wet Grassland	A small eutrophic pond. Situated in a localised depression that accumulates water during the winter months. D Rating: Local Conservation Value (moderate value).
Rye Water Valley Carton SAC (Kildare)	WMI_KE7	Ca. 2.7km	Yes	Calcareous Spring, Reed Swamp, Marsh, Artificial Pond, Canal, Wet Woodland (Oak Ash or Willow Alder)	The Rye Water in Carton Estate is dammed at intervals, creating a series of lakes. The main importance of the site lies in the presence of several rare plant and animal species, and the thermal, mineral, petrifying spring. A Rating: International.
Castletown Demesne Ponds	WMI_KE119	Ca. 3.5km	No	Artificial Pond, Reed Swamp, River, Wet Woodland (Oak Ash or Willow Alder)	Two man made ponds occur within the grounds of Castletown House Estate, west and south-east of the house. These are connected by a stream which flows into the River Liffey in SE corner of the demesne. Western site in woodland and very overgrown. Pond SE of house recently restored. C Rating: Local conservation value (high value).

Site Name	Site Code	Distance from Maynooth town (over land)	Hydrologically connected to LAP?	Wetland type	Description
Leixlip Cold Spring, Louisa Bridge – Rye Water Valley / Carton SAC	WMI_KE13	Ca. 5.2km	Yes	Calcareous Spring	This species-rich site contains a complex of springs, flushes and pools with paludal tufa, oncoids/ooids and marl. A Rating: International.
Royal Canal (Kildare) – Royal Canal pNHA	WMI_KE36	Ca. 5.3km	Yes	Canal	The Royal Canal is a man-made waterway linking the River Liffey at Dublin to the River Shannon near Tarmonbarry. Different habitats are found within the canal boundaries - hedgerow, tall herbs, calcareous grassland, reed fringe, scrub and woodland. B Rating: National.
Kilmacredock Upper Pond	WMI_KE266	Ca. 3.3km	No	Artificial Pond, Scrub	F Rating: Unknown value - survey required.
Parsonstown Ponds	WMI_KE241	Ca. 4.7km	No	Artificial Pond, Reed Swamp,	Three circular ponds located in amenity grassland with marginal paths and ornamental tree and shrub planting. Edge of pond lined with stones and artificial pond liner. A series of man-made waterfalls occur. D Rating: Local Conservation Value (moderate value).
Backwestonpark Reservoir (Kildare)	WMI_KE254	Ca. 5.7km	No	N/A	D Rating: Local Conservation Value (moderate value).
Backwestonpark Reservoir (Dublin)- River Liffey	WMI_DU171	Ca. 6.0km	No	N/A	D Rating: Local Conservation Value (moderate value).
Ballymadeer/ Backweston Campus Ponds	WMI_KE240	Ca. 5.6km	No	Artificial Pond, Reed Swamp	Artificial ponds in parkland setting with extensive reed beds on margins backed by native and non-native tree and shrub planting. Extensive reed bed around large northern lake, with extensive Chara bed in lake in the south. D Rating: Local Conservation Value (moderate value).
Quarry Pond Celbridge	WMI_KE121	Ca. 4.2km	No	Lake, Reed Swamp, Calcareous Spring, Wet Woodland (Oak Ash or Willow Alder)	Quarry pond is formed on a water filled depression (now a pond) fed from a spring or wells. Water quality appears to be poor. Area totally surrounded by urban development. D Rating: Local Conservation Value (moderate value).
Cellbridge Abbey/ Simmonstown House Pond	WMI_KE120	Ca. 4.4km	No	Artificial Pond	D Rating - Local Conservation Value (moderate value).
St Patrick's Hill Thermal Spring pNHA	WMI_KE17	Ca. 4.3km	No	Calcareous Spring, Scrub	A thermal spring which is used as a holy well and surrounded with stonework and paving. There is no

Site Name	Site Code	Distance from Maynooth town (over land)	Hydrologically connected to LAP?	Wetland type	Description
					wetland vegetation present. Ash and willow scrub surround the well. B Rating: National.
Ballysaxhills	WMI_KE144	Ca. 6 km	No	Wet Grassland	Former wetland now drained and reverted to improved agricultural grassland and wet grassland. Some small areas of impounded water with rushes remain but no longer a functioning wetland. C Rating: Local conservation value (high value).
Liffey Oxbow – River Liffey (Kildare)	WMI_KE64	Ca. 5.2km	No	Mesotrophic Lake, Scrub, Reed Swamp,	This site displays both an existing oxbow lake as well as a remnant oxbow lake, which are within 300m of one another. The geomorphology of the surrounding land adjacent to these fluvial features displays previous pathways that the Liffey had taken. B Rating: National.
Hodgestown (Ed Kilcock)	WMI_KE189	Ca. 6.2km	No	Artificial Pond	Site appears to consist of an artificial lake with surrounding managed landscaping. No evidence of marginal reedbed development on aerial photograph. D Rating: Local conservation value (moderate value).
Pitchfordstown	WMI_KE192	Ca. 6.3km	No	Artificial Pond	Artificial lake surrounded by exit from M4 (Junction 8, Kilcock) with steep banks and inflow pipe from motorway. Majority of hollow with open water and moderate cover of <i>Potamogeton</i> . Marginal slope mainly bare subsoil which is re vegetating. E Rating: Local conservation value (low value).
Staffordstown Ponds	WMI_MH467	Ca. 3.9km	No	Artificial Pond, Reed Swamp, Marsh, Scrub	F Rating: Unknown value - survey required.
Grange Golf Course Ponds	WMI_MH356	Ca. 4.7km	No	Artificial Pond, Reed Swamp	Series of artificial ponds in golf course setting. F Rating: Unknown value - survey required.
Hamwood Pond	MIW_MH491	Ca. 5.7km	No	Artificial Pond, Reed Swamp, Scrub	F Rating: Unknown value - survey required.

Note: To review location of wetlands go to Wetland Surveys Ireland mapviewer - <https://www.wetlandsurveys.ie/>

1.2. Objectives and Outputs

The main objectives of this project were to: -

- Survey and map habitats to level 3 of Fossitt (2000) classification.
- Evaluate the nature conservation value and identify likely threats to the ecological integrity of habitats surveyed. The evaluation criteria used was agreed in advance with Kildare County Council. Assess and map hedgerows individually, using a standard methodology agreed in advance with Kildare County Council.
- Identify and map flora species of conservation interest, potential habitat features of value to fauna, and invasive species.
- Identify, evaluate and map the Green Infrastructure in the study area.
- Co-ordinate and manage a public consultation exercise to engage with and gather data from the public.
- Propose recommendations for future work.

The outputs of this project include: -

- A digital dataset (compatible with GIS MapInfo) of all habitat data. The data has been stored in an excel database for future incorporation into the Kildare County Council GIS system.
- Colour maps identifying habitats, and separate map(s) identifying key green infrastructure (overlaid on aerial photograph(s)). Production of thematic colour maps, based on an attribute value in the *.shp* or *.tab* file.
- A separate MapInfo table for each distinct spatial dataset generated in the study.
- MapInfo tables prepared in Irish National Grid coordinate system.
- Each spatial object (point, polyline, and polygon) in a table to have a Unique ID inside that table.
- MapInfo table containing data fields appropriate for recording of the particulars of that spatial dataset. If external databases are used to record data relating to spatial datasets then each record must be linked by a key field to the unique ID in the MapInfo table.
- Concise summary of findings in pdf. format.
- An electronic copy of final report in both Microsoft office word and *pdf.* formats.
- Data on species of conservation interest and invasive species to be lodged with the National Biodiversity Data Centre (NBDC), or other relevant organisation, as per NBDC guidance on submitting records. Written verification that records have been submitted must be supplied to Kildare County Council.

Box 1.3: Invasive Species

Exotic or alien species are plants or animals that are not native to Ireland – in other words, species that did not colonise naturally at the end of the last Ice Age, approximately 10,000 years ago, but have been introduced by humans. Most alien species that have become naturalised in Ireland do not have significant negative impacts on our biodiversity. These include species such as ivy-leaved toadflax, a common plant of old stone walls, crack willow, a tree of riversides and wetlands, and bank vole, an introduced rodent in the southwest of Ireland now thought to have been accidentally imported from Germany with machinery for the Shannon Scheme in the 1920s.

Unfortunately, a minority of exotic species become invasive, spreading rampantly throughout native habitats and threatening biodiversity by competition, overgrazing, predation, habitat alteration, disease or dilution of native gene pools through hybridisation. Invasive species can have serious economic impacts through costs of control, decreases in or damage to economically beneficial species, damage to infrastructure, and reductions in water quality.

Further information about invasive exotic species is available from Invasive Species Ireland (<http://www.invasivespeciesireland.com/>) and the National Biodiversity Data Centre (<http://invasives.biodiversityireland.ie/>).

Invasive exotic species found in Maynooth include: -

Japanese knotweed is a garden escape that forms dense stands in nearly any open habitat. It shades out native species and can even damage nearby walls and roads with its tough underground rhizomes.

Snowberry is a shrub with pretty white (but poisonous) berries that spreads less quickly than Japanese knotweed. It was introduced as ground cover for gamebirds and can be invasive in hedgerows and woodlands, outcompeting native shrubs.

Grey squirrel was originally introduced to Castleforbes, County Longford from where it has expanded and eliminated the native Irish red squirrel from most of eastern Ireland by direct competition for food and by spreading a virus lethal to red squirrels. It damages young trees by stripping bark, often girdling, and killing them.

1.3. Methods

The methods we used to meet the project objectives are outlined in this section, with additional details given in Chapter 3 below. Because this work follows on from the original project carried out in 2011, the methods below outline the original process carried out, followed by that conducted over the period 2021 to 2023. The first step was to carry out the habitat survey of the Maynooth study area. The recently published *Best Practice Guidance for Habitat Survey and Mapping* (Smith *et al.*, 2011) provides advice on how to plan, carry out and use the results of a habitat survey project. According to this guidance, there are five main steps in a good habitat survey, which were followed for this project: -

1. Planning the survey in line with the survey objectives.
2. Reviewing information that already exists for the study areas
3. Carrying out habitat survey and mapping in the field,.
4. Compiling the results into a database, preparing habitat maps and writing the project report.
5. Interpreting and using the results of the survey.

The survey was planned in conjunction with the Kildare Heritage Officer. The areas to be covered by the survey are contained within the development boundary of Maynooth (Figure 1.1). We were subsequently asked to map additional lands in the Maynooth Environs (i.e. Moygaddy, County Meath).

We reviewed information from previous studies on the habitats and biodiversity of the Maynooth study area. These included previous habitat surveys, such as information collated in Environmental Impact Assessment Reports (EIARs), and data from other studies. All information sources are outlined below. Where available, we incorporated digital habitat data into our habitat mapping GIS.

Prior to undertaking field survey work we used information from previous studies to prepare preliminary habitat maps using GIS. We brought these preliminary maps into the field along with Ordnance Survey Ireland (OSi) mapping and aerial photographs. Habitats were originally surveyed in the field between September 08th and September 21st, 2011. We classified habitats according to the Heritage Council classification system (Fossitt, 2000) and marked their extent on the preliminary habitat maps. We collected additional information on conservation value and threats on prepared data sheets. This information included whether the habitat corresponded with a habitat of European conservation importance as listed on Annex I of the EU Habitats Directive, if the habitat supported any rare species, threats to the habitat, and the presence of non-native invasive species. We also took photographs of habitats. We evaluated the nature conservation value of habitats according to the National Roads Authority scale (NRA ,2006; 2009). These criteria have also been used for evaluating the nature conservation significance of important flora and fauna.

- International importance
- National importance
- County importance
- High local importance
- Low local importance
- Negligible importance

In 2021, previously created habitat maps of the area were compared with recent aerial imagery to generate an updated habitat GIS database and map. Ground truthing was conducted out of the optimal habitat surveying season to verify changes in land use and transitions of habitats. A further habitat survey was undertaken in early 2022, during optimal survey season. Additional site photos were also taken in June 2023. The Maynooth

Environs in County Meath were surveyed on August 12th 2022 and Friday October 14th 2022 by Eamonn Delaney, Delichon on behalf of Atkins and Kildare County Council.

Sources of information that were used to inform the assessment included: -

- Environmental Protection Agency (EPA) EnVision Mapping <https://gis.epa.ie/EPAMaps/>.
- EPA Catchments Website – for the 2nd cycle River Basin Management Planning www.catchments.ie.
- Geological Survey of Ireland online mapping www.gsi.ie.
- Information on the conservation status of birds in Ireland (Gilbert *et al.*, 2021).
- NPWS online maps and data, site synopsis and conservation objectives www.npws.ie.
- National Biodiversity Data Centre (NBDC) online maps and data www.biodiversityireland.ie.
- OSI Map Viewer www.osi.ie.
- Botanical Society of Britain and Ireland online maps and data <https://bsbi.org/maps>.

A Phase I Habitat Survey was undertaken as part of the site walkover survey. The methodology used during this survey was based on the Heritage Council's Best Practice Guidance for Habitat Survey and Mapping (2011). The classification of habitats recorded during the field survey is based on the A Guide to Habitats in Ireland (Fossitt, 2000)⁴. The Guide to Habitats in Ireland classifies habitats according to a hierarchical framework with Level 1 habitats representing broad habitat groups, Level 2 representing habitat subgroups and Level 3 representing individual habitat types. The Phase 1 Field Survey focused on identifying habitats to Level 3 of the Guide to Habitats in Ireland. Any other records of interest (e.g. invasive plant species) were also marked on field maps and locations were recorded using GPS handheld units.

Where appropriate, the annotation of vegetation occurring within sites was undertaken using the DAFOR scale. This scale refers to plant species in terms of dominance, abundance, frequency, occasional and rare (DAFOR). All species were readily identifiable during the survey. Plant nomenclature for vascular plants follows 'New Flora of the British Isles' (Stace, 2019), while mosses and liverworts nomenclature follows 'Mosses and Liverworts of Britain and Ireland - A Field Guide' (Atherton, 2010).

Box 1.4: Geographical Information Systems

The Kildare habitat mapping data have been stored in a Geographical Information System (GIS) that was also used to analyse the data and produce the maps in this report. A GIS is a computer-based information system designed to store, process and manipulate geographical data. All habitats within the study areas have been mapped, and their locations and extent are stored in the GIS as two-dimensional shapes (polygons) or, for linear habitats like hedgerows or smaller streams, as lines. The real strength of a GIS, however, is that the habitat polygons and lines are also associated with information. This makes it easy to create maps colour coded by habitat type or conservation value, as this information is stored in the GIS data table. Each row within the table is an individual habitat polygon, and each column corresponds to variables such as habitat type, area, survey date, and conservation value. Data within the table can be quickly analysed to find out important facts about Maynooth's habitats. For example, the total area that different habitat types occupy within the Maynooth study area was determined for this report using the GIS database.

⁴ Fossitt, J. (2000). *A Guide to Habitats in Ireland*. Kilkenny: Heritage Council.

2. Maynooth

2.1. Overview of lands in Kildare

This section of the report discusses habitats with the town of Maynooth, in County Kildare. The habitats of the Maynooth study area as mapped according to Level 3 of the Heritage Council classification scheme are illustrated in Figure 2.1. Agricultural land which includes improved agricultural grassland (GA1) and tillage (BC1-BC3) in addition to buildings and gardens were the most abundant habitat groups covering 48.43% and 35.70% of the study area respectively. These habitats dominated the marginal areas fringing the west, north, south and south-eastern parts of the study area. Buildings and gardens includes the habitat types such as buildings and artificial surfaces (BL3), amenity grassland (lawns) (GA2), flower beds (BC4), ornamental shrubs (WS3) and other habitat types present in private gardens.

Amenity grassland (GA2) occupies 6.03% of Maynooth. This total does not include the lawns of private houses, but does include public grassy spaces within estates, playing pitches, and larger lawns in institutions such as Maynooth University, St Patrick's College and the various schools.

The remainder of the habitat groups each occupy less than 10% of the total study area. Woodlands and scrub account for 4.16% of the study area. These areas were represented by the woodland areas in the Maynooth University campus grounds and the various pockets of isolated woodland situated throughout the study area. Disturbed ground includes areas where recently completed or discontinued construction has created patches of bare and recolonising soil (ED2-ED3). Watercourses, including the Lyreen River and its tributaries (FW2) and the Royal Canal (FW3), and artificial lakes and ponds (FL8) occupy a combined 1.54% of the study area. Semi-natural grassland habitats were dominated by dry meadows and grassy verges (GS2) and account for 2.86% of the study area. The general characteristics of these habitat groups in Maynooth are described in more detail below.

The Maynooth study area supports over 36 km of hedgerows and over 30 km of treelines (Figure 2.2). The density of hedgerows in Maynooth is 3.6 km per km². This is lower than the average hedgerow density of County Kildare 5.92 km / km² (Foulkes, 2006) and 5.8 km / km² in Fingal (McCourt and Kelly, 2007), the latter which is a similar landscape of urban, suburban and intensive agricultural land. Other counties support varying densities of hedgerow, depending on landscape and land use. A survey of County Laois hedgerows found a density of 7.3 km / km² (Foulkes and Murray, 2005), and an ongoing survey of County Meath has estimated a hedgerow density of 9.5 km / km² (Smith *et al.*, 2010).

Hedgerows and treelines have the potential to act as refuges for plant and animal species in otherwise hostile environments, such as intensive grassland or cereal fields. They may also act as corridors, allowing the movement of some animals between larger areas of habitat. These linear habitats are described in more detail below.

2.1.1. Buildings and Gardens

This category includes areas of built land, e.g. private dwellings, public premises, roads, car parks and industrial areas, in addition to gardens, lawns, flower beds and ornamental shrubs (BL3). These habitats were most abundant toward the central parts of the Maynooth study area. Areas that are highly built-up, such as large retail units, car parks and roadways, provide little or no biodiversity value and these have been evaluated in their current condition as being of little ecological significance.

Maynooth supports a number of old walls that were generally associated with the remains of medieval castles, stone walls, and remains of old churches. In particular, St Patrick's College, Maynooth supports many old stone walls associated with the site's boundary walls and remains of a medieval castle. Birds, bats, and small mammals often benefit from old stone wall habitats, particularly within an urban and peri-urban setting where other habitat resources are absent. Such walls may also support a diverse flora, in particular a range of fern species.



Plate 2.1 Maynooth Castle: historic buildings in Maynooth with surrounding mature trees offer suitable habitat to animals such as bats *(Photo: K. McCaffrey).*

Old buildings are of particular importance to bats, as they provide roosting space in attics and crevices. Bats require buildings with crevices or small holes into which they can crawl, which tend to be more common in older buildings than in newer ones. In addition, roosting or hibernating bats are sensitive to changes in temperature, and the temperature of old stone buildings often fluctuates less than that of buildings made of more modern materials. Due to declines in bat populations across Europe, all bat species are protected under Irish and EU law. Repointing crevices in old stone walls and bridges with mortar or concrete risks the loss of roosting space for bats, or worse, can entomb any bats that may be hiding within.



Plate 2.2 Building and gardens are a common feature in Maynooth, e.g. St Patrick's College. Maynooth
(Photo: K. McCaffrey).

In most cases, especially the suburban / residential areas, buildings and other hard surfaces coincided with gardens or well-manicured lawns. The majority of these habitat mosaics also supported ornamental shrubs and immature and mature trees. The majority of the private dwellings were often bordered by semi-mature and maturing deciduous trees and shrubs such as hybrid poplars, common birch, Lawson's cypress, copper beech, field maple, Leyland cypress, *Escalonia* etc. Older housing estates established in the 1960's and 1970's supported large public amenity grassland areas, well-developed flower and shrub gardens, and maturing trees planted along pavement margins such as field maple, silver birch, mountain ash and cherry. More recently established housing estates supported public amenity grassland of varying sizes, private lawns, less mature and diverse flower and shrub gardens, and sapling trees, such as silver birch, alder, cherry, and maple.



Plate 2.3 Building, gardens and amenity grassland characterise suburban areas of Maynooth, Castlepark Estate (Photo: K. McCaffrey).

In most cases, especially the suburban / residential areas, buildings and other hard surfaces coincided with gardens or well-manicured lawns. The majority of these habitat mosaics also supported ornamental shrubs and immature and mature trees. The majority of the private dwellings were often bordered by semi-mature and maturing deciduous trees and shrubs such as hybrid poplars, common birch, Lawson's cypress, copper beech, field maple, Leyland cypress, *Escalonia* etc. Older housing estates established in the 1960's and 1970's supported large public amenity grassland areas, well-developed flower and shrub gardens, and maturing trees planted along pavement margins such as field maple, silver birch, mountain ash and cherry. More recently established housing estates supported public amenity grassland of varying sizes, private lawns, less mature and diverse flower and shrub gardens, and sapling trees, such as silver birch, alder, cherry, and maple.

Although the majority of plant species found in estates and suburban gardens are planted, non-native species, these areas can still be of local importance for birds, insects and to a lesser extent small mammals. The more mature estates and suburban houses are of greater benefit, as the larger trees and denser shrubs and garden hedges provide greater cover and foraging opportunities for wildlife. Older flower gardens tend to be more diverse, providing a wider range and longer availability of nectar for butterflies, bees, moths, and other insects. In such circumstances non-native flowering species can often be beneficial for insects, which in turn provide a food source for birds. The housing estates in the south-western area of the Maynooth study area are good examples of established mature houses that are of good local value for biodiversity. Such estates often support a greater range of plant types and structural diversity, which in turn supports a richer diversity of bird species than the newer estates. The value of gardens is further enhanced by the increasingly popular practice of winter feeding of birds. BirdWatch Ireland runs a national survey of garden birds which monitors garden bird numbers and diversity in Ireland.

In Ireland, however, most estates have enclosed / walled gardens preventing the easy movement of small mammals, such as e.g. Hedgehog through the landscape. This fragments the landscape for many Irish mammals and reduces the value of garden habitats. In contrast species such as grey squirrel which can climb can easily access gardens and increasingly feed at garden bird feeders.

The main threat to the ecological interest of buildings and gardens is inappropriate management. Biodiversity can be beautiful, but not always: scruffy, weedy corners of gardens or neglected parts of estates are often of higher ecological interest than well-manicured lawns. Nettle, for example, is a food plant for a number of butterfly species, including Peacock (*Inachis io*) and Small tortoiseshell (*Aglais urticae*). Clearing these unsightly areas removes habitats for wild, weedy plants, like bramble and common ragwort, and the invertebrates and birds they support. Diversifying the structure and composition of gardens, such as replacing lawns with flower beds or flowering shrubs, can enhance local biodiversity. Other threats to the natural heritage of built land and gardens include dumping of household waste and the spread of non-native invasive plants such as Japanese knotweed and butterfly bush.

Another common feature in Maynooth is Old Stone walls (BL1) which add to the character of Maynooth, but can often also support botanically rich communities.



Plate 2.4 Stone walls (BL1) are a common feature in Maynooth (Photo: K. McCaffrey).

Built structures also are prominent features of the Royal Canal ecological corridor, as well as having industrial / architectural heritage in their own right. The waters of the canal also provide suitable foraging habitat for bat species such as Daubenton’s bat (*Myotis dauberntonii*) and Soprano Pipistrelle (*Pipistrellus pygmaeus*). Care must be taken when considering lighting proposals in such areas as a number of bat species can be displaced by lighting.



Plate 2.5 Bridge over the Royal Canal in Maynooth (Photo: K. McCaffrey).

2.1.2. Intensive Agriculture

The outskirts of the Maynooth study area (especially the western and northern outskirts) is dominated by improved agricultural grassland habitat that mostly supports dairying and beef cattle. The majority of these habitats are of little ecological value, particularly the improved grassland pastures that are dominated by perennial rye grass. Most of these habitats are bordered by hedgerows of varying condition that oftentimes provide the only areas of semi-natural habitat within an otherwise intensively managed landscape. (Hedgerows are discussed in further detail in Section 2.1.8 below). Although of limited value for biodiversity, intensive agriculture can provide useful ecosystem services, primarily food production, but also water regulation and carbon sequestration. The most recent threats to these habitats include abandonment and loss to development of e.g. housing estates, industrial estates, and roads. In some cases, grassland can be slightly more species rich and is defined in such cases as being semi-improved grassland.



Plate 2.6 Improved agricultural grassland located on the boundary of the Maynooth study area (Photo K. McCaffrey).



Plate 2.7 An example of buttercup dominated semi-improved agricultural grassland (Photo K. McCaffrey).

2.1.3. Rivers, Wetlands and Ponds

Rivers and linear watercourses within the Maynooth study area include the Lyreen River and a number of its smaller tributaries in addition to the Royal Canal which flows through the centre of the Maynooth study area.

The Lyreen River main channel enters the study area on the south-eastern boundary before continuing to flow in an easterly direction toward St Patrick's College and Maynooth University. As it enters the study area it is bounded by an open landscape dominated by improved grassland habitats. As it enters the grounds of St Patrick's College the watercourse splits to form a millrace and the main channel. Both watercourses are bordered by various treelines and linear woodland blocks. The main channel of the Lyreen was diverted during the construction of John Paul II library in 1982 (Scott Cawley, 2009). Continuing east of St Patrick's College the Lyreen is channelised for a short stretch both upstream and downstream of the Mill Street Bridge. From here it continues to flow in a north-easterly direction and is bordered by improved agricultural grassland, a continuous patch of open scrub on its northern bank and an angling centre on its southern bank. The Lyreen joins the Rye Water on the north-eastern boundary of the study area, immediately north of the artificial ponds at Mariavilla. Instream aquatic plant species within the Lyreen River were restricted to the more open stretches of the river in the townland of Maynooth South. These included localised abundances of emergent macrophytes such as branched bur-reed, reed canary-grass and marsh willowherb.

Wetlands are not common in Maynooth. The largest wetland area is situated at Mariavilla near the north-eastern boundary of the study area which supports an artificially constructed pond (FL8) (that is probably lined); this is fringed and supports islands of tall herbaceous vegetation dominated by common reed (FS1). There is no evidence of this ponded structure on the 1st or 2nd edition OS mapping. Planning registry records show that permission was granted by Kildare County Council in 1999 for the provision of a 'put and take' fishery under Plan Ref. 1434/98.



Plate 2.8 Artificial ponds at Mariavilla, Maynooth (Photo K. McCaffrey).

Smaller artificial lakes and ponds occur within housing estates created to serve as water features or attenuation measures. Some of these areas support fringing aquatic plant growth such as common reed and bulrush with fringing trees and shrubs such as willow and alder. Building new ponds with an eye to habitat creation for wildlife can be beneficial, particularly in localities where wetlands are rare. Wildlife ponds have the potential to act as stepping stones, aiding the movement of wetland birds, plants, and invertebrates between larger wetland areas. Guidance for building wildlife ponds is widely available on the internet, such as on the Ulster Wildlife Trust website⁵. Natural wetlands are almost always better for biodiversity, however, and thus replacing one lost to development with a created pond is usually not equal compensation.

⁵ www.ulsterwildlifetrust.org

The rivers and wetlands within Maynooth are of high quality for nature conservation as much of County Kildare is dominated by drier habitats of dry ground; hence freshwater and wetland habitats serve to increase the range of wildlife that can live in a given area. For example, they provide very important refuges for common waterbirds such as Grey Heron (*Ardea cinerea*), Moorhen (*Gallinula chloropus*), Mallard (*Anas platyrhynchos*) and Mute Swan (*Cygnus olor*). Freshwater habitats and wetlands are important for insects that spend at least part of their lives in water, such as dragonflies, damselflies, and mayflies. Plants that favour wetlands or damp ground provide food for a wider range of terrestrial insects, including butterflies and shield bugs. The rivers and their adjoining habitats also provide very good examples of green infrastructure or ecological corridors within the Maynooth study area and contribute significantly to the movement of plants and animals through the town. Their role as Green Infrastructure is discussed in further detail in Chapter 3.

Another Significant wetland feature which also represents an important corridor through the landscape of Maynooth is the Royal Canal. This provides both an aquatic and terrestrial corridor through Maynooth and links with the wider landscape.



Plate 2.9 Royal Canal (Photo K. McCaffrey).



Plate 2.10 Lyreen River downstream of Mill Street Bridge (Photo K. McCaffrey).



Plate 2.11 River Rye (Photo K. McCaffrey).



Plate 2.12 Small unnamed stream with heavily overgrown banks (Photo K. McCaffrey).

Threats to watercourses include the spread of invasive exotics, particularly Indian balsam and Japanese knotweed. Other threats include littering or dumping, deterioration in water quality, drainage, drying out and / or siltation.

2.1.4. Semi-natural Grassland

A large proportion of the semi-natural grassland habitats in the Maynooth study area are dry meadows and grassy verges (GS2). Many of these areas are scattered throughout the study area and are generally associated with unmanaged or unmaintained areas. These habitats are most commonly found as linear strips of vegetation bordering roadsides and railways but also occur where areas of improved grassland have been left unmanaged for many years. In Maynooth these habitats tend to support an assemblage of coarse tussocky grasses such as cock's-foot, false oat-grass, couch grass and timothy. Depending on the levels of past management, some areas supported species such as silverweed, common nettle, common vetch, common hogweed, and creeping thistle. Where the grassland habitat was left unmanaged for a longer duration then these area often supported mosaic with bramble dominated scrub. Coarse grasses can support a range of butterfly species, such as speckled wood (*Pararge aegeria*), meadow brown (*Maniola jurtina*) and ringlet (*Aphantopus hyperantus*). Grassy verges along the railway or on the margins of the many roadways (such as that north of the R148, at Laraghbryan east) have the potential, if managed correctly, to support a range of species and to act as wildlife habitat and corridors for smaller animals. Semi-natural grassland is also well represented on roadside verges, which also offer an important resource to pollinators.

The parcels of semi-natural grasslands within Maynooth study area are of notable nature conservation value. These are semi-natural habitat types in a landscape dominated by large tracts of improved grassland, buildings, and other artificial surfaces.

Threats to semi-natural grassland include agricultural improvement through fertilising, infilling, draining, and reseeded. In rural areas potential threats to semi-natural grassland include over-grazing or excessive mowing, or conversely abandonment, which allows scrub encroachment. Similarly, grazing or mowing at inappropriate times of the year can reduce plant diversity if they are not allowed to flower and go to seed. In more urban situations, improvement or tidying through herbicide use, fertilisation, reseeded or mowing excessively or at the wrong times of year can result in the loss of biodiversity value of grassy verges.



Plate 2.13 Example of dry meadows and grassy verges (GS2) on roadside verge (Photo K. McCaffrey).



Plate 2.14 Areas of rough grassland surrounding Lyreen wetlands (Photo K. McCaffrey).



Plate 2.15 Very large areas of semi-natural grassland also occur around Maynooth Castle and St Patrick's College, Maynooth grounds – these offer significant opportunities for habitat enhancement (Photo K. McCaffrey).

2.1.5. Amenity Grassland

Like improved agricultural grassland, areas of improved amenity grassland (GA2) are of limited ecological value. This category includes the larger public and private lawns found in housing estates and institutional grounds (strictly speaking, smaller lawns are also included in this category, but we have included most small lawns in the buildings and gardens category, as due to their smaller size they form a more intimate mosaic with buildings and flower beds). They are dominated by a small number of grasses, mainly perennial ryegrass, and red fescue and support only a limited range of broadleaved weed species, such as dandelions, white clover, and daisies. Amenity grasslands are maintained by regular mowing with frequent use of fertilisers and herbicides.

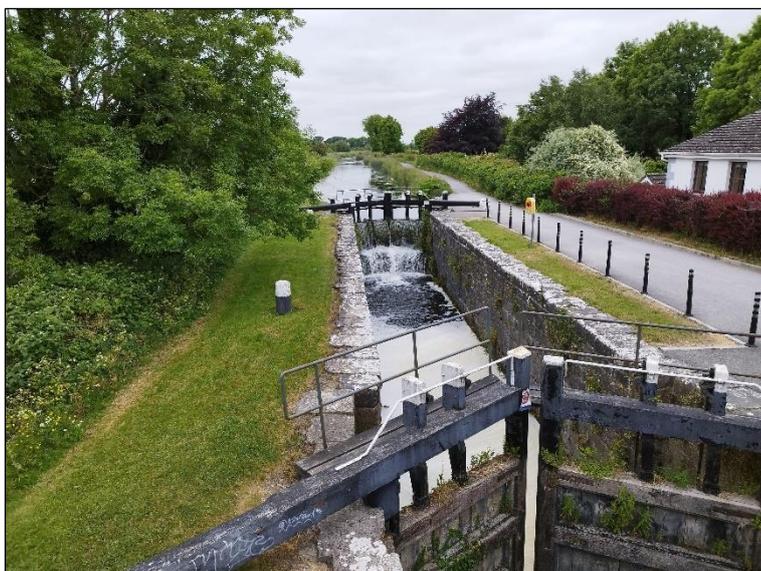
Some amenity grasslands may be regularly reseeded, and conversion to improved amenity grassland is a threat to more diverse semi-natural habitats, especially dry grassy verges. Inappropriate disposal of grass cuttings can be an issue where suburban gardens adjoin areas of semi-natural habitat.



Plate 2.16 Areas of amenity grassland dominate suburban estates in Maynooth *(Photo K. McCaffrey).*



Plate 2.17 Areas of amenity grassland on pitches at Maynooth GAA *(Photo K. McCaffrey).*



Plates 2.18 Areas of amenity grassland along the Royal Canal *(Photo K. McCaffrey).*

2.1.6. Woodlands and Scrub

Woodlands and scrub within the Maynooth study area are often associated with established public institutions such as Maynooth University, St Patrick’s College and along the larger watercourses such as the Lyreen River and the Royal Canal. In other areas they occur as small, isolated pockets associated with private dwellings and public amenity areas.

The most abundant woodland types within the study area were mixed broadleaved woodland and mixed broadleaved / conifer woodland, with a large proportion of non-native tree species comprising the canopy. The most common broadleaved trees in Maynooth’s woodlands included beech, sycamore, lime, and ash, and some of the most common conifers were Scots pine, Sitka spruce, Lawson’s cypress and Monterey cypress. The largest of these mixed non-native woodlands is located within the grounds of St Patrick’s College / Maynooth University where in some instances closely planted and now mature treelines of lime have closed in to form mixed broadleaved woodland.

Scattered trees and parkland (WD5) is a habitat type characterised by mature deciduous trees in and around areas of amenity grassland, where they do not form a closed woodland canopy. Parkland in Maynooth generally occurs in larger private residences, older housing estates and public institutions, such as schools, which supported large gardens with mature trees. Non-native tree species, such as lime, horse chestnut, sycamore and beech, are characteristic of parklands.

Small areas of willow woodland also form part of the wetland complex at Lyreen.



Plate 2.19 Small areas of willow woodland which forms part of the wetland complex at Lyreen (in background) (Photo K. McCaffrey).



Plate 2.20 Area of young Ash woodland in St Patrick's College campus, showing signs of ash-die-back
(Photo K. McCaffrey).



Plate 2.21 An orchard in the grounds of St Patrick's College, which offers woodland cover and represents an important pollinator resource (Photo K. McCaffrey).

Scrub (WS1) was identified in isolated parcels throughout the Maynooth study area. Due to the intensive nature of the farming practices and the dominance of urban and suburban habitats, scrub in the Maynooth study area is notably reduced in area relative to many other parts of Ireland. In the main, the scrub habitats occur as isolated pockets on areas of abandoned or unmanaged grasslands that have been colonised by bramble. A large area of scrub occurs on steeply sloping terrain on the northern bank of the Lyreen River. This was mostly open scrub supporting a diverse cover and abundance of species including bramble, hawthorn, blackthorn, elder with semi-mature sycamore and ash.

Overall, the pockets of woodland and scrub are of considerable ecological importance in the Maynooth study area. Even those dominated by non-native species provide valuable cover and shelter for mammals and birds and provide habitat for the more common woodland plant and fungi species. These habitats, particularly those

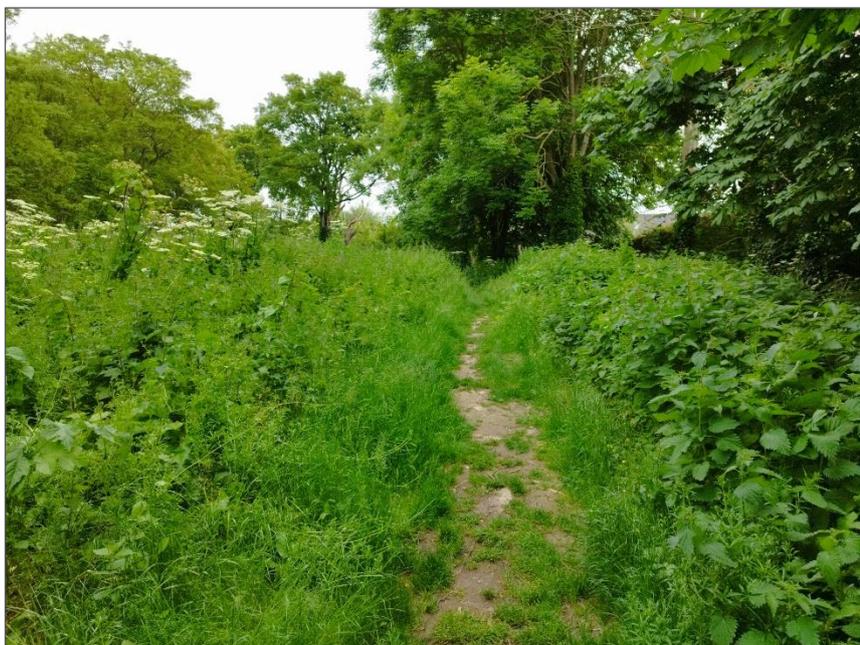
that fringe the Royal Canal and the Lyreen River, further enhance the ability of these watercourses to act as ecological corridors. This will be discussed in greater detail in Chapter 3.

Threats to the areas of woodland include invasive species, which can impact on woodland’s ability to regenerate. A North American grey squirrel was recorded in the woodland habitats in St Patrick’s College during the habitat survey. This species has out-competed the native Irish red squirrel in many areas of lowland Ireland east of the Shannon, and damages young trees by bark stripping (Carey *et al.*, 2007).

Other threats to woodland and scrub include dumping of household waste and the potential of future clearance / removal of scrublands for the purposes of agricultural improvement.



Plates 2.22 Small areas of scrub are dotted around the landscape (Photo K. McCaffrey).



Plates 2.23 Nettle, briar and umbellifer dominated narrow bands of scrub bordering an informal path (Photo K. McCaffrey).



Plates 2.24 Small areas of scrub (bramble, elder, sycamore etc.) also line the canal and towpath in places
(Photo K. McCaffrey).

2.1.7. Disturbed Ground

The disturbed ground habitat group includes areas that have been disturbed in the recent past by human activity, such as construction. Large areas of bare soil are typical of recently disturbed ground. Older patches support a diverse community of weeds and other “fugitive” plant species that need disturbed ground for their seeds to germinate. Typical plants of disturbed ground include thistles, docks, annual meadow grass, common ragwort, charlock, poppies, and scarlet pimpernel. The diversity of flowering plants means that recolonising disturbed ground habitats can be important habitats for insects, such as butterflies and bees. Patches of bare soil are important as basking areas for invertebrates and for burrowing insects, such as solitary bees.

If left alone, patches of disturbed ground will develop into semi-natural grassland and scrub. However, disturbed ground associated with construction is often converted into ecologically dull amenity grassland when construction activities are finished. Many area of bare ground can also support a range of non-native species including invasive species including Japanese knotweed, butterfly bush, winter heliotrope.



Plate 2.25 Disturbed ground which appears to have been cleared for development, with signs of it being recolonised (Photo: K. McCaffrey).

2.1.8. Hedgerows and Treelines

Hedgerows are most common in the outer sections of the study area bordering habitats utilised for intensive agricultural purposes. In most other areas hedges have been removed. The structure of extant hedgerows varies considerably and is strongly influenced by past or ongoing management practices, such as cutting, replanting, and fencing. Shrub species composition tends to vary, but the more commonly recorded species include hawthorn, elder and blackthorn. Frequently occurring tree species include ash, sycamore, beech, oak, and elm. In many instances, hedgerows have been left unmanaged over the long term, and the maturation of the trees and shrubs results in a transition from a tightly planted hedgerow to a gappy hedgerow and treeline structure. Other hedgerows of better structural condition support a continuous line of tightly planted and stock proof shrub species, mainly hawthorn. However, hedgerows exhibiting this structure were greatly reduced or entirely absent from some areas.

In many instances, hedgerows provide valuable conduits and corridors for small mammals and other animals throughout the Maynooth study area. This is particularly the case with the hedgerow network located to the north of the townland of Laraghbryan East, which provide viable corridors to the more open rural habitats to the north. Similarly, the extensive field network situated to the north and south of the treelined avenue leading to Carton Demesne provides viable corridors for mammals and birds from this locality to the wider countryside. Many bat species in particular use hedgerows and treelines as commuting routes to guide them to and from roosts and feeding areas.

Hedgerows are also of significant habitat value themselves, particularly in places where woodland is uncommon. Well-developed hedgerows can support a range of plant species typical of open woodland and woodland edges, including herb-robert, primrose and false wood brome. Dense hedgerows provide important nesting space for birds, and hedgerow fruits, including elder, bramble and hawthorn, are an important food resource. Some degree of grazing at the base of the hedgerow may be beneficial by keeping competitive species, such as bramble, in check and creating patches of disturbed soil for solitary bee nesting. Hedgerows and hedge banks provide space for burrows for mice and rabbits, and entrances to badger setts are frequently hidden in hedgerows. The protection of buffer zones / headlands along the base of hedges should be encouraged to promote biodiversity.

Threats to hedgerows include lack of long term management, fragmentation by construction and infrastructure development and removal.

Treelines (a single or narrow row of trees lining roads or acting as shelter belts) are found throughout the study areas both in the rural outskirts and within the built-up areas nearer the town centres. Maynooth supports notable treeline habitats, particularly the mature lime and beech treelines associated with St Patrick's College, Maynooth and that treelined avenue leading to the periphery of Carton Demesne from Main Street Maynooth. Treelines fringing farmhouses and other private dwellings within the peripheral areas comprise ash, Scots pine or occasionally hybrid black poplars.



Plate 2.26 Heavily box-cut hedgerow characterise many areas of the agricultural landscape close to Maynooth *(Photo: K. McCaffrey)*.

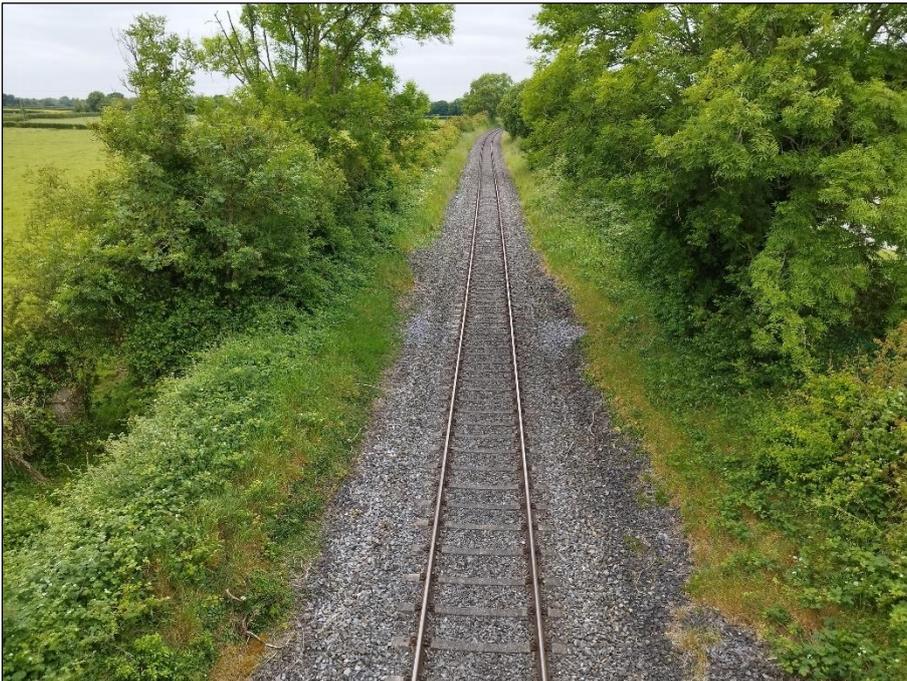


Plate 2.27 Hedges / treelines also line the rail corridor *(Photo: K. McCaffrey)*.



Plate 2.28 Example of diverse hedge around patch of semi-natural grassland (Photo: K. McCaffrey).



Plate 2.29 Trees also characterise the built landscape of Maynooth (Photo: K. McCaffrey).



Plate 2.30 Areas of Parkland are also common in the Maynooth landscape (Photo: K. McCaffrey).



Plate 2.31 Mature treeline / parkland in Maynooth Castle / St Patrick's College, Maynooth grounds (Photo: K. McCaffrey).



Plate 2.32 Trees represent an important part of the landscaping of suburban areas (Photo: K. McCaffrey).



Plate 2.33 Example of urban treeline (Photo: K. McCaffrey).



Plate 2.34 Mature roadside treelines (Photo: K. McCaffrey).

2.2. Overview of lands in the Maynooth Environs, County Meath

The study site is located within an area of expansive improved agricultural grassland (GA1) to the north of Maynooth town, north of the Rye Water watercourse and west of the R157 (Maynooth – Dunboyne) Regional Road. East of the R157, the study area also includes mixed broadleaved woodland (WD1) and overgrown / unmanaged gardens that have developed into mixed broadleaved / conifer woodland (WD2) / scrub (WS1) mosaic on the western margins of Carton Demesne.

The improved pastoral lands west of the R157 are utilised for sheep, cattle, and horse grazing. The lands are free draining and comprise thin soils and exhibited no evidence of standing water. Field boundaries comprise low earth banks (BL2) with overgrown and unmanaged hedgerows (WL1) and treelines (WL2). The woodlands on the western margins of Carton Demesne are unmanaged comprising a mosaic of open and close canopy woodland with maturing non-native broadleaved and conifer trees. These woodlands supported localised, but well-established stands of Japanese knotweed (*Reynoutria japonica*), a high impact alien invasive species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. No. 477 of 2011) Regulation S.I. 477 (Ireland).

2.2.1. Improved Agricultural Grassland (GA1)

The lands to the west of the R157 road and north of the Rye Water River support extensive areas of improved agricultural grassland which primarily supports grazing horses, sheep and to the south of the local road, cattle. This is a species poor habitat and was closely grazed or recently mown during the site walkover survey. Plant species composition includes perennial rye grass (*Lolium perenne*), Yorkshire fog (*Holcus lanatus*), common bent (*Agrostis capillaris*), creeping bent (*Agrostis stolonifera*), creeping buttercup (*Ranunculus repens*), broadleaved dock (*Rumex obtusifolius*) white clover (*Trifolium repens*), creeping thistle (*Cirsium arvense*) and ragwort (*Jacobaea vulgaris*). The improved grasslands to the south of the local road support areas of semi-improved agricultural grassland, where the ongoing management through routine fertiliser application and reseeding has not occurred. These areas supports a reduction in the cover and abundance of the aforementioned agricultural herbs and perennial rye grass and supports frequent to locally abundant crested dog's tail (*Cynosurus cristatus*), common bent (*Agrostis capillaris*) and sweet vernal grass (*Anthoxanthum odoratum*).

The lands to the east of the R157 road within the grounds Carton Demesne, comprise rough improved grassland habitat that exhibit signs of annual or biannual management through mowing. Plant species composition includes locally frequent cock's-foot (*Dactylis glomerata*), creeping thistle, false oat grass (*Arrhenatherum elatius*) in addition to the aforementioned grass and broadleaved herb species.



Plate 2.35 Expansive improved agricultural grassland located north of the local road serving the Moygaddy lands in the Maynooth Environs (Photo: E. Delaney).

2.2.2. Dry Meadows and Grassy Verge Grassland (GS2)

Discrete and localised sections of this habitat occur along the roadside margins of the R157 road. These habitats typically occur where semi-natural grassland and semi-improved grassland habitats have remained unmanaged through grazing and mowing. This has resulted in the proliferation of stout grasses and the reduction in broadleaved herb cover. Plant species composition included locally abundant Yorkshire fog (*Holcus lanatus*) in addition to common bent, false oat grass (*Arrhenatherum elatius*), cock'-foot (*Dactylis glomerata*), timothy (*Phleum pratense*), red fescue, ribwort plantain, sweet vernal grass, creeping thistle (*Cirsium arvense*), meadow buttercup (*Ranunculus acris*), red clover (*Trifolium pratense*), crested dog's tail (*Cynosurus cristatus*), white clover and locally frequent cat's ear (*Hypochaeris radicata*). The outer fringes of the improved grassland area within the Carton demesne dwelling supports localised sections of this habitat developing upon uncut or unmanaged areas.

2.2.3. Scrub (WS1)

Scrub occurs in mosaic with the mixed broadleaved / conifer woodland (WD2) habitat within the Carton House demesne area. This scrub has developed following the lack of ongoing habitat management resulting in the proliferation of localised abundances of bramble (*Rubus fruticosus* agg.) and gorse (*Ulex europaeus*) scrub. This scrub has established on the margins of shrubberies and within the footprint of areas previously maintained as amenity grassland. A small pocket of mixed scrub is also located near the western boundary of the study area, south of the local road serving the Moygaddy townland and on the northern fringes of the Rye Water watercourse. Plant species composition in this area includes spreading gorse in addition to hawthorn (*Crataegus monogyna*), blackthorn (*Prunus spinosa*) and bramble.

2.2.4. Mixed Broadleaved Woodland (WD1)

This habitat occurs as localised woodland copses around the margins of Moygaddy Castle and the farmhouse located immediately north. The farmhouse supports a fringing copse of maturing and standard beech (*Fagus sylvatica*), copper beech (*Fagus sylvatica atropurpurea*), downy birch (*Betula pubescens*) and lime (*Tilia x europaea*) trees. This woodland is poorly structured with an open understorey and underdeveloped ground layer. An area of young broadleaved plantation woodland is located immediately south of Moygaddy Castle. This is a densely planted woodland comprising pedunculate oak (*Quercus robur*), sycamore (*Acer pseudoplatanus*) and ash (*Fraxinus excelsior*). The understorey and ground layer is not yet well established and supports abundant leaf litter with occasional nettle (*Urtica dioica*), herb Robert (*Geranium robertianum*), ivy (*Hedera helix*), wood avens (*Geum urbanum*). The plantation supports some remnant maturing pedunculate oak trees associated with the demesne dwelling.

A large block of mixed broadleaved woodland is located east of the R157 road on the north-western margins of Carton House demesne. The northernmost section of the woodland is poorly structured as the woodland canopy is not fully formed. Plant species composition includes tall maturing sycamore with occasional tall Sitka spruce (*Picea sitchensis*) and fir (*Abies* spp.) trees. The shrub and ground layer is poorly structured with localised abundances of bramble scrub in addition to occasional harts tongue (*Asplenium scolopendrium*), male fern (*Dryopteris filix-mas*), pendulous sedge (*Carex pendula*), ivy, ground ivy (*Glechoma hederacea*), herb Robert, wood avens, false wood brome (*Brachypodium sylvaticum*), creeping buttercup (*Ranunculus repens*), nipplewort (*Lapsana communis*) and remote sedge (*Carex remota*). Rhododendron (*Rhododendron ponticum*) occurs locally throughout the woodland shrub layer. Along the western and north-western roadside boundary, the woodland's canopy is fully formed, comprising maturing ash (*Fraxinus excelsior*), beech and sycamore and a reduction of conifer tree cover and reductions of bramble abundance in the shrub and ground layers. The southernmost area of the woodland block within the Carton House demesne supports localised copses of broadleaved woodland with semi-mature sycamore and pedunculate oak and with false wood brome, bramble, male fern and herb Robert in the understorey.



Plate 2.36 Young mixed broadleaved plantation woodland located south of the local road serving the Moygaddy Lands in the Maynooth Environs (Photo: E. Delaney).

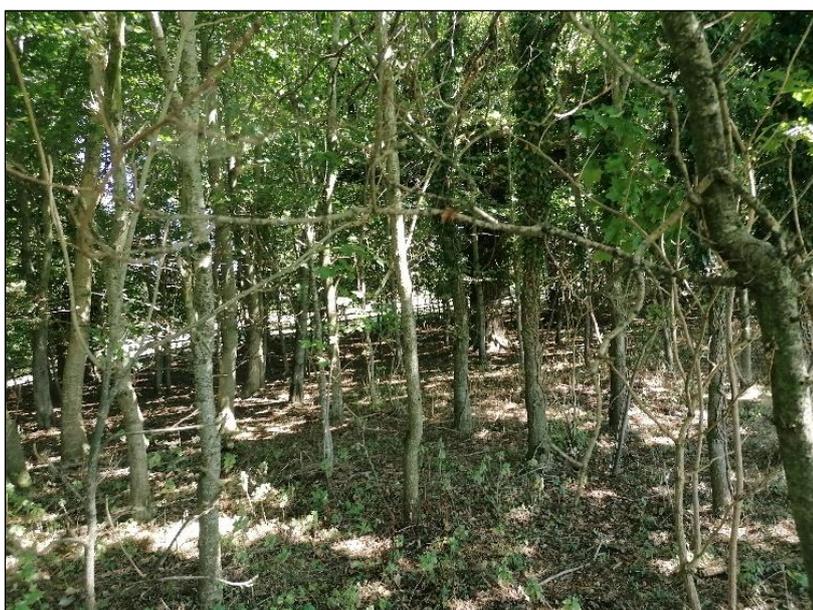


Plate 2.37 Open understorey of mixed broadleaved woodland north-west of Carton House (Photo: E. Delaney).

2.2.5. Mixed Broadleaved / Conifer Woodland (WD2)

The southernmost section of the Carton House demesne woodland includes unmanaged woodland, shrubbery, and gardens. These areas have remained unmanaged for many years which has resulted in the proliferation of bramble scrub throughout the amenity grassland and areas of shrubbery. This habitat supports localised areas of maturing conifer and broadleaved trees including Sitka spruce, Douglas fir (*Pseudotsuga menziesii*), sycamore, pedunculate oak, beech, Lawson's cypress (*Chamaecyparis lawsoniana*), downy birch and horse chestnut (*Aesculus hippocastanum*). The woodland supports localised pockets of broadleaved woodland with beech, ash standard pedunculate oak trees. The understorey and adjoining areas of scrub supports localised abundances of rhododendron, some of which has been recently cleared, in addition to spreading bramble scrub.



Plate 2.38 Bramble scrub and mixed broadleaved conifer woodland west of Carton House (Photo: E. Delaney).

2.2.6. Scattered Trees and Parkland (WD5)

This habitat is associated within the grounds of Moygaddy Castle and includes maturing pedunculate oak and sycamore trees on improved grassland.

2.2.7. Depositing Lowland Rivers (FW2)

The study area is drained by two tributaries of the Rye Water watercourse. The lands to the west of the R157 are drained by an ephemeral watercourse, identified as the Rye Water_030 on EPA mapping, also known as the Blackhall Little watercourse (IE_EA_09R010400). This watercourse was dry during the site walkover survey undertaken in August 2022. This watercourse is fringed by treelines and, during the site walkover survey, supported a dried out substrate with rounded cobbles, boulders, and fine aggregates.

The eastern fringes of the demesne woodland within Carton House are fringed by another tributary of the Rye Water watercourse, identified as the Brownrath stream (IE_EA_09R010600) on EPA mapping. This is a narrow channelised watercourse between 2.0m and 2.5 wide. The watercourse supports fast glide and intermittent riffle with water average depths of 25cm. Plant species coverage within the watercourse was mostly absent due to heavy shading by the nearby demesne woodland habitats.



Plate 2.39 Rye Water_040 watercourse located along the western fringes of the mixed broadleaved woodland west of Carton House (Photo: E. Delaney).

2.2.8. Hedgerows (WL1)

Hedgerow habitats are located within the western half of the study area along the field and roadside boundaries and along the site boundary with the Rye Water watercourse. The hedgerows located along the local road serving the Moygaddy townland are maintained to 2.5m in height and comprise hawthorn, blackthorn and occasional dog rose and hazel. These hedgerows are overtopped by young ash trees. The hedgerow structure is typically good, with localised gaps developing along the hedgerow ground layer. The hedgerow fringing the northern bank of the Rye Water Valley is overgrown, unmanaged and gappy and supports hawthorn and hazel (*Corylus avellana*) as the primary shrub components, in addition to occasional elder (*Sambucus nigra*) and locally frequent to occasional bramble. The hedgerow is routinely overtopped by semi-mature pedunculate oak trees which in turn support localised abundances of ivy cover on the tree boles. The hedgerow along the western margins of the local road, north of Moygaddy Castle supports a mixed hedgerow with semi-mature ash trees, overgrown and spreading hawthorn and bramble in addition to occasional young sycamore trees and dog rose (*Rosa canina* agg.). The north-western fringes of the R157 also supports a mixed hedgerow habitat with hawthorn and blackthorn (*Prunus spinosa*), young ash trees exhibiting ash dieback disease in addition to sycamore and beech and locally abundant bramble and hedge bindweed (*Calystegia sepium*). This hedgerow has been topped in recent times, presumably as part of roadside verge maintenance.



Plate 2.40 Maintained hawthorn hedgerow located underneath an ESB overhead line (Photo: E. Delaney).



Plate 2.41 Local road with adjoining hedgerows serving the Moygaddy Lands (Photo: E. Delaney).

2.2.9. Treelines (WL2)

The improved pastoral lands located to the west of the R157 road and north and south of the local road serving the Moygaddy townland support extensive coverage of maturing treeline habitats. Treelines have been established around Moygaddy Castle and the farmhouse to the north. A substantive double sided treeline fringes the Rye Water_030 watercourse to the north of the farmhouse. This treeline comprises maturing double sided treelines with ash, crack willow (*Salix fragilis*), occasional Sitka spruce and larch (*Larix* sp.) and underlying elder and hawthorn. The local road east of Moygaddy Castle is lined on either side by a maturing treeline with lime, sycamore, grey willow (*Salix cinerea*) and occasional ash and with underlying hawthorn, elder, holly (*Ilex aquifolium*), blackthorn, dog rose and bramble. The pastoral lands located north and south of the local road serving the Moygaddy townland are mostly bound by semi-mature treelines. In many instances, these treelines have formed from unmanaged hedgerow habitats. Plant species composition includes semi-mature ash trees, overtopping hawthorn shrubs, with occasional elder, holly, blackthorn and hazel. Some treelines are adjoined by shallow dry ditches with localised occurrences of nettle and bramble growth in addition to cleavers (*Galium aparine*) and herb Robert.



Plate 2.42 Local road serving the Moygaddy townland with adjoining treelines (Photo: E. Delaney).

2.2.10. Buildings and Artificial Surfaces (BL3)

This habitat includes existing local access roads, tracks and regional road and associated buildings and outbuildings within the study area. These habitats support little to no plant species cover.

2.2.11. Invasive Plants

The margins of the woodland habitats within the grounds of Carton Demesne support localised but well-established stands of Japanese knotweed (*Reynoutria japonica*). The northernmost boundary of Carton House demesne supports a disparate, spreading population of individual Japanese knotweed plants immediately south of the roadside stone wall, continuing east to west for 30m and extending as individual plants 20m south into the woodland.

Two more long established stands are located further south on the margins of the mixed broadleaved woodland. These are large stands to 2.5m height, ca. 5.0m wide on the woodland edge. Another series of Japanese knotweed stands are located to the south-east along a woodland ride / track margins. These are also long-established stands to 3.0m height, 7-8m long paralleling the woodland ride and ca. 4m deep into the woodland understorey. The southernmost section of the woodland also supports another large pocket of Japanese knotweed within areas of scrub and unmanaged shrubbery. The locations of these Japanese knotweed populations are presented in Figure 3.2 below.

In addition to Japanese knotweed, the demesne woodland areas within Carton House support localised abundances of rhododendron (*Rhododendron ponticum*) in the woodland understorey.



Plate 2.43 Japanese knotweed located on the southern verge of mixed broadleaved woodland (Photo: E. Delaney).



Plate 2.44 Japanese knotweed located within the unmanaged gardens / mixed broadleaved conifer woodland west of Carton House (*Photo: E. Delaney*).

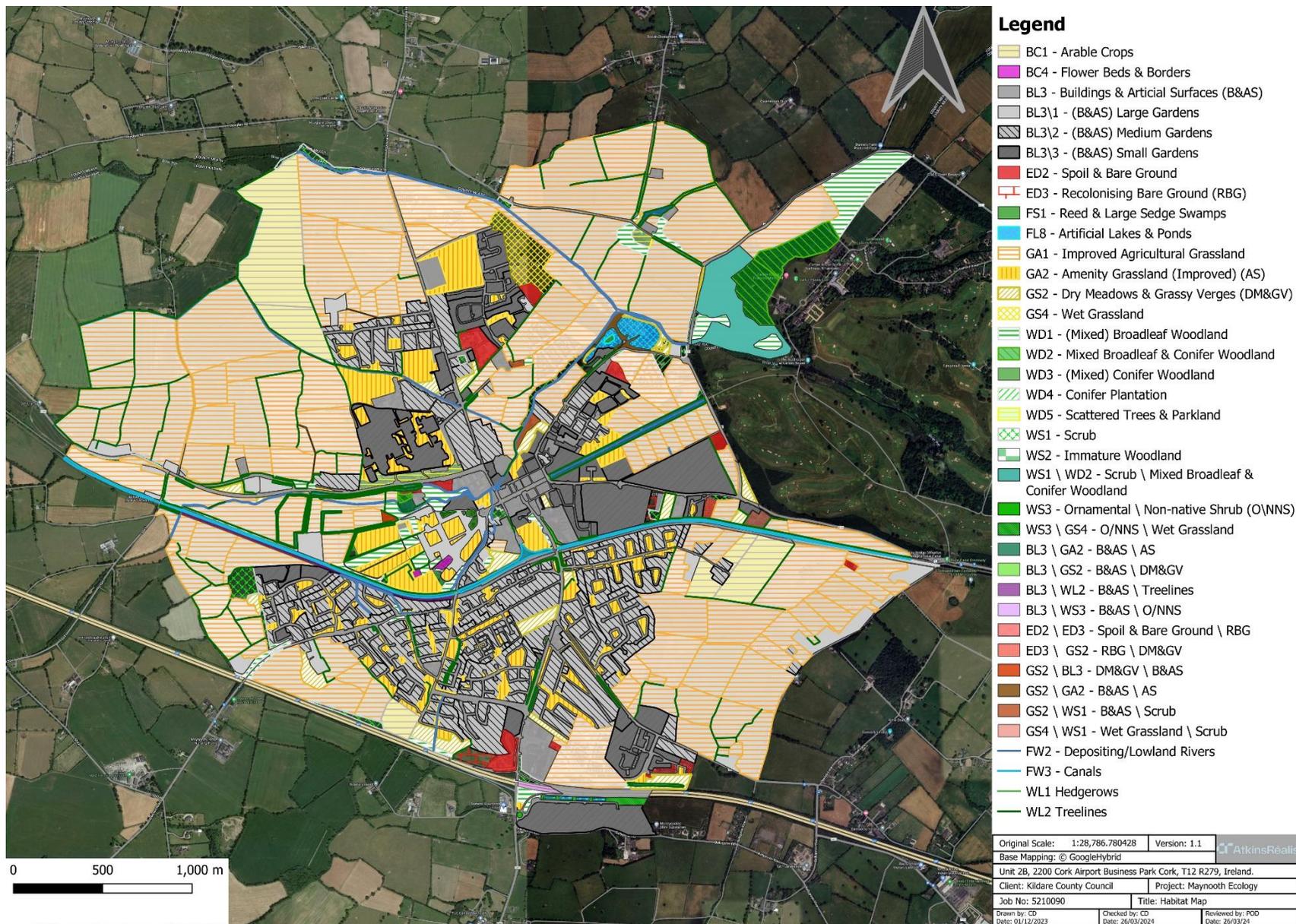


Figure 2.1 Habitat Map for the Maynooth Study Area

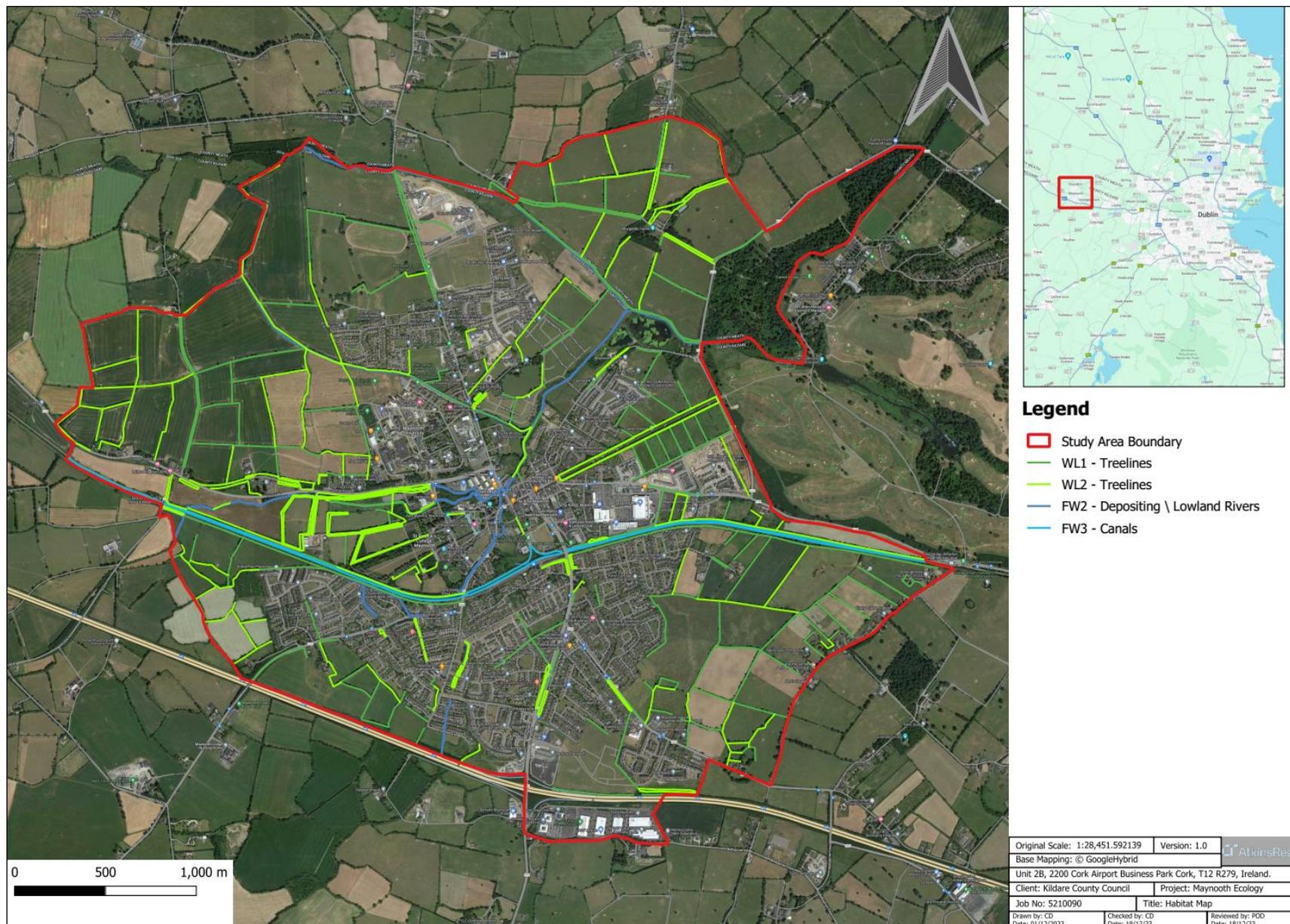


Figure 2.2 Linear woodland (hedges and treelines) within the Maynooth Study Area

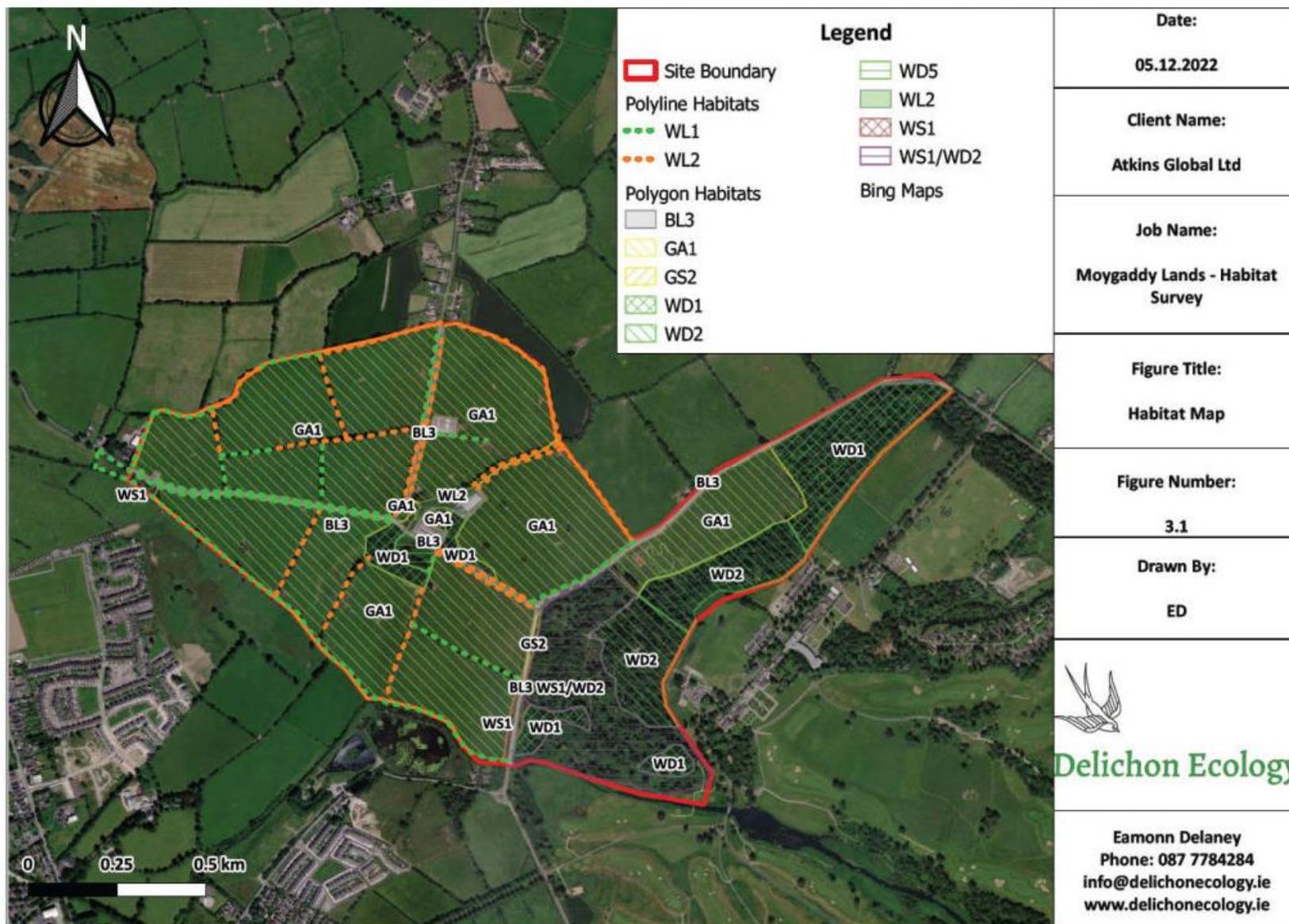


Figure 2.3 Habitat Map for lands in Maynooth Environs (Moygaddy, County Meath).

3. Green Infrastructure

3.1. Defining Green Infrastructure in County Kildare

Central to the concept of Green Infrastructure is multi-functionality: i.e. the provision of a number of ecosystem services. Not all pieces of Green Infrastructure perform the same functions, however, and not all are of equal value. The grassy strip between a footpath and the road surface provides some water regulation services by providing a green space for excess water to soak into, and it also provides a very limited habitat for plants and insects. On the other hand, a riparian wetland would have a much greater capacity to absorb water and would support a much greater range of biodiversity. In order to be useful, any project identifying Green Infrastructure must recognise these differences in value and distinguish what are the most important components. This was our main objective and challenge in preparing this report.

We initially looked at habitats that we evaluated as being of Low Local importance for nature conservation or greater. However, this resulted in too many areas being identified as potential Green Infrastructure to be useful. We then looked at habitats of High Local importance or greater, but this resulted in too few areas identified and also overlooked the other ecosystem services provided by Green Infrastructure. It was decided to use a phased approach using Medium Local importance habitats as a starting point and then add other habitats and habitat complexes that provided important ecosystem services or acted as ecological corridors or stepping stones. These areas were identified as key Green Infrastructure, and these are named and discussed in more detail in Section 3.2 below.



Plate 3.1 Royal Canal near Maynooth Train Station (Photo: K. McCaffrey).

The criteria we used for identifying key Green Infrastructure were: -

- Habitats of Medium Local conservation value or greater
- Adjacent habitats of lower conservation value that together form a coherent habitat complex⁶ or that buffer the higher importance areas

⁶ A coherent habitat complex for the purpose of this study is a group of habitats united by one or more common ecosystem or management features. Examples include woodland, scrub and hedgerow forming a wooded habitat complex; wet woodland, marsh and wet grassland forming a wetland complex; or scrub, semi-natural grassland and abandoned agricultural grassland forming a complex of habitats with dense vegetation managed under low intensity.

- Habitats of Low Local conservation value that perform another significant ecosystem service, such as amenity, water regulation or carbon sequestration
- Habitat corridors or stepping stones of Low Local conservation value in an area surrounded by and dominated by habitats of negligible ecological value

In addition to the key Green Infrastructure areas, two other types of Green Infrastructure that are of less ecological importance were also mapped: namely agricultural land (Figure 4.2) and amenity grasslands (Figure 4.4). Agricultural land is mapped for its food production value. Amenity grassland can be of significant recreational and passive amenity value and, in urban situations where hard surfaces are abundant, can assist with surface water drainage; it may also be appropriate to manage some amenity grasslands or parts of them to improve their benefits for biodiversity.

3.2. Maynooth's Green Infrastructure

3.2.1. Royal Canal

The Royal Canal flows through the centre of the Maynooth study area. The Royal Canal links the River Shannon at Termonbarry County Longford to the River Liffey in Dublin City Centre where it discharges at Sir John Rogerson's Quay. It is designated as a proposed Natural Heritage Area (site code: 2103) due to the collective diversity of the species it supports in addition to its presence in many areas where large tracts of improved grassland dominates. The canal is a man-made watercourse initially created and utilised to transport raw materials and commodities. The Royal Canal was closed to navigation in 1961 with those parts of the canal west of Mullingar allowed to become silted and encroached with vegetation. Restoration of the canal began in 1988 and it is now used for navigational and recreational purposes (NPWS, 1995).

The Royal Canal enters the Maynooth study area along its south-western boundary at the townland of Maynooth South. It is bordered to the south by the Dublin-Sligo railway line and by lands within the ownership of St Patrick's College, Maynooth to the north up as far as Maynooth Harbour. The northern margin of the Canal supports a towpath fringing by strips of amenity grassland regularly used for recreational purposes. This towpath backs onto a strip of linear woodland associated with St Patrick's College comprising tall thin-boled ash, sycamore, and horse chestnut with abundant ivy on the ground layer. The southern margins of the canal backs onto the railway line and is separated by a mounded verge comprising tussocky grasses and bramble dominated scrub with scattered hawthorn and grey willow trees.

The main channel of the Royal Canal from where it enters the western part of the study area to Maynooth Harbour and the train station is fringed by marginal growth in the form of locally abundant branched bur-reed and reed sweet-grass, frequent reed canary-grass and the occasional common club-rush, wild angelica, and meadowsweet. Instream aquatic species were largely reduced in many areas save for occasional to frequent yellow water-lily. One exception includes the aquatic plant species spiked water-milfoil which is abundant near the R408 road bridge where water levels are lower. Continuing east from Maynooth Harbour and the train station, the canal is again fringed by a towpath and associated amenity grassland strips to the north in addition to treelines located both north and south of the canal. Portions of the amenity grassland are of calcareous nature including species such as lady's bedstraw and marjoram. With the correct management, these areas could be developed into calcareous grassland.

This Royal Canal provides considerable ecosystem services within a town that supports high levels of human activity. Not only is it a wildlife habitat and amenity area in its own right, but it also functions as a corridor, linking two very important watercourses in the form of the Lyreen River, Rye Water and the River Liffey. Dromey *et al.*, (1990) outlined the importance of the Royal Canal in Maynooth to bird species such as Grey Heron and Mallard. Indeed, both Grey Heron and Mallard were observed during the site walkover surveys. Grey Heron breeding at a colony within Carton Demesne are likely to feed along the Royal Canal (Dromey *et al.*, 1990). The ecological value of the Royal Canal resides in the biodiversity associated with the waterbody and its fringing habitats. Furthermore, the canal crosses through and forms linkages with habitats in the surrounding rural environment, while also providing a valuable amenity resource.

The marginal areas along the Royal Canal within the Maynooth study area are routinely maintained. This includes the upkeep of the towpath and the marginal strips of amenity grassland. Past management of the canal south of the St Patrick's College, Maynooth lands is outlined by Dromey *et al.* (1990) below and outlines that the canal was almost silted and dried up before dredging took place.

“This section was dredged early in 1989; the spoil deposited on the towpath and levelled off a few months later. The channel at this point was practically dry prior to dredging and dominated by Glyceria maxima. The vegetation of the towpath one year after dredging is still dominated by this reed. Cutting the vegetation in the first growing season (1989) may have reduced this dominance.”

Threats to the Royal Canal include over-maintenance and / or management of the marginal areas. Deposition of plant or grass cuttings in addition to herbicide application could result in the localised eutrophication of the waterbody as it passes through the Maynooth study area.

There are also connections into the wider landscape beyond Maynooth Environs. Royal Canal from Maynooth eastwards to Louisa Bridge, Leixlip. This is also designated as Royal Canal pNHA (002103). This section of the canal was studied by BEC Environmental Consultants on (BEC, 2013). BEC were contracted by the National Transport Authority (NTA) to undertake an ecological survey of the Royal Canal between Talbot Bridge (12th Lock), Blanchardstown, County Dublin and Maynooth Train Station, Maynooth, County Kildare. The full report can be viewed on the Waterways Ireland webpage⁷.



Plate 3.2 Royal Canal – showing aquatic habitats, edge vegetation, towpath and bordering hedge line station (Photo: K. McCaffrey).

7 https://www.waterwaysireland.org/Documents/Heritage%20+%20Environment/Ecological%20Surveys/Royal%20Canal%20Ecology_V1.2%20-%20BEC%20Consultants%202013.pdf



Plate 3.3 Royal Canal – Rail corridor (Photo: K. McCaffrey).

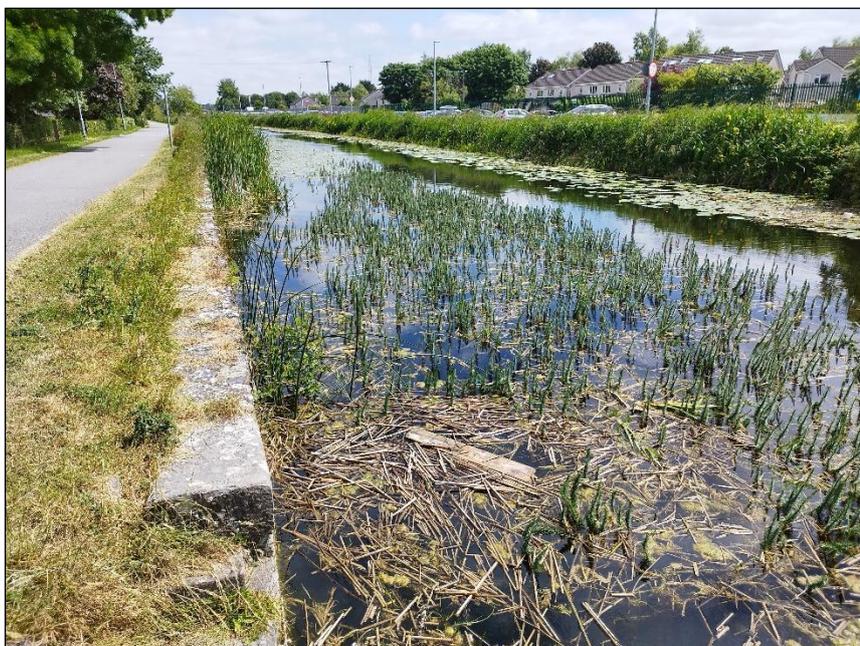


Plate 3.4 Areas of significant aquatic plant growth, such as yellow water-lily and mare's-tail (Photo: K. McCaffrey).

3.2.2. Rye Water / Carton SAC, pNHA

To the north of Maynooth the Lyreen River enters the Rye Water; this flows east, joining the River Liffey at Leixlip. East of the R157 road at Carton Demesne the watercourse is within the Rye Water Valley/Carton SAC (0001398). The site is also designated as a proposed Natural Heritage Area.

The qualifying interests of the SAC are - Petrifying springs with tufa formation (Cratoneurion) [7220]; *Vertigo angustior* (Narrow-mouthed Whorl Snail) [1014]; and *Vertigo moulinsiana* (Desmoulin's Whorl Snail) [1016]. The potential for *Vertigo* species to occur in wetlands habitats further upstream from the SAC should always be considered where suitable habitat types favoured by *Vertigo* are found to occur. This is also designated as Rye Water Valley/Carton pNHA (001398).

Fish species recorded in the Rye Water upstream of Leixlip include Brown trout (*Salmo trutta*), Atlantic salmon (*S. salar*), European eel (*Anguilla anguilla*), lamprey sp., minnow (*Phoxinus phoxinus*), Nine-spined stickleback

(*Pungitius pungitius*), Three-spined stickleback (*Gasterosteus aculeatus*), Pike (*Esox lucius*), Roach (*Rutilus rutilus*) and Stone loach (*Barbatula barbatula*) (IFI, 2018). (records from Balfeaghan Br., Anne’s Br. and Kildare Br., County Kildare). The lake system along the southern boundary of Carton Demesne also offers suitable habitat for otter, wetland birds and invertebrates such as dragonflies / damselflies. Bird species noted include Kingfisher (*Alcedo atthis*), Teal (*Anas crecca*) and Gadwall (*A. strepera*).

3.2.3. Maynooth University and St Patrick’s College

The habitats within the campus of the Maynooth University and St Patrick’s College are not of high biodiversity value in and of themselves. Apart from buildings, the main habitats are amenity grassland lawns and mature lines of lime, beech and copper beech, parcels of young plantation woodland, tree copses, orchards, and scatterings of semi-mature trees and low canopy trees. The Lyreen River and Millrace also passes through the St. Patrick College, Maynooth lands but these habitats are considered as their own discrete Green Infrastructure area (see below). Nonetheless, this is one of the more significant areas of open space within the Maynooth study area. The South Campus is located between the Lyreen River and the Royal Canal and therefore has the potential to act as a corridor or potential area of transit between both of these watercourses. The abundance of mature trees in this area are non-native and include species such as lime, beech, sycamore, yew, pedunculate oak and horse chestnut; in combination with a diverse range of buildings which could offer roosting opportunities such as landscape is, however, likely to be of value to bats. The more recently developed North Campus does not support the abundance of mature treelines and tree copses when compared to the South Campus. Nonetheless, the northern campus does support large areas of amenity grassland near its northern boundary in addition to groupings of low canopy and young broadleaved trees fringing the R148 and the more established buildings. Threats to this Green Infrastructure area include ongoing development. There is significant potential for improving the ecological value of this area through sensitive management and habitat creation.

The North Campus of Maynooth University is also included as a Green Infrastructure area. This campus is separated from the South Campus by the R148 Kilcock Road. The North Campus is more recently established than the South Campus and does not support the same abundance of mature treelines or woodland pockets that characterise the South Campus. Nonetheless, it is included as a Green Infrastructure area as it supports pockets of semi-mature trees and scattered semi-mature trees on areas of amenity grassland (classified in parts as WD5 –scattered trees and parkland). These mostly included low canopy tree species such as mountain ash, birch, maple, Norway maple, cherry, and hornbeam with some larger canopy trees such as horse chestnut, lime, lodgepole pine and ash. The North Campus also supports large areas of amenity grassland that are generally utilised for recreational and sporting activities.

The Maynooth Green Campus Committee (MGC) was established in 2021. Since then, the university has been awarded three Green Flags and a stronger focus has been placed on biodiversity within the campus. Maynooth University is an official partner of the All-Ireland Pollinator Plan 2021-2025, with habitat surveys, pollinator planting and installation of bat and birdboxes taking place on the campus. Thus, with continued efforts, the campus will gain in local biodiversity value.



Plate 3.5 Maynooth University and St Patrick’s College; built land and gardens (Photo: K. McCaffrey).



Plate 3.6 Maynooth University and St Patrick's College; tree line avenue (Photo: K. McCaffrey).



Plate 3.7 Maynooth University and St Patrick's College; grassland (Photo: K. McCaffrey).

3.2.4. Lyreen River, Rye Water River, tributaries and associated treelines

The Lyreen River, a small depositional watercourse and tributary of the Rye Water River, flows from the southwest. It is crossed by the Royal Canal and R148 road before it flows onwards in a north-easterly direction. It enters the study area at the townland of Maynooth South where it passes under the Royal Canal pNHA. This section of the river is relatively open and is bordered by grassy river banks on either side (agricultural grassland). The watercourse along this section of the river is relatively slow moving and displays silted water indicative of slightly polluted conditions. This section of the Lyreen supports extensive beds of instream branched bur-reed within the centre of the river channel. The channel is fringed by both reed canary-grass and marsh willowherb that gradually grades out higher up the bank to be replaced by a dry grassy verge habitat supporting cock's-foot, false oat-grass, and common nettle.

Within the grounds of the St Patrick's College, Maynooth part of the Lyreen River is diverted to form a millrace which runs along the margins of the R148 Regional Road, and the main channel located further to the south. The main channel of the Lyreen is heavily fringed by treelines continuing on to smaller pockets of recently planted broadleaved woodland (WD1) and mixed broadleaved / conifer woodland (WD2); a pocket of wet willow alder ash woodland (WN6) located to the east is comprised of grey willow with a ground layer of ivy, nettle, alexanders, and enchanter's nightshade. A line of riparian woodland (WN5) is also located along the margins of the Lyreen River. This comprises riparian tree species such as alder, osier and ash in addition to more recently planted sycamore and horse chestnut. The most notable aspect of the river and its adjoining woodland habitats includes the occurrence of green figwort a plant species listed in the Irish Red Data Book for vascular plant

species (Curtis and McGough, 1988). This plant is restricted in its distribution to the Rye Water (of which the Lyreen is a tributary) and River Liffey valleys (Scott Cawley, 2009).

Continuing east from the grounds of St Patrick's College the Lyreen River flows through Maynooth Town Centre continuing in a north to north-easterly direction. Where the river approaches the northern-eastern boundary of the study area it is bordered to the north by steeply terraced slopes that supports open and somewhat scattered scrub comprising hawthorn, elder, bramble and young sycamore trees. The southern side supports more gently sloping land, some of which has been recently disturbed and allowed to recolonise as rough and unmanaged grassland habitat.

The Lyreen River acts as a viable corridor for mammals and birds that, together with its parcels of fringing woodland, treelines, and hedgerows, provides suitable shelter, habitat and commuting routes. In addition, it forms a continual link between the Royal Canal, the Rye Water Valley and the River Liffey and ensures an overall link of three significant watercourses within this locality.

The Rye Water Valley extends along much of the northern boundary of the study area. It acts as the border between Counties Kildare and Meath. At the western-most extent of the northern boundary of the study area the Rye Valley Water flows through a small mixed broadleaved woodland, then flowing in an eastwards direction as far as the Lyreen Angling Centre, before entering the Carton Estate. Along the banks between the woodland and where it exits the study area, the river is bordered by narrow riparian treelines and hedgerows.

Threats to the Lyreen River and Rye Water Valley include siltation, as was noted within the grounds of St Patrick's College, Maynooth and along agricultural fields. The most recent (2019) EPA water quality monitoring results rate the Lyreen River as Q3 immediately downstream of St Patrick's College, Maynooth, indicating poor water quality status. The Rye Valley Water was sampled at two locations within the study area in 2019. It was rated as Q4 (Good) upstream of the confluence with the Lyreen River, and 3-4 (Moderate) immediately downstream of the confluence.

3.2.5. Treelined Avenues in Maynooth

Treelines form a significant visual or aesthetic presence within Maynooth, particularly Maynooth Town Centre. These include the treelined pavements located either side of Main Street, Maynooth; along the R148 west of the Maynooth University South Campus and continuing west along an avenue leading to the R157 (and effectively Carton Demesne). These treelined avenues are considered as areas of Green Infrastructure because of both their intrinsic aesthetic value and their importance to wildlife in the locality. Those treelines fringing Main Street Maynooth are mainly comprised of lime and are generally in poor to moderate condition due principally to their location and the likely compaction and restriction of their root networks resulting from the adjoining pavements and pathways (see section 3.2.4; Plate 3.6).

A treeline of mature lime trees of seemingly good structural condition is located along an avenue leading towards Carton Demesne. These trees all measure between 18 and 23 metres height supporting tree girths measuring between 250 cm and 300 cm. On a local scale this treeline provides viable commuting, refuge and nesting habitat for birds, bats and other small mammals such as squirrel. Most importantly the treeline forms connectivity to the Rye Water valley / Carton SAC, an area designated due the presence of several rare and threatened plant and animal species, and of a rare habitat, *thermal, mineral, petrifying spring*. The woods found on Carton Estate and their birdlife are of additional interest (NPWS, 2003).

3.2.6. Laraghbryan Cemetery

This small area of Green Infrastructure is based around the Laraghbryan Cemetery which supports an old-ruined church building, mature trees, treelines, linear woodlands and a patch of unmanaged and now rough grassland located to the west of the cemetery. The Cemetery supports strips of amenity grassland lined by mature trees that includes yew, lime, beech and horse chestnut. A treeline supporting European larch, horse chestnut, lime and Sitka spruce is located on the western boundary of the cemetery whilst a small block of woodland comprising beech, sycamore and copper beech is located east of the cemetery. An abandoned and now overgrown roadway / trackway is located to the west of the cemetery is bordered on either side by sycamore, hybrid poplars, horse chestnut and ash whilst species such as elder, spindle, bramble and common nettle are colonising the central section within the footprint of the roadway. This area is fringed to the south by a pocket of tussocky grassland dominated by coarse grasses such as false oat-grass and cock's-foot in addition to other herbaceous species and climbers such as common vetch, large bindweed, meadowsweet, dog-rose and bramble. This block of Green Infrastructure does in itself support high quality semi-natural habitats

restricted in coverage within County Kildare. However, the cumulative value of all of these habitats within and around Laraghbryan Cemetery, and their potential to support roosting and nesting sites for bat and bird species, makes this a viable Green Infrastructure area. It is also connected with the wider countryside and the North Campus of Maynooth University via the treeline / hedgerow network located on the margins of the improved grassland fields to the north.

3.2.7. Lyreen Angling Centre

The Lyreen Angling Centre is centred on a series of artificial ponds and fringing reed swamp habitats (see Plate 2.8). Although these ponds are manmade (FL8), they are included based on the overall paucity of these habitats within the Maynooth study area. Furthermore, their proximity to the Lyreen and Rye Water rivers and their capacity to support wildfowl species such as Coot, Moorhen and Mallard, as well as a range of wetland insects and amphibians, results in this area being considered an area of Green Infrastructure. The reed and large sedge swamp habitats fringing the ponds include common reed and branched bur-reed, while the open water areas support Canadian pondweed and broadleaved pondweed. Other habitats associated with the angling centre's premises include an area of young alder, willow and ash plantation, marginal areas of rough grassland and most notably a series of allotments typically supporting a range of vegetables, herbs and flowers.

3.2.8. Carton Demesne Woodlands

There are significant interconnected blocks of woodland in the east of Maynooth and north of the Royal Canal, including large areas within Carton Demesne. These connect areas of woodland, treeline, and hedgerow into a wider network of woodland, including areas within Rye Water Valley/Carton SAC. The woodlands along the eastern side of the study area within Maynooth Environs also provide direct connectivity into this wider series of woodlands.

Within Carton Demesne, mixed broadleaved woodland (WD1) occurs on site as unmanaged demesne woodland with maturing non-native broadleaved trees. The woodland structure and understorey is poorly developed. Nonetheless, this habitat provides viable and valuable foraging and refuge habitat for local small mammals (including bats) and passerine birds in the locality and surrounding areas. An area of mixed broadleaved / conifer woodland (WD2) occurs on site as unmanaged demesne woodland with maturing non-native broadleaved trees. The woodland structure and understorey is poorly developed. Nonetheless, this habitat also provides viable and valuable foraging and refuge habitat for local small mammals (including bats) and passerine birds in the locality and surrounding areas. The estate also includes an area of Scattered Trees and Parkland (WD5).

The website – Irish Birding (irishbirding.com) includes interesting records of Woodcock (*Scolopax rusticola*). Records are from the winter months. Woodcock is on the red list of birds of conservation concern in Ireland (Gilbert et al., 2021) due to a long term breeding range decline by (BDr2). On 4th February 2023 17 birds were noted flying into the woodland Carton Demesne, Maynooth, County Kildare. It would be worth considering whether the woods at Carton Demesne also support any breeding Woodcock. The Game & Wildlife Conservation Trust recently published Guidance on habitat management for Woodcock⁸.

The site also includes records of Spotted Flycatcher (*Muscicapa striata*) is on the amber list of species of conservation concern in Ireland (Gilbert et al., 2021). Woodlands in the area also include the recent colonist – Great spotted woodpecker (*Dendrocopos major*).

The woodland areas are under pressure and face threats from lack of recent management and consequent deterioration in woodland structure, in addition to the establishment and spread of high impact alien invasive plant species Japanese knotweed and rhododendron. Consideration should be given to developing a woodland management plan for this sight, with thought also given to how grants support might be sourced.

⁸ Brewin, J. Hoodless, A.N., Heward, C.J., Hopgood, A. (2022). Conserving our Woodcock: Research based measures to help UK's resident population. Game and Wildlife Conservation Trust, Fordingbridge.

3.2.9. Smaller Steeping Stones

Attenuation ponds - Maynooth Business Park

This includes four attenuation ponds (artificial ponds and lakes) located on the northern boundary of Maynooth Business Campus with the M4 Motorway. These habitats, although manmade, are included as stepping stones due to their restriction in the overall study area coupled with their potential to provide viable habitat for wetland birds, amphibians and invertebrates. Two of the attenuation ponds were drying out at the time of inspection and are being colonised by a wet grassland / marsh vegetation with abundant hard rush, marsh willowherb and bulrush. The remaining two ponds support stagnant water with fringing clumps of bulrush and hard rush. These attenuation areas are also bordered by dogwood with dense roadside planting dominated by semi-mature alder trees to the north of these attenuation areas.

The park also includes significant areas of landscape young woodland.



Plate 3.8 Tree cover at Maynooth Business Campus (Photo: K. McCaffrey).

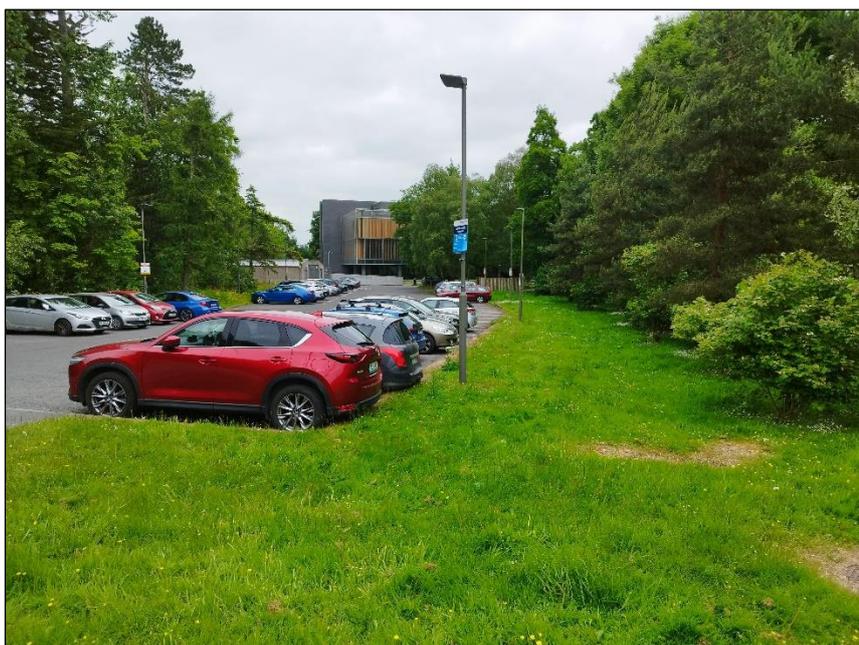


Plate 3.9 Tree cover at Maynooth Business Campus (Photo: K. McCaffrey).

Isolated patches of Dry Grassy Meadows and Scrub

The Maynooth study area supports a variety of isolated patches of dry semi-natural grassland that have in some instances generated into bramble dominated scrub. In most instances, these grassland areas have generated from the abandonment of improved agricultural pastureland or amenity grassland. As outlined above, areas of rough grassland provide pockets of biodiversity value for butterflies or other invertebrate fauna in urban areas such as Maynooth. There can also provide temporary cover / refuge for smaller mammals and birds. In time such areas if managed appropriately could develop into scrub woodland (dominated by species such as ash, sycamore, willow or alder, depending on location and ground conditions).

Maynooth Hedgerow and Treeline Networks

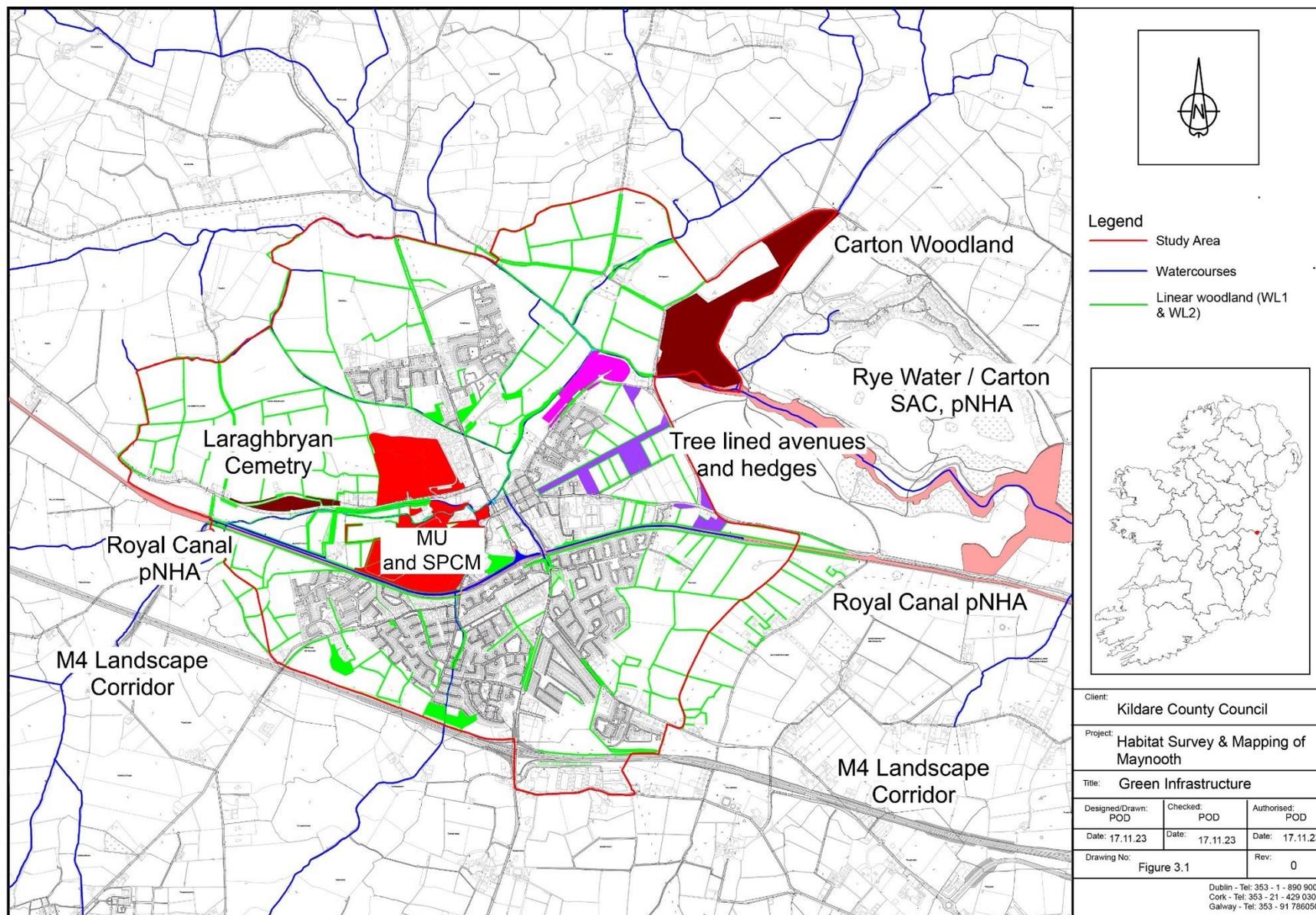
As noted in Figure 3.1 a number of the treelines and hedgerows associated with the agricultural fields have been included as viable corridors or ecological transit routes within the study area. These treelines and hedgerows in some instances provide connectivity between Green Infrastructure areas, such as those hedgerows to the north of the treelined avenue with Lyreen Angling Centre. In addition, the treeline / hedgerow network to the north of Laraghbryan Cemetery connects Laraghbryan Cemetery with the North Campus of Maynooth University.

M4 Motorway

Outside of Maynooth, to the south the M4 Motorway acts as both a barrier to movement as well as an east-west ecological corridor.



Plate 3.10 Landscape corridor on the M4 Motorway bordering the southern side of Maynooth (Photo: K. McCaffrey).



Ordnance Survey Ireland Licence No. AR 0082523

Figure 3.1 Green infrastructure within Maynooth (County Kildare).

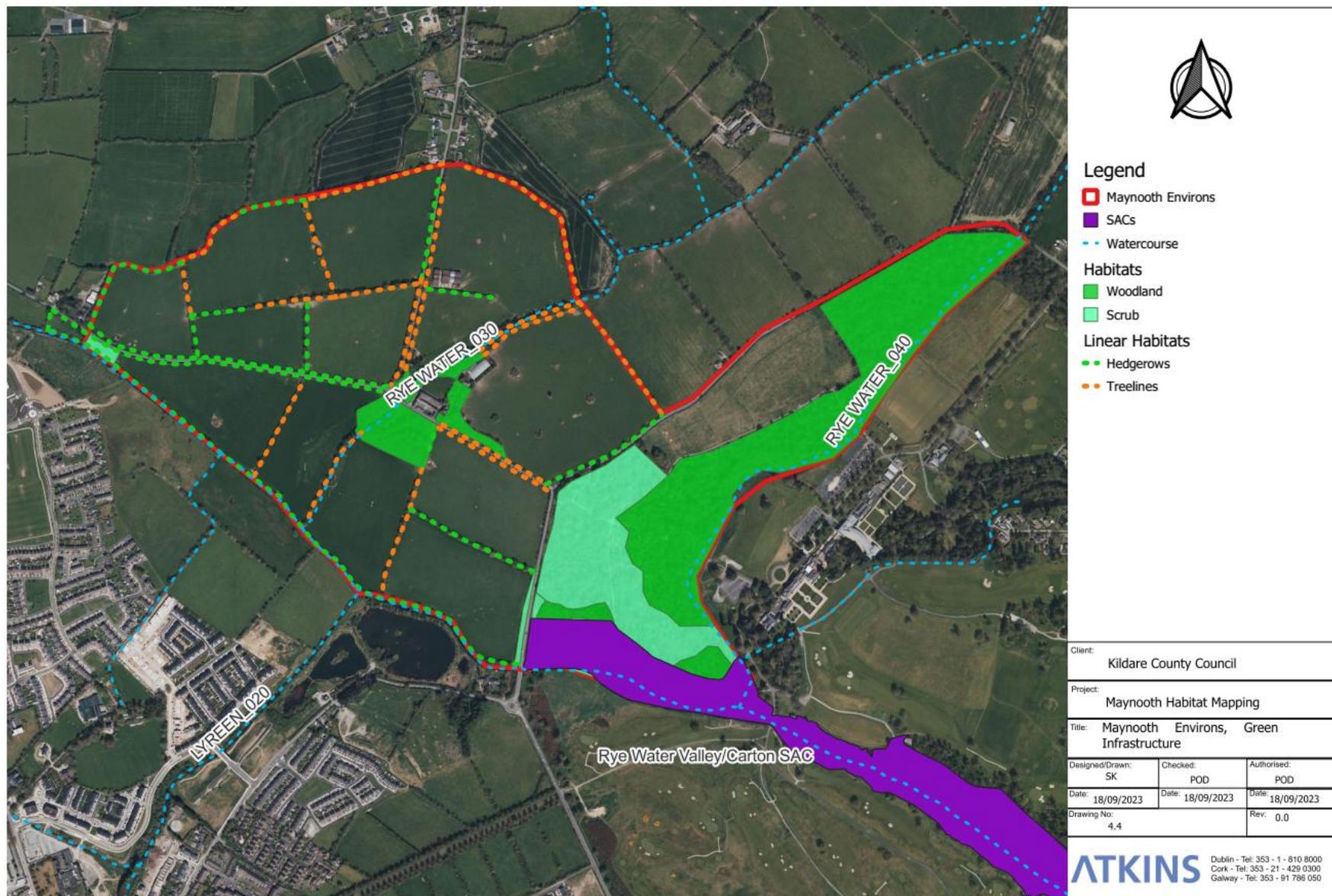


Figure 3.2 Green infrastructure within Maynooth Environs (Moynagaddy, County Meath).

4. Recommendations

Completing the habitat survey and preparing this report and the accompanying GIS database are only the first steps in conserving and enhancing the habitats within Maynooth and Environs. Below are recommendations for some next steps that arise from the habitat survey.

4.1. Planning

The concept of Green Infrastructure should be further integrated into all levels of the planning process. As noted above (Box 1.1), the thinking behind Green Infrastructure is already incorporated into the Kildare County Development Plan 2029–2029. Future strategic planning should build on this and identify different types and grades of Green Infrastructure for conservation and enhancement. The key Green Infrastructure areas identified in this report should be used as a baseline. As these have been identified with biodiversity as the primary concern, additional or overlapping Green Infrastructure areas may need to be identified to fully encompass the ecosystem services provided.

Where appropriate, strategic planning should aim for synergies among ecosystem services provided by the same Green Infrastructure areas. This multi-functional approach is central to the Green Infrastructure concept and will help maximise the benefits provided by a given area. From a natural heritage perspective, a goal in strategic planning should be to reinforce and strengthen where necessary the biodiversity value of Green Infrastructure. For example, this can include improving the ecological value of public parks and other amenity areas or promoting biodiversity conservation in agricultural lands.

Ecological value should be an explicit criterion in the zoning of lands for Green Infrastructure, recreation or similar in strategic planning. The value of ecological habitats identified with the Maynooth study area is included in the accompanying GIS database provided to Kildare County Council (the valuation of habitats in the Maynooth Environs are included in Chapter 4.0).

4.1.1. Mitigation Banking

Local authorities often adopt the principle of mitigation banking “*where the loss of habitats and features of the wider countryside is unavoidable as part of a development, to ensure that appropriate mitigation and/or compensatory measures are put in place, to conserve and enhance biodiversity and landscape character*”. In some cases, it may be more effective to carry out mitigation or compensatory measures in another location than where the development is taking place. For example, there may be insufficient scope for adequate compensation or the outcomes of mitigation may be uncertain. There may also be cases where off-site habitat creation or enhancement work may be more effective or beneficial for biodiversity than on-site works. Options for incorporating such a “mitigation banking” strategy should be explored and incorporated into planning. Where appropriate, off-site mitigation banking can be used to contribute to enhancing ecological Green Infrastructure in strategic locations both locally and at a county level.

4.1.2. Strengthen Green Infrastructure Links to the main watercourses and consolidated areas of semi-natural habitat

It is recommended to strengthen and reinforce links to the larger and contiguous areas of Green Infrastructure (such as watercourses, wetland areas in Lyreen as well as important ecological corridors such as the Royal Canal). Ecological linkage from other habitats to these linear habitats is, in some areas, fragmented through the positioning of residential areas. Strategic planning should aim to strengthen the ecological linkages with these watercourses where possible. This may include reinforcing habitats along watercourses or the planting of continuous green corridors such as hedges and treelines within particular locations of the built up residential areas.

4.1.3. Biodiversity Net Gain

The concept of Biodiversity Net Gain (BNG) has been legislated as a planning condition for all developments in England. It is an approach to development that leaves local biodiversity in a better state than before. BNG still relies on the application of the mitigation hierarchy for any project or plan to avoid, mitigate or compensate for

biodiversity losses. Interventions that help deliver BNG can also deliver wider environmental benefits. For example, wetland habitat creation or smaller rain gardens can deliver flood attenuation and enhanced water quality; woodland habitat creation can deliver noise attenuation, visual screening and carbon sequestration but also provides an educational and recreational resource that improves the health and wellbeing of the local population. Mechanisms for measuring and demonstrating environmental benefits are advocated through a natural capital or ecosystem service approach that is underpinned by biodiversity and frames these benefits which derive from natural capital or ecosystem assets (CIEEM, 2021)⁹. In England, the 2021 Environment Bill introduces a mandatory requirement for BNG for projects for new developments. The mandated net gain must meet a minimum of 10%. This is calculated and implemented using the Natural England Biodiversity Metric.

There is no legislated standard to calculating net loss of biodiversity in Ireland. Irish Water (2021) have developed an adjusted metric, based on the Natural England Biodiversity Metric, for use in Ireland. It is advised that consideration is given by Kildare County Council to adopting such a metric as a planning condition for further developments in Kildare and beyond.

The metric requires an assessment of the habitat value (score 1 – 12) of all habitats combined with the area or length of the habitat in question, i.e. the habitats within the boundary of the development being proposed. The ecologist must calculate the metric for the pre-development site, formulate the options for habitat enhancement or creation, and then calculate the post-development metric. At this stage, the mitigation hierarchy has already been followed; all possible habitat avoidance opportunities have been identified and applied prior to developing options for habitat enhancement and creation.

Pre- and post-development calculations for various options can be compared to determine the most biodiversity-beneficial habitat enhancement or creation options for the site.

When considering the type of habitat that should be enhanced or created, the following points should be considered: -

- Identify existing ecological networks and home ranges of species in the locality and choose habitats that support these species.
- Any compensatory habitat for that lost should be 'like for like, or better'.
- Consider the difficulty in habitat enhancement/creation and likelihood of failure of any planting.
- Do not aim to transform habitats (e.g. grassland to wetland) where there is an enhancement option that can be more easily achieved.
- Don't take short-cuts for the sake of a 'better' score e.g. transforming the site by planting a lot of woodland that may be difficult to manage.
- Consider whether it will be more effective to enhance an existing habitat or create a new one.
- Consider timeframes for habitat enhancement or creation – what can be achieved within the delivery contract, and what will require ongoing management to reach the desired outcome.
- Where habitats are being left to regenerate naturally (typically succeeding to some form of scrub or woodland), or where IW are planting on 3rd party lands, for the purposes of the metric consider what habitat is likely to have developed in the medium term (5-10 years).
- Be additional – do not aim to create or enhance a habitat that would happen anyway due to other commitments. It is assumed that, with the ongoing roll-out of the Biodiversity Area Plan (BAP), that reduced mowing will occur on all sites to some extent. The basic reduced mowing regime (e.g. cut every 6 weeks) should not be counted as a habitat creation measure for the purposes of calculating No Net Loss, as it is assumed that this would be progressed regardless. A more bespoke commitment to development wildflower grassland e.g. seeding with yellow rattle, meadow management, soil alteration can however be counted towards No Net loss.

⁹ CIEEM Environmental Net Gain Briefing Paper (April 2021).

4.2. Kildare Hedgerow Survey

A hedgerow survey of County Kildare was completed by Flynn Furney on behalf of Kildare County Council in 2022. Key findings of this survey and key points for the management of hedges are presented below. These data can help to inform hedge planting within proposed developments in Maynooth. Any such mixes should be developed by both a landscape architect and ecologist working co-operatively.

The frequency and abundance of woody shrub in hedges sample during the 2022 Hedgerow Survey was summarised in Table 6.3.1 of Flynn Furney (2022) (this is reproduced in Table 4.1). This includes a comparison with the 2006 Hedge Survey (Foulkes, 2006).

Table 4.1 Frequency and abundance of woody shrub species occurrence in sampled hedges.

Botanical name (*Denotes introduced species)	Common name	Frequency of occurrence (%)	Mean Domin value	Frequency of occurrence in 2006 (%)
<i>Crataegus monogyna</i>	Hawthorn	88.2	7	93
<i>Sambucus nigra</i>	Elder	41.6	5	51
<i>Prunus spinosa</i>	Blackthorn	34.8	5	48
<i>Fraxinus excelsior</i>	Ash	31.7	4	57
<i>Ligustrum vulgare</i> *	Wild privet	21.1	5	43
<i>Ulex europaeus</i>	Gorse	9.9	4	10
<i>Ulmus</i> spp.	Elm	9.3	5	15
<i>Salix</i> spp.	Willow	8	5	15
<i>Acer pseudoplatanus</i> *	Sycamore	7.5	5	12
<i>Illex aquifolium</i>	Holly	6.8	4	8
<i>Prunus domestica</i>	Plum	6.2	5	6
<i>Corylus avellana</i>	Hazel	6.2	5	13
<i>Symphoricarpos albus</i> *	Snowberry	3.7	6	2
<i>Viburnum opulus</i>	Guelder rose	3.1	3	4
<i>Malus sylvestris</i>	Crab apple	2.5	6	6
<i>Euonymus europa</i>	Spindle	1.9	4	5
<i>Fagus sylvatica</i> *	Beech	1.9	7	7
<i>Fuchsia magellanica</i> *	Fuchsia	1.2	2	0
<i>Lonicera nitida</i> *	Box hedge honeysuckle	1.2	2	1
<i>Prunus avium</i>	Wild cherry	0.6	3	2
<i>Populus tremula</i>	Quaking aspen	0.6	3	1
<i>Picea</i> spp*	Spruce	0.6	3	1
<i>Cornus sanguinea</i> *	Dogwood	0.6	3	1
<i>Buddleja davidii</i> *	Buddleia	0.6	3	0
<i>Cotoneaster</i> spp.*	Cotoneaster	0.6	3	0

In addition to these shrub species, climbing and non-woody species recorded included Bramble (*Rubus fruticosus* agg.), Dog rose (*Rosa canina*) and Honeysuckle (*Lonicera periclymenum*).

The type and frequency of woody tree species recorded by Flynn Furney (2022; as listed in Table 6.7.0.1) are reproduced in Table 4.2. This includes a comparison with the 2006 Hedge Survey (Foulkes, 2006).

Table 4.2 Frequency and abundance of woody tree species occurrence in sampled hedges.

Botanical name (*denotes introduced species)	Common name	Frequency of occurrence (%)	Frequency of occurrence 2006 (%)
<i>Fraxinus excelsior</i>	Ash	50	58
<i>Crataegus monogyna</i>	Hawthorn	29	28
<i>Acer pseudoplatanus</i> *	Sycamore	17	14
<i>Salix</i> spp.	Willow	17	9
<i>Quercus</i> spp.	Oak	10	12
<i>Fagus sylvatica</i> *	European beech	9	11
<i>Corylus avellana</i>	Hazel	4	0
<i>Populus tremula</i>	Quaking aspen	4	1
<i>Cupressus</i> spp.*	Cypress	4	3
<i>Betula</i> spp.	Birch spp.	4	4
<i>Aesculus hippocastanum</i> *	Horse chestnut	2	2
<i>Picea</i> spp.*	Spruce species	2	2
<i>Malus sylvestris</i>	Crab apple	2	5
<i>Sorbus aucuparia</i>	Rowan	2	0
<i>Ulmus</i> spp.	Elm	1	3
<i>Prunus avium</i>	Wild cherry	1	5
<i>Alnus glutinosa</i>	Alder	1	3
<i>Acer campestre</i> *	Field maple	1	0
<i>Larix decidua</i> *	European larch	1	2
<i>Fagus sylvatica</i> f. <i>purpurea</i> *	Copper beech	1	0
<i>Eucalyptus globulus</i> *	Eucalyptus	1	0
<i>Taxus baccata</i>	Yew	1	1
<i>Acer rubrum</i> *	Red maple	1	0

Box 4.1: County Kildare Hedgerow Appraisal Survey 2022.

Aims and Objectives (in relation to Hedgerows)

Objective

To gain an overview of hedgerows in County Kildare in terms of extent and condition from a biodiversity, historical and cultural perspective in order to inform conservation priorities and assess any changes in the last decade.

Aims

To carry out a detailed field survey of hedgerows in County Kildare, quantifying extent, composition, structure, condition and management.

To identify any rare or vulnerable species that may be present.

To compile a species list, including ground flora.

Identify areas of the county which may have ancient hedgerows or hedgerows which are remnants of old woodlands.

To compare townland boundary hedgerows with non-townland boundary hedgerows.

To establish criteria to aid the identification of potential ancient hedgerow locations and composition. Collate and map the data in accordance with best practice.

To prepare a Habitat Action Plan for hedgerows in County Kildare, to include recommendations on conservation and management priorities.

To raise awareness of the ecological and cultural importance of hedgerows.

Key summary points for those managing hedgerows:

- Hedge cut on a rotation of every 2-4 years.
- 1-3 wide verge maintained as a separate habitat area.
- Hedge cut and maintained at a minimum of 1.5m but incrementally increased.
- A-shaped profile, with a bushy top if the hedge is tall and overgrown.
- Mature trees scattered throughout the hedgerow.
- Incremental cutting is key. This is cutting slightly (10cm/cut) higher and wider at each cut. This means 1-year-old wood is always available for fruiting and flowering and it also encourages hedgerow density.

The following steps should be followed for rapid growth and establishment and for the greatest benefits to biodiversity. If being planted for biodiversity as the main objective, try and achieve at least 2 metres in width with 2 metres of a grassy verge on at least one side:

Ground preparation:

Ground preparation should be carried out prior to tree establishment. The ground should firstly be dug up with a digger or ploughed and harrowed to break up the soil. This creates the best conditions for rapid root growth. If digging a drain, consider creating an open drain instead of a piped drain with the hedge then established on a bank made from the excavated material.

Mulching:

Add a mulch material of old straw, wood chip or mature compost. This will help insulate the trees from drought conditions, introduce a range of fungal and invertebrate species to the area and act as a slow-release nutrient source. Avoid farmyard manure and hay as the former is too high in nitrogen while the latter will introduce too much grass into the area. If possible, ground preparation and mulching should be done in late summer or autumn with trees, then planted in the winter or the following spring.

Planting:

Plant a diverse range of trees and shrubs. Aim to plant at least 10 species including Hawthorn, Oak, Hazel, Wild Cherry, Crab apple, Holly and Guelder Rose. Plant density is an important consideration. Aim for at least 3 trees/m². This encourages competition between the trees above ground and the establishment of interconnected root systems below ground. To further add to the diversity, native wildflower seed can also be spread around the trees and along the verges at establishment.

Recommendations from Survey:

- All relevant stakeholders need to commit to eliminating the cutting of hedges during the period laid down in the Wildlife Amendment Act (2000) (1st March to 31st August) except where absolutely necessary for safety reasons.
- The public should be encouraged to report damage to, and removal of, hedgerows, including out-of-season cutting.
- Stakeholders should ensure all relevant staff (and any contractors used) have the necessary skills and data sources to implement or evaluate best practice hedgerow conservation.
- Kildare County Council should produce and adopt a ‘Hedgerow Conservation Policy’.
- Strategic objectives concerning hedgerows and trees in the Monaghan Biodiversity & Heritage Strategic Plan - ‘Hedgerows & Trees’ and ‘High Nature Value Farming’ need to be highlighted, promoted and considered by all relevant parties.
- The concept of “Heritage Hedgerow” should be introduced for hedgerows which have notable historical, structural, or species composition characteristics. This should be taken into account when planning infrastructure and could be incorporated into new developments and landscaping.
- Local groups and individuals should be encouraged to carry out local hedgerow surveys.
- National legislation and policies should be put in place to protect hedgerows and there is a need for stricter monitoring in County Kildare, including: -
 1. Wildlife (Amendment) Act 2000 and Heritage Act 2018, which stipulate that hedgerow must not be cut between 1st March and 31st August (unless in specific circumstances such as road safety), to avoid harm to wildlife.
 2. EIA (Agriculture) Screening Regulations 2011 are adhered to for removal of large sections of hedgerows for farming purposes across County Monaghan. Monaghan is the only county to date which has no record of applications for.
 3. EIA screening under these regulations.
 4. CAP Cross Compliance requirements, which mean that since 2009, hedges cannot be removed unless a replacement hedge of similar length is planted at a suitable location on the holding in advance of the removal of the hedge. If farmers have removed hedges since 2009, they can be penalised any stage.
 5. Nitrates Derogation, where a Biodiversity Option includes either leaving at least one mature blackthorn/whitethorn tree within each 300m of hedgerow, or maintaining hedgerows on a three-year cycle.
 6. Liaises with The Forest Service of the Department of Agriculture, Food and the Marine on forestry requirements in relation to a habitat setback (5 metres minimum).
- A review of roadside hedge cutting practices, in regard to the necessity and the manner in which hedges are cut annually.
- Local authorities already manage roadside verges, but this should be extended hedgerows abutting roads. While local authorities have a responsibility to road users and their safety regarding hedgerow maintenance, more effort must be made to ensure best practise is exercised and only experienced hedge cutters are contracted.
- Local advertising campaigns and projects (e.g. with community groups & schools) to highlight the importance of hedgerows and their benefits for nature, farming and as beautiful landscape features.
- Guidelines should be produced for planners and road engineers dealing with hedgerows in planning applications.
- The use of locally provenanced native plant species should be specified for and hedgerow planting (including hedgerow trees). Encouraging a diversity of native hedge species consistent with the findings of this survey is recommended.
- A number of showcase sites of best practice covering different aspects of conservation and management should be developed around County Kildare. This might be done in conjunction with the Hedge Laying Association of Ireland.

- A repeat hedgerow survey for the county should be carried out no later than 2032.

Source: -

Flynn Furney Environment Consultants (2022). *County Kildare Hedgerow Appraisal Survey-2022*. Report prepared for Kildare County Council.

4.3. Management

4.3.1. Ecological Planning Guidance Measures

Table 4.3 outlines planning measures that should be implemented / incorporated into future developments within Maynooth and Environs. These measures include the retention and protection of trees, hedgerows and treelines in addition to the enhancement of amenity grassland by the establishment of trees groups, wildflower meadows and shrubberies. These measures and other planning recommendations are outlined in further detail below.

Table 4.3 Ecological Planning Guidance Measures.

Feature	Guidance measure
Protection of trees, hedgerows and treelines	<ul style="list-style-type: none"> • Protect trees, hedgerows and treelines as part of planning development. • Where possible, retain mature trees as part of future developments. If felling is required replacement planting should be incorporated into the development proposal. • Protection of isolated sections of hedgerow often leads to deterioration and ultimate removal of such isolated fragments; to maximise hedgerow biodiversity and viability retained sections should be connected into existing hedge or woodland network. • Enhance existing hedgerows within developments / along development boundaries by establishing connection with semi-natural habitat such as grassland (open space) or through the addition of native tree species to create small areas of contiguous amenity woodland.
Enhancement of amenity grasslands	<ul style="list-style-type: none"> • Plant native shrubs and trees • Establish wildflower meadows • Integrate ponds / water features as appropriate
Nature based solutions to surface water management	<ul style="list-style-type: none"> • Encourage features associated with Sustainable Drainage Systems within developments.

4.3.2. Promote Best Practice in Conservation Management

Conservation management should follow best practice. There is a wealth of easily accessible information on conservation management available on the internet, in published books and magazines, from NGOs and from conservation professionals. Inappropriate conservation management can waste valuable resources and can impede progress towards meeting objectives.

Community groups have a strong role to play in managing Green Infrastructure. They should be consulted at an early stage and integrated fully into the planning and management processes. They have the advantage of being on the ground, close to the action, which facilitates monitoring progress and identifying problems at an early stage.

Some general guidance on conservation management that arises from field observations and consultations during the habitat survey includes: -

- Planting native species of native genetic stock as part of landscaping developments and public lands and as part of private gardens should be encouraged.
- Old stone walls should not be indiscriminately cleared of vegetation, as most plants growing in walls do not damage the fabric. Clearance of ivy or other dense growth should be carried out in September or October when the potential for damaging nesting birds and bats is lowest.
- A bat specialist should be consulted prior to repointing stone walls to ensure there are no bats located inside crevices. Erecting bat boxes or bat bricks can compensate for loss of roosting space.
- Semi-natural grasslands should be mowed once or twice a year as a rule of thumb. More frequent mowing enriches the soil by increasing recycling of organic matter and leads to changes in species. Autumn mowing should take place after flowering and seed set. If required, grasslands can be cut a second time in early spring prior to flowering.
- Use of “wildflower” seed mixes should be avoided, as these often contain non-native species or non-native genetic stock. When introducing wildflowers, native seed and autumn cuttings, preferably from a known local source, should be used (in compliance with the Wildlife Act).

4.3.3. Enhancing Amenity Grasslands

Amenity grassland, without accounting for those areas associated with private dwellings. This represents a significant resource of green space, much of which could be improved for biodiversity without losing recreational amenity value. Possible measures for enhancing amenity grassland for biodiversity include: -

- Planting native trees or areas of dense shrubs.
- Establishing flowerbeds with a diverse range of flowering species to provide nectar and pollen at different times of year for a wide range of insects.
- Establishing wildflower meadows.
- Allowing areas to develop tall, grassy meadows
- Creating wildlife ponds or wetlands;.
- Planting low management intensity vegetable and herb gardens and leaving some space for weeds
- Supplementing the above with bird or bat boxes or building dens or hibernation areas for small animals, such as hedgehogs;.

Not all of the options above will be suitable for all areas, and some, such as wildflower meadows or wetlands, will require long-term management. In developed estates, more aesthetic options may be preferable, and public safety will be a greater concern, which may rule out ponds, for example. Native species should be used to enhance or replace amenity grassland areas whenever possible, as these tend to support a greater range of native insects and birds. While non-native flowering plants and shrubs can have some biodiversity value, the emphasis where possible should be placed on creating semi-natural wildlife habitats. A focus on “prettification” alone will have limited ecological benefits.

4.3.4. Enhancing Gardens for Biodiversity

Ecological connectivity through corridors and stepping stones are becoming increasingly fragmented through the spread of residential and business developments. The priority in modern gardens is leaning towards aesthetics and lower maintenance, with hard surfaces, gravel and artificial lawns becoming increasingly popular. However, given the linear connected formations created by gardens in housing developments, they provide an opportunity to bolster and connect the ecological corridors and stepping stones. While it may not be possible to achieve high biodiversity in small gardens, collectively they can provide increased habitat and connectivity between areas of higher biodiversity, reducing the risk of ecological islands in densely developed areas.

In the United States, the National Wildlife Federation have developed a concept of awarding private landowners for efforts to create “*wildlife habitats*” in their gardens has been successful in spreading awareness and encouraging small-scale biodiversity enhancement projects. They have formulated a user-friendly checklist for participants, outlining what is required to achieve the certification. Such a campaign in addition to locally subsidised native tree planting on private property would create awareness of the importance of personal accountability in the conservation of local biodiversity, in addition to providing further ecological stepping stones and corridors within the study area. Opportunities to integrate such an approach into the Tidy Town process should be investigated.

Their potential biodiversity value should also be considered when proposing to develop/ manage allotments.

4.3.5. Tree and Hedges

A policy of replacement planting should be investigated for mature trees within and adjoining the study area (Figure 1.1); including stand-alone trees; treelines; trees within hedges and trees in natural and mixed woodland. Otherwise in years to come, as specimen trees progress from mature to over-mature; there is an increasing risk of loss of specimen trees to storms.

Appropriate protection should be carried out for as many hedgerows and treelines as possible where they come under future development pressure. However, the protection and isolation of small sections of hedges in the landscape often does not achieve the intended aim of protecting biodiversity as these isolated fragments tend to lose species richness and quality over time; in many cases they ultimately end up being removed. We would instead encourage consideration of the protection of a more meaningful set or network of hedges when site layouts are considered; a developer should be required to seek the advice of an ecologist and / or appropriately qualified landscape architect when making these decisions and consideration be given to hedgerow quality, opportunities for habitat compensation / biodiversity gain, habitat connectivity etc. Furthermore, we would encourage where possible that retained hedges should be the focus for the planting of small areas of woodland (using e.g. quick growing species such as alder, birch, ash, willow, hazel etc. as appropriate to the site), or areas of wet grassland / wetland as appropriate. The objective should be to create habitat patches / stepping stones within the landscape; to maximise the type and diversity of habitats and to allow proper connectivity between urban and peri-urban parks and the surrounding rural landscape. Further studies should be completed to rank and evaluate local hedgerows whilst providing recommendations on the future management and planting regimes associated with hedgerows.

Planting Trees For Pollinators (All-Ireland Pollinator Plan) recommends the following native pollinator friendly trees¹⁰: -

- Hawthorn/ Whitehorn
- Willow
- Blackthorn
- Rowan
- Wild Cherry
- Crab Apple

Table 4.4 (overleaf) reproduces Table 15.1 (a) of the Kildare County Development Plan 2023 – 2029 presents a summary of native plants that can be used in planting schemes.

¹⁰ <https://pollinators.ie/planting-trees-for-pollinators>

Table 4.4 Native Trees and Shrubs (from Table 15.1 (a) of KCC County Development Plan 2023-2029).

Common name	Height (max)	Suitable for public open spaces	Suitable for streets and confined spaces	Suitable for tubs, containers and raised beds etc.	Guide to planting: See key below
Alder	22m	Yes	No	Yes	ADPS
Alder Buckthorn	6m	Yes	No	Yes	D
Ash	28m	Yes	No	No	ADIPS
Aspen	24m	Yes	No	No	DPSV not close to buildings or services.
Arbutus (strawberry tree)	8m	Yes	No	Yes	Not frost hardy
Bramble	2m	No	No	No	C / H tends to be invasive
Broom	2m	Yes	No	Yes	tolerates dry conditions
Burnet Rose	2m	Yes	No	Yes, but vigorous	C / H. Restricted distribution. Not commonly.
Common (or European) Gorse	2.5m	Yes	No	In a rural setting	HV
Crab Apple	6m	Yes	No	No	AHIP
Dog Rose	2m	Yes	No	Yes. Vigorous	C / H
Downy Birch	18m	Yes	Yes	Yes	ADIP
Elder	6m	In hedge	No	No	V
Guelder Rose	4.5m	Yes	No	No	DH
Hawthorn	9m	Yes	Yes	Yes	AHIPS
Hazel	6m	Yes	No	No	AHS
Holly	15m	Yes	Yes	Yes	AHPS
Honeysuckle	climber	Yes	On walls	No	C
Ivy	climber	Yes	Yes	Yes	C
Juniper	6m	Yes	No	No	S
Pedunculate Oak	30m	Yes	No	No	AI only suitable for large spaces
Rowan or Mountain Ash	9m	Yes	Yes	Yes	ADHIP
Scots Pine	24m	Yes	No	No	AI
Sessile Oak	30m	Yes	No	No	AI only suitable for large spaces
Sliver Birch	18m	Yes	Yes	Yes	ADIP
Sloe, Blackthorn	3m	Yes	No	No	AHPV
Spindle	7.5m	Yes	No	No	H
Whitebeam spp.	12	Yes	Yes	Yes	IPS

Common name	Height (max)	Suitable for public open spaces	Suitable for streets and confined spaces	Suitable for tubs, containers and raised beds etc.	Guide to planting: See key below
Wild Cherry	15m	Yes	Yes	Yes	AHI
Wild Privet	3m	Yes	Yes	Yes	No
Willow spp.	6m	Some	No	No	V Not suitable near buildings or services
Wych Elm	30m	Yes	No	PS	
Yew	14m	Yes	No	Yes	AIPS

Key - (Native Trees and Shrubs)

A - Grows in a wide variety of soils

C – Climber

H - Suitable for hedging

I - Suitable as an individual tree

D - Tolerates or prefers damp conditions

P - Tolerates smoke or pollution

S - Tolerates shades

V - Invasive

Box 4.2: Recommendations on Tree and Shrub Planting (NHBC Foundation, 2021).

Structural heterogeneity of planting is important in creating high quality places for wildlife. A varied structure provides a greater range of features used by different wildlife, and so provides for a greater diversity of species.

There are four key principles to consider when planting blocks of trees or shrubs to make the most of structural planting for wildlife. Depending on the size of plot, aim to use a combination of these planting patterns (see also Figure 17, NHBC, 2021): -

- *vary the number of species in clumps or groups of trees using one to three species.*
- *vary the area of clumps or groups of trees.*
- *vary the space between clumps or groups of trees.*
- *vary the space between trees within clumps or groups of trees.*

In addition, straight planting lines are usefully avoided as, although they might provide minor easement of maintenance, they: create wind funnels, which cool the micro-climate, lower humidity, limit shelter and cause cooling in spring when wildlife, especially invertebrates, needs warmth cause sight lines, so remove concealment that is important to many animals. Applying these principles to create naturalistic landscaping with trees helps diversify both horizontal and vertical structure making it attractive to more wildlife. (NHBC Foundation 2021).

If possible, tree planting and tree pits should be incorporated within a planted area such as a rain garden. This facilitates the percolation of rainwater from the impermeable areas and also enhances the growing environment for the tree and improves the water handling capacity of the rain garden. In order to resolve these issues, urban trees are often planted into specially designed “tree pits” that are composed of designed soils and substrates that can both support the surrounding paved areas, roads etc. and also allow for water movement, air diffusion and tree root growth. There are various proprietary designs available. (DHLG -Nature-based solutions).

Source: -

NHBC Foundation (2021). *Biodiversity in new housing developments: creating wildlife-friendly communities*. NF89.

https://www.nhbcfoundation.org/wp-content/uploads/2021/05/S067-NF89-Biodiversity-in-new-housing-developments_FINAL.pdf

Box 4.3: Guidance on Biodiversity in New Housing Estates.

General Principles taken from Guidance on Biodiversity in New Housing Estates (NHBC Foundation, 2021):

Placemaking:

Existing natural features retained within the development footprint, be they veteran trees, old hedgerows, or ponds provide a context and character for the development. Incorporating them into the landscape scheme ensures continuity of that character. At the same time, doing so ensures more opportunities for wildlife than if starting from scratch, and provides enjoyable recreational space, through which the value of homes can be increased.

Implementations costs:

Examples of potential cost savings:

- retaining soils and adapting planting / seed mixes to suit them rather than importing soil should cause fewer plant failures and reduce soil handling
- Sustainable Drainage Systems (SuDS¹¹) that use soft landscape features have lower installation and maintenance costs than hard engineered solutions
- locally adapted native species are more durable, so have lower long-term maintenance costs

Protection and enhancement of wildlife:

- Create wildlife friendly multi-functional spaces
- Provide opportunities for building dependent species like bats and swifts
- Provide features for wildlife throughout the development even in built-up areas.
- Design landscaping with wildlife in mind.
- Incorporate enhanced sustainable drainage systems (SuDS)
- Ensure boundaries are permeable to wildlife
- Protect and enhance existing features (rather than starting from scratch).

Brownfield Land Recommendation:

Developments on brownfield land which incorporate into their landscape designs elements of the specialised habitats that develop on formerly developed land once it is abandoned, have real potential to retain what are often now rare and specialised species characteristic of these sites. Also, replicating brownfield features can lead to increased biodiversity.

Greenfield Land Recommendation:

Meanwhile, greenfield sites are often characterised by features such as hedgerows, mature trees, streams and ponds; these should be retained and used to inform both the layout of a site to accommodate them, and the design of the greenspace, which would use them as focal points. Existing connections between these features should be retained and new links created to provide so-called ecological networks.

Mitigation Hierarchy (to be incorporated into Design):

Avoid: Could damage to important habitats on site be avoided by considered layout, phasing, alternative technologies, reducing the scale of the development?

Minimise: Can alternatives to the development's location, siting, scale, layout or phasing be used to minimise impact?

Rehabilitate: Where features of ecological value must be temporarily damaged or removed to allow the development to take place, and these impacts are deemed acceptable, every effort should be made to return these areas to as close to the original state as possible, or better.

Compensate/offset: Any residual negative impacts should be compensated for by the creation or enhancement of habitat.

Fences and Walls:

Hard boundaries such as walls and fences form a barrier to ground dwelling animals such as hedgehogs, reptiles and amphibians, inhibiting their movement around a housing development. Creating small 13cm diameter or 13cm

¹¹ This is now also referred to as Nature Based Solutions for surface water management.

square holes in garden fences or walls allow them to pass between gardens. Avoid making holes that lead directly onto roads. Incorporating wildlife highways can also help with increasing biodiversity.

Verges with SuDS features incorporated to benefit wildlife:

- a varied vegetation structure, including grasses, low herbaceous vegetation, shrubs and trees
- a continuity of vegetation cover, linking with other landscape features to provide safe connectivity for, for example, hedgehogs to help them move through the development with minimal road crossing
- informal landscaping of grass and wildflower mixes appropriate to soil types and or conditions, with regularly mown areas adjacent to paths and roads, and more extensive mowing elsewhere.
- Where shrubs are used, plant mixtures of native and non-native shrubs of wildlife value in informal irregular shrub beds.

Bioretention beds and filter strips:

Bioretention beds and filter strips manage run-off from paths and roads. Omitting kerbs or leaving gaps between kerb stones allows water to enter these features. Removing kerbs makes it easier for wildlife such as amphibians and hedgehogs to escape the road.

Conveyances:

Where water needs to be conveyed across hard landscapes, rills or stone lined channels can add interest. These can be enhanced by planting wetland species around check dams or incorporating other design elements that can also be enhanced by planting.

Rain gardens:

These are shallow depressions with free-draining soil that slow and clean the run-off they receive from paved areas and roofs often via a water butt and downpipe. Or wildlife benefit ensure that planting is nectar-rich and of benefit to pollinators.

Use of materials generated from site clearance:

Materials generated from site clearance and construction where repurposed have a use in creating new features instead of being carried off site with costs involved. Soft landscaping features can also be created using repurposed materials: Beetle bank, butterfly bank, community orchards and allotments.

Roost features for bats:

The following features can be incorporated in to the design to maintain and encourage bat populations:

- retaining and enhancing existing mature landscape features e.g. trees, hedges, ponds and streams, within the development as these are favoured foraging areas.
- ensuring good connectivity between roosts and foraging areas by providing native hedges and trees
- designing the lighting plan to avoid illuminating roost entrances or the areas between the roost and foraging areas. (Follow Local Guidelines).

Source: -

NHBC Foundation (2021). *Biodiversity in new housing developments: creating wildlife-friendly communities*. NF89.

https://www.nhbcfoundation.org/wp-content/uploads/2021/05/S067-NF89-Biodiversity-in-new-housing-developments_FINAL.pdf

4.3.6. Wetlands/Surface Water Management

Wetland loss has been a significant feature of biodiversity loss in Ireland. When attenuating or treating surface water runoff, consideration should be given to adopting soft engineering solutions. When designed, built and operated appropriately these can represent valuable additions to biodiversity in an area while also assisting in the delivery of good status in all our rivers in Ireland as required by the Water Framework Directive. The need to protect and safeguard surface and groundwater quality within Maynooth (County Kildare) is particularly pertinent. The many diverse semi-natural wetland habitats located within the localised area (e.g. Lyreen wetlands) are perpetuated by the intricate surface and groundwater features associated with the study area. Point source or more extensive impacts to watercourses in these areas have the potential to result in considerable changes to the diversity and the overall integrity associated with these wetlands areas.

The Department of Housing, Local Government and Heritage (DHLGH) recently published *Nature-based Solutions to the Management of Rainwater and Surface Water Runoff in Urban Areas Water Sensitive Urban Design*. A summary of nature-based solutions to the management of rainwater and surface water runoff in urban areas is presented in Box 4.4.

Box 4.4: Nature-based solutions to the management of Rainwater and Surface Water Runoff in Urban Areas.

Enhance water quality and resource management by:

- Ensuring flood risk management informs place-making by avoiding inappropriate development in areas at risk of flooding in accordance with The Planning System and Flood Risk Management Guidelines for Planning Authorities.
- Ensuring that River Basin Management Plan objectives are fully considered throughout the physical planning process.
- Integrating sustainable water management solutions, such as Sustainable Urban Drainage (SuDS), porous surfacing and green roofs, to create safe places.

Irish Water policy is to promote the use of nature-based solutions in urban areas in order to reduce the need for large scale and more costly underground solutions such as large pipes and tunnels. Traditional engineering solutions to rainwater management using gullies and piped underground networks are not easily adapted to a changing rainfall pattern. Which can potentially result in catastrophic flooding.

To facilitate the restoration of rivers in urban areas, there is a need for local authorities to take a proactive approach. This should involve the consideration of any future requirements that would facilitate such restoration, in line with Water Framework Directive objectives. This is likely to include ‘making space’ for water bodies within developed areas and identifying riparian areas that need to be protected and should be based on historic river mapping as well as on the OPW catchment flood risk modelling. This approach can be used to inform other spatial plans such as development plans and local area plans and to support the restoration of urban rivers and streams to the largest extent possible, as development takes place.

In order to use a water sensitive urban design approach, it is important that, having looked at the urban area in three dimensions and mapped the anticipated rainfall flow patterns, that urban areas are designed to contribute, as far as practicable, to the retention, treatment and storage of rainwater, prior to its discharge back to the water environment. Using an innovative approach to urban design, it should be possible to achieve this while also enhancing placemaking, the use of sustainable transport and the “self-regulated streets” approach promoted by DMURS.

Areas around buildings should be designed to incorporate appropriate nature-based solutions to the management of rainwater and surface water runoff. Basements should be designed with sufficient vertical clearance below finished ground level that will allow sufficient soil depth for planted areas above the basements to retain and treat rainwater runoff before disposal through underground pipes into the drainage system.

Source: -

Department of Housing, Local Government and Heritage (DHLGH) (2022). *Nature-based Solutions to the Management of Rainwater and Surface Water Runoff in Urban Areas Water Sensitive Urban Design*. Best Practice Interim Guidance Document.

4.3.7. Road Network

NBDC published guidance for pollinators along transport corridors in 2022. Key elements of this guidance are summarised in Box 4.5. Maynooth is bordered to the south by the M4 Motorway corridor.

Box 4.5: Pollinator-friendly management of: Transport Corridors.

Actions for pollinators along transport corridors (roads and railways):

- A. Identify and protect existing areas that are good for pollinators.
 - **Action 1:** Protect existing sources of food and shelter for pollinators
 - **Action 2:** Limit habitat loss during project or maintenance works
 - **Action 3:** Protect embankments and rock cuttings for pollinators
 - **Action 4:** Protect boundary walls for pollinators
 - **Action 5:** Protect 'Habitat islands' at junctions and interchanges for pollinators
 - **Action 6:** Consider transport corridors for nocturnal pollinators
- B. Reduce the frequency of mowing of grassy areas.
 - **Action 7:** Manage immediate verge for pollinators
 - **Action 8:** Manage wider verge area for pollinators
- C. Pollinator-friendly planting.
 - **Action 9:** Incorporate new native hedgerows into planting for new transport corridor landscape schemes
 - **Action 10:** Create a native wildflower meadow
 - **Action 11:** Incorporate ornamental pollinator friendly trees and shrubs into planting for new linear infrastructure landscape schemes (only where native planting is unsuitable)
 - **Action 12:** Plant pollinator-friendly trees along streets in towns and villages
 - **Action 13:** Plant pollinator-friendly seasonal beds
 - **Action 14:** Plant pollinator-friendly bulbs
 - **Action 15:** Make the area around service stations/ Luas stops/train stations/Park and Ride stops pollinator-friendly
- D. Provide wild pollinator nesting habitat: hedgerows, earth banks, bee hotels.
 - **Action 16:** Manage native hedgerows as nesting habitat
 - **Action 17:** Protect embankments and rock cuttings for solitary bees
 - **Action 18:** Include shelter for solitary bees at train stations and service stations
- E. Reduce the use of pesticides
 - **Action 19:** Reduce the use of Pesticide (Herbicides, fungicides, insecticides)
- F. Promote the aims of the All-Ireland Pollinator Plan in planning of new infrastructure and make staff aware of management actions for pollinators
 - **Action 20:** Promote the aims of the All-Ireland Pollinator Plan when designing new linear transport schemes, and make staff aware of management actions for pollinators
 - **Action 21:** Log your actions

Source: -

NBDC (2022). *Pollinator-friendly management of: Transport Corridors*. All-Ireland Pollinator Plan, Guidelines 9. National Biodiversity Data Centre Series No. 20, Waterford. Sept, 2019. Updated Oct 2022.

4.3.8. Bats and Birds

The study area incorporates a mix of historic built structures (e.g. Maynooth Castle; Maynooth University / St Patrick's College), which along with newer buildings, bridges and trees offer a host of roosting opportunities for bats. In general, there is an abundance of good quality bat habitat within the Maynooth study area (Figure 1.1; 2.1). The significant number of mature trees and tree lined avenues, as well as wetlands such as Lyreen and the Royal Canal provide good quality habitat for bats, as well as corridors for movement through the wider landscape. Maynooth University Bat Box Project is also ongoing placing bat boxes on trees within the campus.

Lundy et al. (2011). *Landscape conservation for Irish bats & species specific roosting characteristics* characterises the landscape in the environs of Maynooth as being of high value for bats (see also NBDC viewers).

We would encourage the following: -

1. Include consideration of bats when considering developments that might impact on potential roost, foraging and commuting sites¹².
2. To this end consult with Bat Conservation Ireland, NPWS etc. as to the current understanding of bat diversity, numbers and distribution in each of the study areas and their environs.
3. Depending on the findings of the above either commission bat surveys or liaise with voluntary groups in order to assist them with the delivery of such as survey.
4. Use the findings of the above to inform decision on e.g. landscape planting at new developments; vegetation management; decide on locations for bat boxes etc.

This should then provide the Council with baseline data to inform forward planning decisions. Useful documents include: -

- NRA Best Guidelines for the Conservation of Bats - <http://www.nra.ie/Publications/DownloadableDocumentation/Environment/file,3487,en.pdf>
- NPWS Bat Mitigation Guidelines for Ireland. Irish Wildlife manual No. 25. - <http://npws.ie/publications/irishwildlifemanuals/>
- Heritage Council – the Heritage Council have published a range of documents including Bat Survey Guidelines for Heritage Buildings; Bats, Birds and You which can all be downloaded from the Heritage Council webpage at - <http://www.heritagecouncil.ie>
- JNCC – Habitat Management for Bats - http://jncc.defra.gov.uk/pdf/habitat_management_for_bats.pdf

With respect to birds, we would recommend liaison with BirdWatch Ireland Kildare Branch (<http://www.birdwatchkildare.com/>) when formulating habitat creation or landscaping proposals in order to integrate plans for erecting bird boxes and to determine which species would benefit most; e.g. Swift (*Apus apus*) are very vulnerable to loss of nest sites during building repair works (details of nest boxes can be found online). The Kildare Branch of BirdWatch Ireland has recently undertaken the construction and installation of a number of bird boxes varying in size and dimensions. While many nest box programmes target high profile species, such as Kestrel (*Falco tinnunculus*) and Barn Owl (*Tyto alba*), we would also encourage installation of boxes for species such as House Sparrow (*Passer domesticus*). In all cases you must ensure suitable foraging habitat is present nearby. Nest box programmes can also be operated in co-operation with local schools and play an important role in biodiversity education.

The presence of a large number of tall buildings in areas such as Maynooth Castle; Maynooth University / St Patrick's College are such that consideration should be given to the installation of Swift nest boxes.

¹² Note: It is an objective of Kildare County Council to - Require that expert advice is sought from a suitably qualified bat expert, in developing lighting proposals along river and stream corridors or other important locations or corridors for wildlife, to mitigate impacts of lighting on bats and other species. The use of artificial lighting shall be avoided in streamside zones (see Figure 12.2 of KCC, CDP 2023-2029) and artificial lighting should be restricted unless absolutely necessary in the middle zone (see Table 12.4 of KCC, 2023-2029). LEDs should, where permitted, be warm white to minimise disturbance to wildlife.

4.3.9. Invasive Species

The findings of the 2007 habitat survey indicated that non-native invasive species such as Japanese knotweed are present, but do not appear to be a significant issue within Maynooth (field observations & NBDC map viewer). Areas of Japanese knotweed have been recorded within the Maynooth Environs (Section 2.2.11). There are no records of Himalayan knotweed, Giant knotweed or Himalayan balsam from within the study area. Giant Hogweed has been recorded from N9638 (At the N.E. corner of Carton estate, within the grounds. Carton, east of Maynooth. Kildare) (NBDC map viewer).

Nonetheless the presence, establishment and spread of invasive plant species should be closely monitored as control costs for (e.g. Japanese knotweed) can become prohibitive once the species has become both abundant and widely distributed. Nonetheless, initiatives should be put into practice whereby staff in Kildare and Meath County Councils can be instructed on how to identify such invasive species and modify work practices accordingly around such species.

4.3.10. Managing Key Green Infrastructure

Management plans should be developed for key pieces of Green Infrastructure identified in this report, particularly those in public ownership. Drafting management plans should also be explored with other landowners, where appropriate. For many sites, appropriate management is required to conserve and enhance their biodiversity value; otherwise, this value will be lost through neglect. Some sites will require removal of exotic species, and some will require regular management in the form of mowing or vegetation control. More detailed site-by-site advice is beyond the scope of this report, however. As noted above, management should follow best practice and should include community groups at all stages.

4.4. Education

4.4.1. Public Awareness and Education

Public awareness of the natural heritage within Maynooth and Environs has been raised by this project and others in the recent past. Public education on natural heritage has also been enhanced by such activities as Heritage Week. This work should continue and should also emphasise links between built and cultural heritage and natural heritage, where appropriate.

The results of this habitat survey should be disseminated widely and made available in easily accessible formats, such as on the internet and in the form of a user-friendly brochure or other publication.

4.4.2. Conservation Management

Programmes to educate the general public on gardening and small-scale habitat creation to enhance biodiversity should be supported and promoted. These should be as practical and hands-on as possible and could perhaps be linked with ongoing biodiversity enhancement of public Green Infrastructure.

4.5. Site Specific Measures

Based on the above a number of specific proposals are recommended: -

- Undertake a programme of more comprehensive ecological surveys and prepare a site specific management plan for Lyreen Wetlands.
- Prepare a Woodland Management Plan for woodlands in Carton Demesne, with particular emphasis placed on its use by Woodcock.
- Prepare a Management Plan for semi-natural habitats, especially grasslands, within Laraghbryan Cemetery.
- Explore opportunities for erecting Swift next boxes within Maynooth (note e.g. to the OPW Swift Initiative - <https://heritageireland.ie/articles/opw-swift-initiative/>).

- Consult with Waterways Ireland ecology team with respect to opportunities for biodiversity gain, enhancement of habitats for pollinators etc. along the Royal Canal pNHA.
- Consult with Transport Infrastructure Ireland with respect to how they manage habitats along the M4 Motorway corridor and how such measures can be integrated with management of habitats more widely in Maynooth.
- Prepare recommendations for Tree Planting in Maynooth.
- As noted there is a dense network of hedges in the eastern side of the town. The landscape / archaeological significance of this landscape should be explored.

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Appendices



Appendix A. Habitat Classification According to Fossitt (2000)

The table below outlines the classification of terrestrial and freshwater habitats according to the Heritage Council classification system (Fossitt, 2000). Level 1 of the hierarchy is indicated by a single-letter code, level 2 is indicated by a two-letter code, and level 3 is indicated by a three-character alphanumeric code.

Table A.1 – Heritage Council habitat classification system (Fossitt, 2000).

F FRESHWATER	
FL Lakes and Ponds	FL1 Dystrophic lakes
	FL2 Acid oligotrophic lakes
	FL3 Limestone/marl lakes
	FL4 Mesotrophic lakes
	FL5 Eutrophic lakes
	FL6 Turloughs
	FL7 Reservoirs
	FL8 Other artificial lakes and ponds
FW Watercourses	FW1 Eroding/upland rivers
	FW2 Depositing/lowland rivers
	FW3 Canals
	FW4 Drainage ditches
FP Springs	FP1 Calcareous springs
	FP2 Non-Calcareous springs
FS Swamps	FS1 Reed and large sedge swamps
	FS2 Tall herb swamps
G GRASSLAND AND MARSH	
GA Improved grassland	GA1 Improved agricultural grassland
	GA2 Amenity grassland (improved)
GS Semi-natural grassland	GS1 Dry calcareous and neutral grassland
	GS2 Dry meadows and grassy verges
	GS3 Dry-humid acid grassland
	GS4 Wet grassland
GM Freshwater marsh	GM1 Marsh

H HEATH AND DENSE BRACKEN	
HH Heath	HH1 Dry siliceous heath
	HH2 Dry calcareous heath
	HH3 Wet heath
	HH4 Montane heath
HD Dense bracken	HD1 Dense bracken
P PEATLANDS	
PB Bogs	PB1 Raised bogs
	PB2 Upland blanket bog
	PB3 Lowland blanket bog
	PB4 Cutover bog
	PB5 Eroding blanket bog
PF Fens and Flushes	PF1 Rich fen and flush
	PF2 Poor fen and flush
	PF3 Transition mire and quaking bog
W WOODLAND AND SCRUB	
WN Semi-natural woodland	WN1 Oak-birch-holly woodland
	WN2 Oak-ash-hazel woodland
	WN3 Yew woodland
	WN4 Wet pedunculate oak-ash woodland
	WN5 Riparian woodland
	WN6 Wet willow-alder-ash woodland
	WN7 Bog woodland
WD Highly modified/non-native woodland	WD1 (Mixed) broadleaved woodland
	WD2 Mixed broadleaved/conifer woodland
	WD3 Yew woodland
	WD4 Conifer plantation
	WD5 Scattered trees and parkland
WS Scrub/transitional woodland	WS1 Scrub
	WS2 Immature woodland
	WS3 Ornamental/non-native shrub

	WS4 Short rotation coppice
	WS5 Recently-felled woodland
WL Linear woodland/scrub	WL1 Hedgerows
	WL2 Treelines
E EXPOSED ROCK AND DISTURBED GROUND	
ER Exposed rock	ER1 Exposed siliceous rock
	ER2 Exposed calcareous rock
	ER3 Siliceous scree and loose rock
	ER4 Calcareous scree and loose rock
EU Underground rock and caves	EU1 Non-marine caves
	EU2 Artificial underground habitats
ED Disturbed ground	ED1 Exposed sand, gravel or till
	ED2 Spoil and bare ground
	ED3 Recolonising bare ground
	ED4 Active quarries and mines
	ED5 Refuse and other waste
B CULTIVATED AND BUILT LAND	
BC Cultivated land	BC1 Arable crops
	BC2 Horticultural land
	BC3 Tilled land
	BC4 Flower beds and borders
BL Built land	BL1 Stone walls and other stonework
	BL2 Earth banks
	BL3 Buildings and artificial surfaces

In this report, Heritage Council habitat types were grouped into broad habitat groups according to the system outlined in Table B.2 overleaf. Where habitats occur in mosaics, the habitat area has been categorised in a broad habitat group according to the dominant habitats, with the exception of BL3 – buildings and artificial surfaces. All habitats containing habitat type BL3 have been included in the Buildings and Gardens group, except for a few mosaic types as noted overleaf.

Table A.2 – Kildare broad habitat group equivalencies with the Heritage Council classification system.

Broad Habitat Group	Heritage Council Habitat Types
Buildings and Gardens	BL3 – Buildings and artificial surfaces WS3 – Ornamental / non-native shrub
Intensive Agriculture	BC – Cultivated land GA1 – Improved agricultural grassland (including mosaics with BL3) ¹³
Amenity Grassland	GA2 – Amenity grassland (improved) ¹⁴
Disturbed Ground	ED2 – Spoil and bare ground (including mosaics with BL3) ¹⁵ ED3 – Recolonising bare ground (including mosaics with BL3) ¹⁵
Semi-natural Grassland	GS – Semi-natural grassland
Woodland and Scrub	W – Woodland and scrub ¹⁴
Rivers	FW – Watercourses
Wetlands	FS1 – Reed and large sedge swamps FS2 – Tall herb swamps GM1 – Marsh FP – Springs
Lakes and Ponds	FL – Lakes and ponds

¹³ The mosaic GA1 \ BL3, sometimes including ED3 as a minor constituent, was rarely used for agricultural grassland in which a farm outbuilding or other structure was situated.

¹⁴ Except for the golf course, which is classified as scattered trees and parkland (WD5) but assigned to the Amenity Grassland group.

¹⁵ These mosaic types were used for construction sites or similar areas where the area of buildings or hard surfaces such as concrete or tarmac is small relative to disturbed soil.

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