



ARKLOW LOCAL PLANNING FRAMEWORK 2026

GREEN INFRASTRUCTURE AUDIT



Foreword

This is the Green Infrastructure Audit (GIA) for Variation No. 6 to the Wicklow County Development Plan 2022-2028, including the Arklow Local Planning Framework 2026. This assessment was carried out in 2025 in order to prepare the objectives and land use zonings of the draft Local Planning Framework and therefore does not reflect the material alterations made to the final Variation/LPF. However, this document has been updated to include the final Map No. 3 Key Green Infrastructure.

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1.0 Approach to Green Infrastructure in Arklow

Chapter 18 of the Wicklow County Development Plan 2022-2028 sets out the policies and objectives applicable to Arklow with regard to Green Infrastructure.

It states that Green Infrastructure (GI) can be broadly defined as *'an interconnected network of green space that conserves natural ecosystem values and functions and provides associated benefits to human populations. Green Infrastructure is the ecological framework needed for environmental, social and economic sustainability – in short it is a nation's natural life sustaining system'*.

Green Infrastructure can include varying land uses - pasture lands, croplands, woodlands, heath, bog, scrubland, quarries, parks, formal and informal green spaces, active and passive spaces, areas around domestic and non-domestic buildings, brownfield areas, waterways, waterbodies, waterway corridors, wetlands, coastal areas and community/institutional lands such as hospitals, schools, graveyards, allotments and community gardens. Heritage sites, European sites and NHAs are also important GI sites.

Specifically County Policy Objective 18.5 states that it is an objective of Wicklow County Council:

'To identify and facilitate the provision of linkages along and between green / river corridors within the county and adjoining counties to create inter connected routes and develop riverside parks and create linkages between them to form 'necklace' effect routes including development of walkways, cycleways, bridleways and wildlife corridors where feasible and ensuring that there is no adverse impact (directly, indirectly or cumulatively) on the conservation objectives of European sites.'

Therefore, in the creation of Green Infrastructure mapping for the new Arklow Local Planning Framework (LPF), primarily watercourse-based green corridors were identified to form the core of ecological corridors in the area. Other areas of potential biodiversity value were also identified, and thereafter potential linkages between same were evaluated in order to connect the individual sites into a coherent, interlinked network of ecological corridors and 'necklace' effect routes throughout the LPF area.

In the identification of watercourse-based green corridors, particular regard has been had to CPO 17.26 of the Wicklow County Development Plan, which requires a 25m riparian buffer zone along watercourses in line with guidance issued by Inland Fisheries Ireland.

Other areas of value that have been included as sites in the ecological corridor network have been informed by the Wicklow County Development Plan 2022-2028, with a particular focus on the County Policy Objectives set out in Chapter 17 'Natural Heritage & Biodiversity', combined with the data sources listed to follow. Such sites could include:

- Protected sites, e.g. NHAs or pNHAs, and land in close proximity and visibility to such;
- Areas identified as local biodiversity areas in previous studies;
- Significant existing areas of forestry or woodland, and woodland legacy habitats, as identified by GIS mapping, aerial imagery and visual inspection;
- Existing hedgerows or linear tree stands that provide connectivity between sites;
- Existing wetland areas / habitats;

- Existing residential/public open space contiguous to site of biodiversity value which can act as green corridors;
- Where relevant, existing 'green' land use zonings as per the Arklow Local Area Plan 2018-2024;
- Residual areas of land, e.g. narrow areas of land between a GI asset and a physical constraint, e.g. a narrow strip of land between a riparian buffer zone and a roadway, whereby the strip could further add to the riparian buffer (or set aside further lands for biodiversity) and further protect/filter surface water entering the watercourse, where development on the lands may be physically difficult and may preclude the inclusion of adequate surface water infrastructure/protection.

The resultant **Map No. 3 Key Green Infrastructure** (see below) includes a series of interconnected ecological sites / corridors throughout the plan area.

Note that the inclusion or exclusion of individual hedgerows/linear tree stands does not speak to the biodiversity value, or lack thereof, or any individual such feature. Rather, it indicates hedgerows/linear tree stands of particular relevance for connectivity between larger sites of ecological importance.

Other non-contiguous features have been included in the Green Infrastructure Map. Such standalone features (which could include residential open space, cemeteries, etc.) could act as important 'stepping stones' between different branches of ecological corridors.

While existing roadways do cross the identified ecological corridors, some level of permeability may be possible through culverts. As such, ecological corridors have been mapped as crossing roadways. Where permeability is poor e.g. narrow, long section of pipe culverts, it is recommended that objectives be included in the Arklow LPF to require significant road improvements to ameliorate / improve culverts to more permeable features. Such features could include box culverts with wildlife ledges, or indeed clear-span bridges in place of culverts.

While the Green Infrastructure Map is not intended as a land use map (see below), it is recommended that objectives be included in the Arklow LPF to ensure the maintenance of the biodiversity value and ecological connectivity of identified (or otherwise) Green Infrastructure assets.

2.0 Green Infrastructure Data Sources

In the creation of Green Infrastructure mapping, regard was had to the following sources of information:

Tailte Éireann Prime 2 Mapping:

WATER_LINE
WATER_SINGLE_STREAM_LINE
WATER_POLY
VEGETATION_POLY (FUNC_ID = Managed Woodland)
VEGETATION_POLY (FUNC_ID = Unmanaged Woodland)
VEGETATION_POLY (FUNC_ID = Green Space)
VEGETATION_POLY (FUNC_ID = Cemetery)
VEGETATION_POLY (FUNC_ID = Graveyard)
EXPOSED_POLY (FUNC_ID = Sand)
EXPOSED_POLY (FUNC_ID = Sand & Gravel)
EXPOSED_POLY (FUNC_ID = Dunes)
EXPOSED_POLY (FUNC_ID = Flat Rock)
ARTIFICIAL_POLY (FUNC_ID = Rail Edge)
ARTIFICIAL_POLY (FUNC_ID = Rail Bed)

EPA OGC Web Mapping Service:

River Waterbodies

National Parks & Wildlife Service OGC Web Map Service:

Special Protection Area (SPA)
Proposed Natural Heritage Area (pNHA)

Bluesky Mapping:

National Tree Map

WCC Datasets:

Arklow Urban Habitat Mapping

Historical Mapping & Aerial Imagery:

Geohive.ie
Google Earth
Google Maps

The Environmental Impact Assessment, Appropriate Assessment, Ecological Assessment, or other assessments of recent and historical planning applications, as relevant.

Local Biodiversity Studies:

Arklow Town Urban Habitat Study 2008
<https://www.wicklow.ie/Portals/0/adam/Documents/ywfT1QIHjEOXVTN0dV6nPw/Link/Arklow%20Urban%20Habitat%20Mapping%202008.pdf>
Arklow Biodiversity Action Plan 2021
<https://actionforbiodiversity.ie/app/uploads/2023/07/Arklow-Biodiversity-Action-Plan-2021.pdf>
Arklow Marsh Protection Report May 2025 (see Appendix A)
Arklow & Environs Hedgerow Survey 2024 (see Appendix B)

Arklow Local Area Plan 2018-2024: Existing zoning

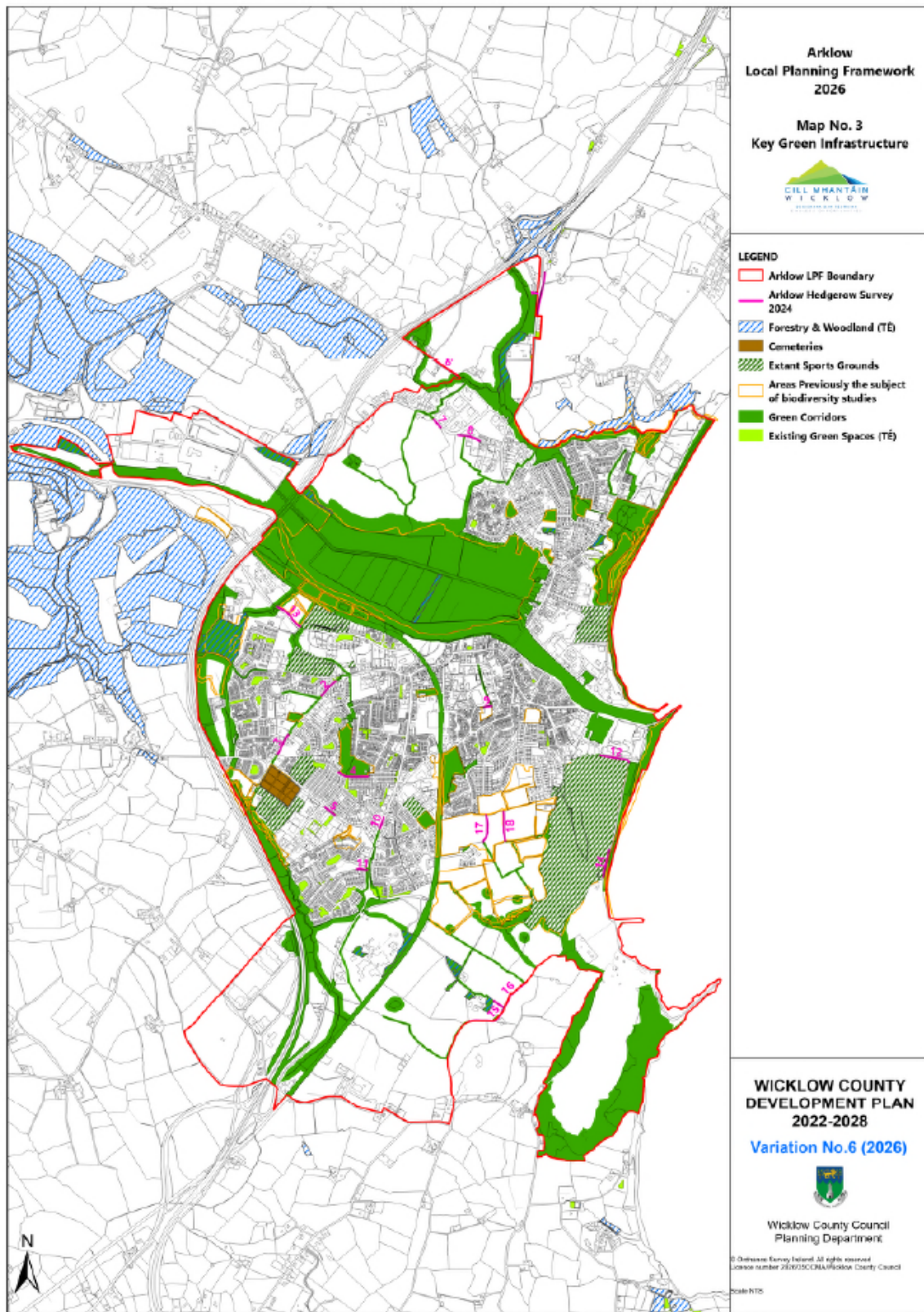


Figure 1: Map No. 3 Key Green Infrastructure

3.0 Approach to Green Infrastructure & Land Use Zoning in Arklow

Map No. 3 Key Green Infrastructure indicates Green Infrastructure Assets regardless of the land use zoning of the assets in question.

In some cases, it may be worth zoning areas of land for a land use that would ensure the protection of such GI assets, e.g. 'OS2 Natural Areas', while in other cases it may be too prescriptive or unwieldy to identify and 'zone' all GI assets on a land use map.

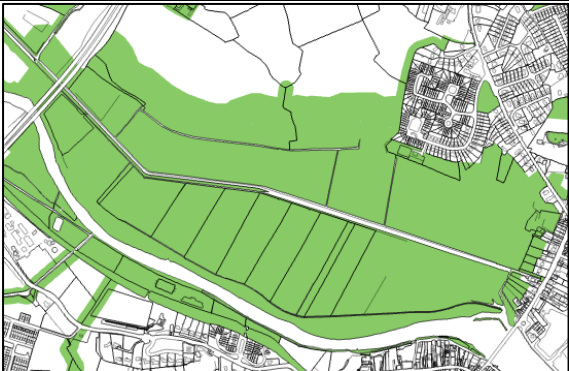
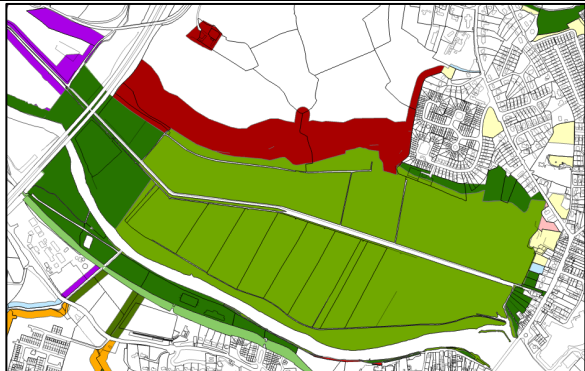
It is proposed to transpose GI assets as necessary into land use zoning objectives throughout the LPF area utilising the following approach:

- Defined European Sites will not be zoned;
- Other Protected Sites (NHA, pNHA) will be zoned 'Open Space'(OS);
- Necessary buffers around defined European, or other protected sites, will generally be protected via an appropriate 'OS' land use zoning objective;
- 25m riparian buffer zones, where largely undeveloped, will generally be specifically protected via an appropriate 'OS' land use zoning objective, as per CPO 17.26 of the Wicklow County Development Plan 2022-2028;
- Significant areas of existing woodland/forestry will, where deemed necessary, generally be protected via an appropriate 'OS' land use zoning objective, as per CPO 17.18-17.23 of the Wicklow County Development Plan 2022-2028;
- 'Residual Areas', as outlined above, will generally be specifically protected via an appropriate 'OS' land use zoning objective.
- Hedgerows and linear tree stands will generally **not** be protected via land use zoning objectives unless of significant value / spatial extent but will rather be addressed in the development management process;
- GI assets that form part of an existing permitted development, or were zoned RE 'Existing Residential' in the previous Arklow Local Area Plan, will be included or excluded as land use zoning objectives on a case-by-case basis. Where not included, they can be addressed through the development management process.

Those assets identified as warranting protection via an appropriate land use zoning objective may have a variety of land use zonings applied to them. A precautionary approach will generally be followed, where land use zonings will be considered in the following order of preference: OS2 'Passive Open Space' zoning objectives as a first preference; followed by a preference for OS1 'Open Space' or AOS 'Active Open Space' zoning objectives; followed by zoning objectives that could involve the substantial development of structures on the land. Where there is ambiguity about the level of development possible on a GI asset while maintaining its essential biodiversity and ecological connectivity functions, input from WCC Heritage/Biodiversity Officers may be sought.

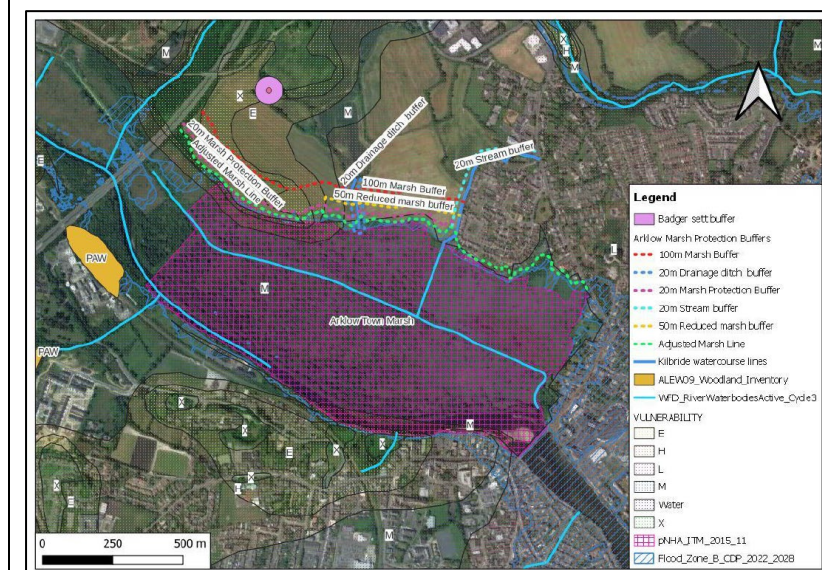
Note that this document addresses lands zoned for reasons of green infrastructure/ecological connectivity/biodiversity only, and does not preclude the planning authority from zoning other lands as OS2 'Natural Areas', OS1 'Open Space', AOS 'Active Open Space', etc., as deemed appropriate.

4.0 Land Use Zoning assessment & recommendations with respect to Green Infrastructure assets

Location	Arklow Town Marsh & Environs
Description	Proposed Natural Heritage Area on northern banks of Avoca River and adjacent lands, including a 100m buffer from the northern boundary of the marsh, backlands of properties at Ferrybank, and watercourse buffers.
Map of GI asset	Land Use Zoning Arklow LAP 2018
	
Key considerations impacting future zoning	Designated site (pNHA), previous zoning, Flood Risk, Arklow Marsh Protection Report May 2025

Assessment & Recommendation for New LPF

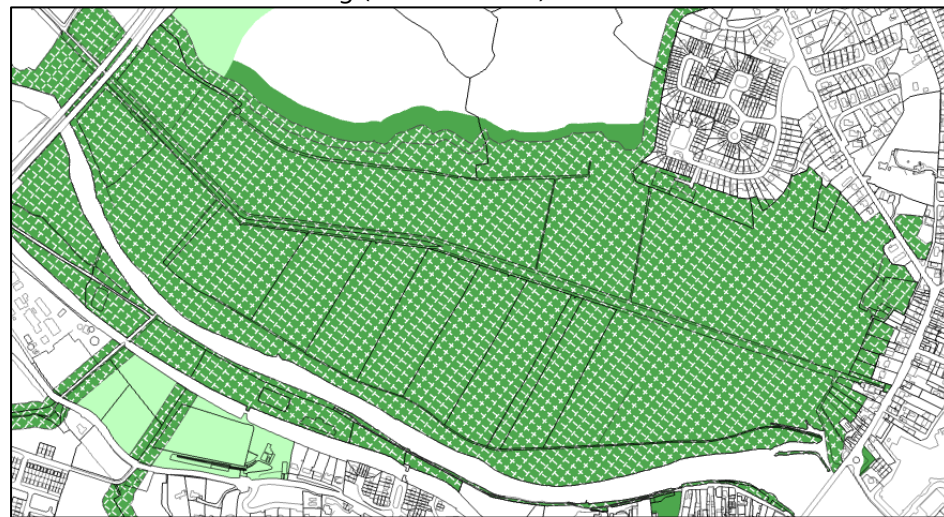
The Arklow Marsh Protection Report advises a 100m buffer north of the adjusted Marsh Line, as indicated by the red line below. This area is shown as part of the GI asset in the map of the site above (left).



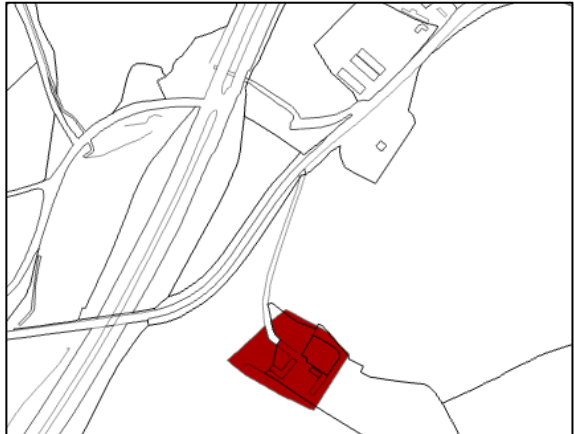
Noting that there are extant permissions in this area based on an agreed Action Area Plan under the 2018 LAP, the following is recommended for the draft LPF:

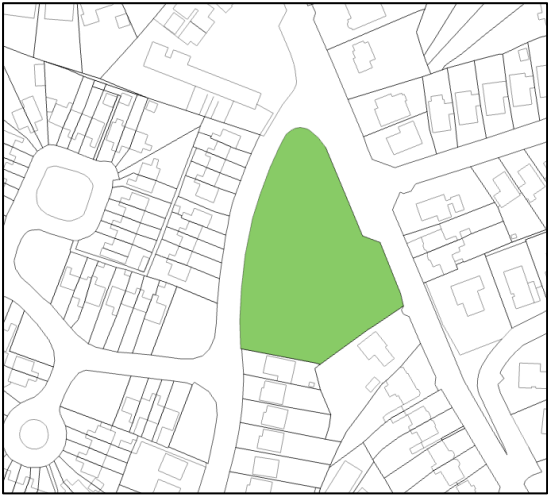
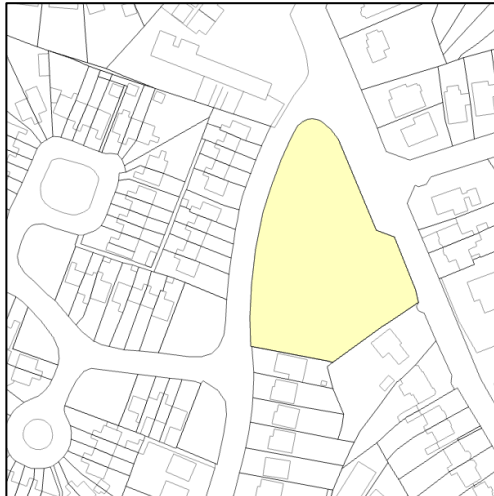
- Lands along the northern side of Arklow Town Marsh have been zoned OS1 to facilitate the development of a linear park acting as a buffer between this proposed NHA and the proposed new residential development to the north. This area is located in SLO5 Kilbride which is earmarked for significant future residential development. This new amenity parkland will serve to link proposed and existing residential development in this area to the proposed AOS lands to the west whilst also facilitating possible walking and cycle connections towards Ferrybank and the town centre.
- In relation to backlands to the rear of properties west of the R772 at Ferrybank, zoned RE 'Existing Residential' and LSS 'Local Shops and Services', flood risk is apparent throughout the area. It is considered appropriate that the precedent established in the last plan of OS2 zoning to backlands just south of this area be extended, providing an extended buffer to the east of the Marsh.
- On the basis of the sites designation as a pNHA, the previous land use zoning on the lands, the recommendations of the Arklow Marsh Protection Report May 2025 and the risk of flooding in the area, it is recommended to zone the lands OS2 'Natural Areas', OS1 'Open Space' and AOS 'Active Open Space' as recommended above. Areas not included as OS2 or OS1 should be excluded from the final GI map green corridors.

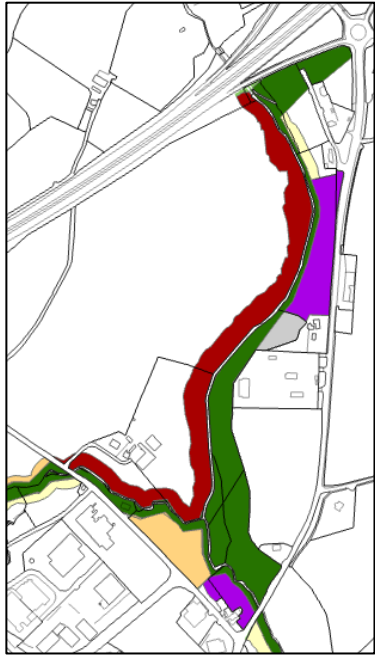
The resultant land use zoning (OS2/OS1/AOS) is illustrated below:



Location	Watercourses north of Marsh
Description	Two watercourses feeding into the Arklow Town Marsh pNHA from the north, one of which appears to be culverted through the grounds of a school.
Map of GI asset	Land Use Zoning Arklow LAP 2018  MU 'Mixed Use', RE 'Existing Residential', CE 'Community & Education'.
Key considerations impacting future zoning	Watercourse 25m riparian buffer zone CPO 17.26, Arklow Marsh Protection Report May 2025
Assessment & Recommendation for New LPF	
The Arklow Marsh Protection Report May 2025 recommends that a 25m protected riparian buffer zone should also be applied to the Ferrybank watercourse and drainage ditch along the eastern boundary of the SLO that drains into the marsh. Zone all lands identified as a GI asset, other than the culverted section through the RE/CE lands, OS2 'Natural Areas'. It is not considered necessary to retain the green corridor through the RE/CE lands on the GI map, as this corridor does not continue into any GI asset on the eastern side of the R772.	

Location	Kilbride House
Description	Ruined house and outbuildings.
Map of GI asset	Land Use Zoning Arklow LAP 2018
	 MU 'Mixed Use'.
Key considerations impacting future zoning	CPO 17.4 Protected Species
Assessment & Recommendation for New LPF	
Planning history, including the Environmental Impact Assessment Impact Report included under WCC Reg. Ref. 25/60387, indicated that this area is the location of active badger setts. On this basis, zone all lands identified as a GI asset OS2 'Natural Areas'.	

Location	Dewadden Drive
Description	Green space between Dewadden Drive and Dublin Road.
Map of GI asset	Land Use Zoning Arklow LAP 2018
	 RE 'Existing Residential'
Key considerations impacting future zoning	Identified Urban Habitat
Assessment & Recommendation for New LPF	
The site was identified as Site 12 during Arklow Urban Habitat Mapping 2008, where it was described as follows: <i>'Species Poor amenity grassland of low conservation value'</i>. No recommended management practices were set out for this site. The site was not resurveyed as part of the Biodiversity Action Plan for Arklow 2021. As a residential green space within an existing housing estate, which is not adjacent/contiguous with any green corridor, it is recommended that the site retains its previous RE 'Existing Residential' zoning. It is further recommended that general objectives in relation to the improvement of identified urban habitats of low conservation value be included.	

Location	Templeraíney Stream North
Description	Watercourse forming the boundary of the townlands of Coolboy, Killiniskyduff and Kilbride north of Beech Road, with areas of flood risk.
Map of GI asset	Land Use Zoning Arklow LAP 2018
	 OS2 'Passive Open Space', MU 'Mixed Use', E 'Employment', R10 'New Residential', RE 'Existing Residential'.
Key considerations impacting future zoning	Watercourse 25m riparian buffer zone CPO 17.26, Flood Risk, Previous OS Zoning, Residual Areas between riparian buffers and roadways.
Assessment & Recommendation for New LPF	
Lands at the north east of the GI asset were previously zoned OS2 on the basis of buffers from the M11 motorway as opposed to the presence of sites of biodiversity value. As there are proposals for the development of a park and ride in this area, it is considered that the areas of GI asset outside the riparian corridor in the north-east, adjacent to the M11, be not zoned OS2 to facilitate this via another land use zoning. Zone all other lands identified as a GI Asset OS2 'Natural Areas'.	

Location	Templeraíneay Stream West
Description	Watercourse partly forming the boundary between the townlands of Coolboy and Kilbride, to both the north and south of Beech Road. Lands to west of the stream and north of houses on Beech Road, beyond the 25m watercourse buffer, were previously zoned OS2 in the Arklow LAP 2018.
Map of GI asset	Land Use Zoning Arklow LAP 2018
	 OS2 'Passive Open Space', MU 'Mixed Use', RE 'Existing Residential', R10 'New Residential', MU 'Mixed Use'.
Key considerations impacting future zoning	Watercourse 25m riparian buffer zone CPO 17.26, Previous Zoning, Green Space contiguous with green corridor.
Assessment & Recommendation for New LPF	
Prime2 base mapping indicates green spaces zoned RE 'Existing Residential' contiguous to the 25m watercourse buffers. These have been included within the green corridors as per the approach outlined above. However, as these green spaces more closely resemble large back gardens rather than public open space within a residential development, it would not necessarily be appropriate to zone these lands for open space use. On this basis, retain the previous RE 'Existing Residential' zoning to rear of houses on northern side of Beech Road, where beyond 25m from the watercourse. Zone all other lands identified as a GI Asset OS2 'Natural Areas'.	

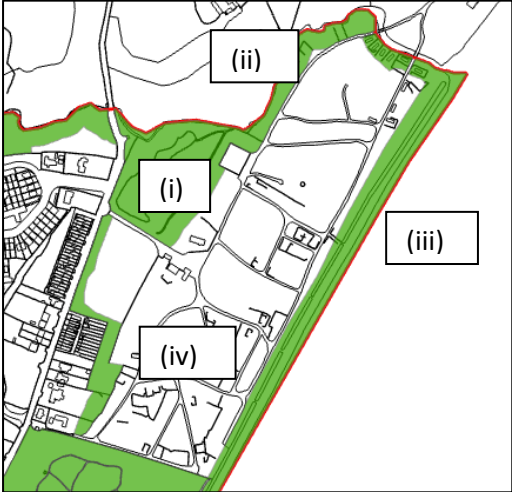
Location	Templeraíneay Stream East
Description	Watercourse between Dublin Road and Sea Road and adjacent undeveloped lands
Map of GI asset	Land Use Zoning Arklow LAP 2018
	 OS2 'Passive Open Space', RE 'Existing Residential'.
Key considerations impacting future zoning	Watercourse 25m riparian buffer zone CPO 17.26, Flood Risk, Previous OS Zoning
Recommendation for New LPF	
Zone all lands identified as a GI Asset OS2 'Natural Areas'.	

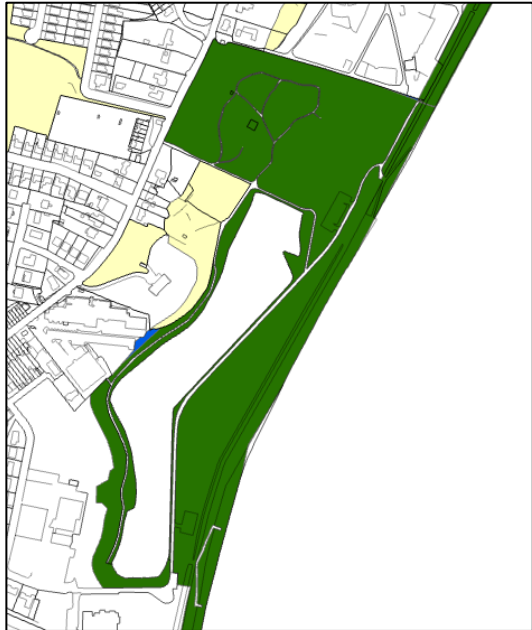
Location	The Pines Open Space
Description	A significant area of linear residential green space in The Pines, contiguous to the Templeraíne stream corridor.
Map of GI asset	Land Use Zoning Arklow LAP 2018
	 RE 'Existing Residential'
Key considerations impacting future zoning	Existing green space contiguous with green corridor
Assessment & Recommendation for New LPF	
While residential open spaces are usually zoned RE 'Existing Residential', this site is contiguous to another green corridor, significantly expands ecological connectivity south from the Templeraíne Stream, and is of a scale that zoning to recognise its current use as an existing open space would be appropriate. On this basis, zone all lands identified as a GI Asset OS2 'Natural Assets'.	

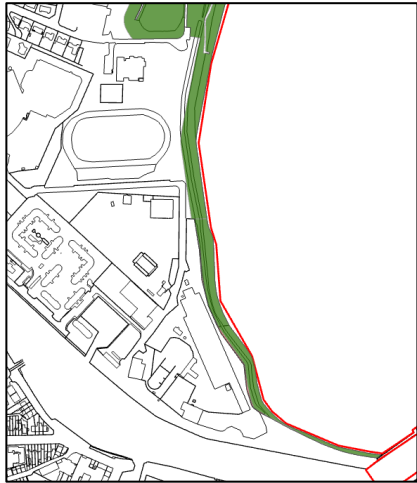
Location	Brigg's Lane North
Description	Scrubland between Highfield and Brigg's Lane
Map of GI asset	Land Use Zoning Arklow LAP 2018
	 RE 'Existing Residential'
Key considerations impacting future zoning	Identified Urban Habitat
Assessment & Recommendation for New LPF	
The site was identified as Site 13 during Arklow Urban Habitat Mapping 2008, where it was described as follows: <i>'Scrub containing area characterised by Gorse with Bramble. The area is rather small and of low conservation value'</i>. No recommended management practices were set out for this site. The site was not resurveyed as part of the Biodiversity Action Plan for Arklow 2021. The site is not contiguous to another branch of a green corridor, though could function as a stepping stone. On the basis of the above, all lands identified as a GI asset should retain the previous RE 'Existing Residential' zoning or another comparable zoning. It is further recommended that general objectives in relation to the improvement of identified urban habitats of low conservation value be included.	

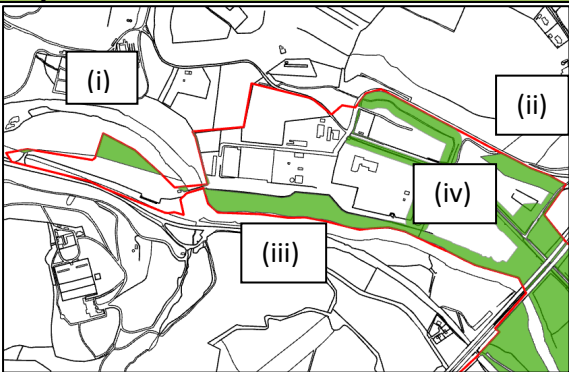
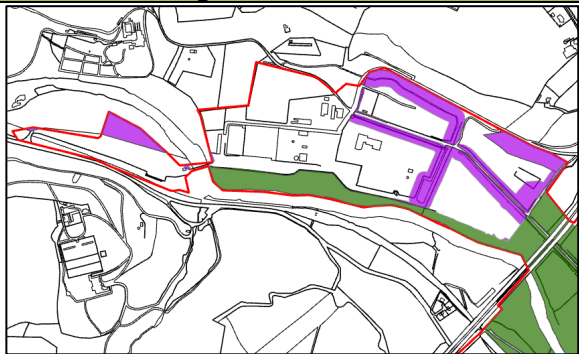
Location	Brigg's Lane Centre
Description	Wooded Area off Brigg's Lane
Map of GI asset	Land Use Zoning Arklow LAP 2018
	 RE 'Existing Residential'
Key considerations impacting future zoning	Existing areas of woodland/forestry CPOs 17.18-17.23
Assessment & Recommendation for New LPF	
This site is immediately adjacent to existing residential dwellings, and aerial imagery indicates that the extent of trees in this area might not match the prime2 site boundaries, such that zoning the lands may be inappropriate. On this basis, it is recommended to zone the land RE 'Existing Residential' to reflect its previous zoning under the Arklow LAP 2018. The GI asset can be protected at development management stage through the application of the objectives and development standards of the Wicklow County Development Plan and Arklow LPF.	

Location	Brigg's Lane South
Description	Wooded green area at junction of Dublin Road and Brigg's Lane'. Faces a boundary with the Arklow Town Marsh on the opposite site of Dublin Road.
Map of GI asset	Land Use Zoning Arklow LAP 2018
	 RE 'Existing Residential'
Key considerations impacting future zoning	Existing areas of woodland/forestry CPOs 17.18-17.23, Identified Urban Habitat.
Recommendation for New LPF	
Zone all lands identified as a GI asset OS2 'Natural Areas'.	

Location	Caravan Park & Coast
Description	Section of the Templeraíne Stream passing through the Arklow Holidays Caravan Park and entering the sea, pond within caravan park and wooded areas with the Caravan park and adjacent land.
Map of GI asset	Land Use Zoning Arklow LAP 2018
	 T 'Tourism', RE 'Existing Residential', OS2 'Passive Open Space'
Key considerations impacting future zoning	Site (i): Watercourse 25m riparian buffer zone CPO 17.26, Identified Urban Habitat. Site (ii): Watercourse 25m riparian buffer zone CPO 17.26 Site (iii): Previous OS2 Zoning Site (iv): Existing areas of woodland/forestry CPOs 17.18-17.23 – providing an ecological corridor directly from the pond to Kynoch Park to the south.
Assessment & Recommendation for New LPF	
Part of the riparian buffer zone in this area has caravans currently located on it. It is considered appropriate that the land use zoning reflect the existing use in this area and retain its previous T 'Tourism' zoning, noting that CPO 17.26 will remain applicable in the development management process. Green corridors should be amended to reflect the land use zoning in this area. Zone all other lands identified as a GI asset OS2 'Natural Areas'. The Pond/Wetland area was identified as Site 12 during Arklow Urban Habitat Mapping 2008 and was resurveyed as part of the Arklow Biodiversity Action Plan 2021.	

Location	Kynoch Park & Duck pond
Description	Large park and pond with bird populations
Map of GI asset	Land Use Zoning Arklow LAP 2018
	 OS1 'Open Space', RE 'Existing Residential', T 'Tourism'
Key considerations impacting future zoning	Watercourse 25m riparian buffer zone CPO 17.26, Identified Urban Habitat, Existing areas of woodland/forestry CPOs 17.18-17.23
Assessment & Recommendation for New LPF	
2 No. areas zoned RE 'Existing Residential' are indicated as being part of the GI asset. Though small in size, 1 No. site to the front (west) of the structure on the site has a well-defined boundary. The other sit to the east and north of the structure on the site has a less well-defined physical boundary and may be unwieldy/inflexible to zone OS2. On this basis, zone the well-defined site to the front/west of the structure OS2 'Natural Areas' and maintain the RE 'Existing Residential' zoning on the lands to the east/north, where the GI assets can be further protected via the development management process. The remainder of the lands are in use as parkland, and it is considered appropriate to recognise the existing use with an appropriate land use zoning, though the lands will remain an integral part of the GI network. Zone all other lands identified as a GI asset OS1 'Open Space'.	

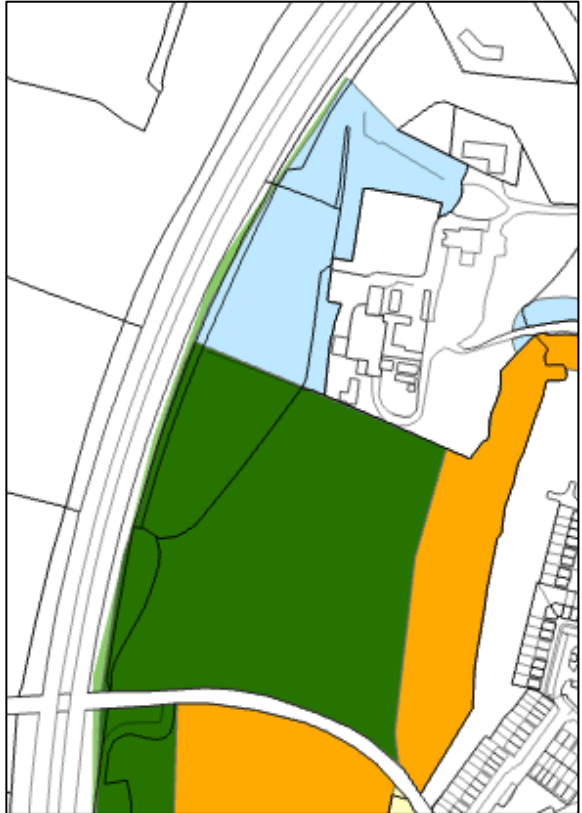
Location	North Quay Coast
Description	Strip of Coastland between Arklow Duck Pond and the North Quay
Map of GI asset	Land Use Zoning Arklow LAP 2018
	 OS2 'Passive Open Space'
Key considerations impacting future zoning	Previous zoning
Recommendation for New LPF	
Zone all lands identified as a GI asset OS2 'Natural Areas'.	

Location	Avoca River Park Industrial Estate
Description	Various features, some highly modified, within the industrial estate west of the M11.
Map of GI asset	Land Use Zoning Arklow LAP 2018
	
Key considerations impacting future zoning	Sites (i) & (ii): Existing areas of woodland/forestry CPOs 17.18-17.23. Site (iii): Previous Zoning. Site (iv): Watercourse 25m riparian buffer zone CPO 17.26
Assessment & Recommendation for New LPF	
The watercourses represented by Site (iv), which does not include the buffer applied to the Avoca River, forms part of a heavily modified industrial landscape. Zoning buffers for the entirety of the watercourses in this area may be inflexible having regard to the number and multi-directional nature of watercourses. These watercourses may be protected as required at development management stage. On this basis, zone all lands identified as a GI asset, other than site (iv), OS2 'Natural Areas'.	

Location	Avoca River South Bank (including Ford Wood)
Description	Area between railway line and Avoca River, largely undeveloped but includes some existing sport and education facilities. Ford Wood to the west close to M11
Map of GI asset	Land Use Zoning Arklow LAP 2018
	 OS2 'Passive Open Space'
Key considerations impacting future zoning	Watercourse 25m riparian buffer zone CPO 17.26, Previous Zoning, Identified Urban Habitat.
Recommendation for New LPF	
Zone all lands identified as GI assets OS2 'Natural Areas'	

Location	South Bank East Watercourse
Description	Watercourse passing under rail line into the Avoca River in the vicinity of sporting facilities. A contiguous wooded area to the south of the watercourse provides an ecological corridor between as far as Lamberton Avenue
Map of GI asset	Land Use Zoning Arklow LAP 2018
	 OS2 'Passive Open Space', R28 'New Residential', RE 'Existing Residential'.
Key considerations impacting future zoning	Watercourse 25m riparian buffer zone CPO 17.26, Previous Zoning, Existing areas of woodland/forestry CPOs 17.18-17.23.
Recommendation for New LPF	
Zone all lands identified as GI assets OS2 'Natural Areas'.	

Location	South Bank west watercourse
Description	Watercourse passing from Glenart Wood to the Avoca River through Vale Road and the railway line
Map of GI asset	Land Use Zoning Arklow LAP 2018
	
Key considerations impacting future zoning	Watercourse 25m riparian buffer zone CPO 17.26
Recommendation for New LPF	
Zone all lands identified as GI assets OS2 'Natural Areas'. Note that the area between the eastern and western watercourses described here was previously identified as an urban habitat in 2008. This was primarily on the basis of the hedgerows contained therein and therefore, following the approach outlined above, was not included as a potential land use zoning.	

Location	Glenart/Ballyraine Wood (North)
Description	Wooded area stretching from Woodlands Park laneway (pedestrian section of Lamberton Avenue) to north of Sunbeam House
Map of GI asset	Land Use Zoning Arklow LAP 2018
	 OS2 'Passive Open Space', R28 'New Residential', CE 'Community & Education'.
Key considerations impacting future zoning	Existing areas of woodland/forestry CPOs 17.18-17.23, Identified Urban Habitat.
Assessment & Recommendation for New LPF	
Surveyed in 2005 as part of the National Native Woodland Survey and identified as ancient or long established woodland. Identified in Arklow Town Urban Habitat Mapping 2008, and resurveyed as part of the Arklow Biodiversity Plan 2021. Boundary of GI asset corresponds to habitats mapped as part of the Arklow Biodiversity Plan 2021. Zone all lands identified as GI assets OS2 'Natural Areas'.	

Location	Glenart/Ballyraine Wood (South)
Description	Wooded area stretching from Woodlands Park laneway (pedestrian section of Lamberton Avenue) to residential lands to the south.
Map of GI asset	Land Use Zoning Arklow LAP 2018
	 R28 'New Residential', OS2 'Passive Open Space', RE 'Existing Residential'
Key considerations impacting future zoning	Existing areas of woodland/forestry CPOs 17.18-17.23, Watercourse 25m riparian buffer zone CPO 17.26, Identified Urban Habitat.
Assessment & Recommendation for New LPF	
The site appears as woodland on both the Ordnance Survey 6-inch (1830s–1840s) and 25-inch (1880s–1910s) maps, indicating continuous woodland cover from at least the early 19th century. It is mapped in the National Inventory of Ancient and Long-Established Woodland (ALEW) as <i>possible ancient woodland</i>. Satellite imagery confirms that until 2022, the site remained wooded and contiguous with Glenart Forest. The woodland was cleared in 2022, but regrowth dominated by willow scrub (<i>Salix</i> spp.) and wetland vegetation was observed during a May 2025 site visit, confirming persistent wet conditions and the likely presence of a viable woodland seedbank and soil structure. The underlying alluvial soils, mapped by the EPA, combined with the site's visible hydrology and vegetation, strongly indicate a former alluvial wet woodland habitat (Annex I 91E0), with potential classification as a groundwater-dependent terrestrial ecosystem (GWDTE). The site lies adjacent to a tributary of the Ballyduff Stream, which is classified as having moderate ecological status and is at risk of not achieving good status, according to EPA monitoring. A culverted section of this tributary opens just south of the site and influences surface water levels. Inland Fisheries Ireland (IFI) has recommended the application of riparian buffer zones in this catchment, and their urban guidance	

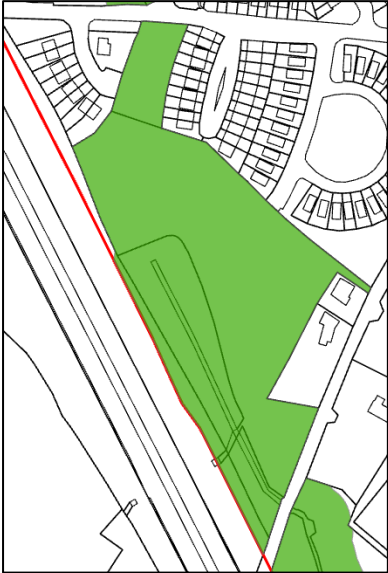
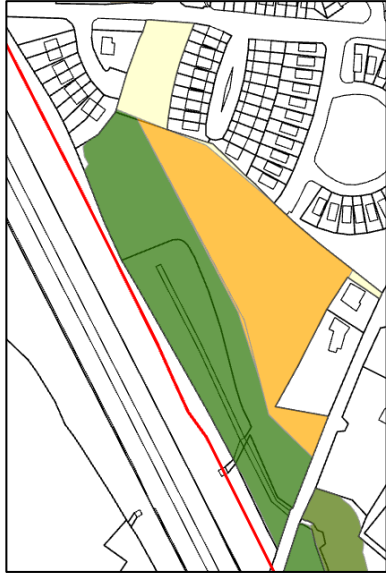
advises a minimum 20 m buffer to protect aquatic and riparian ecosystems.

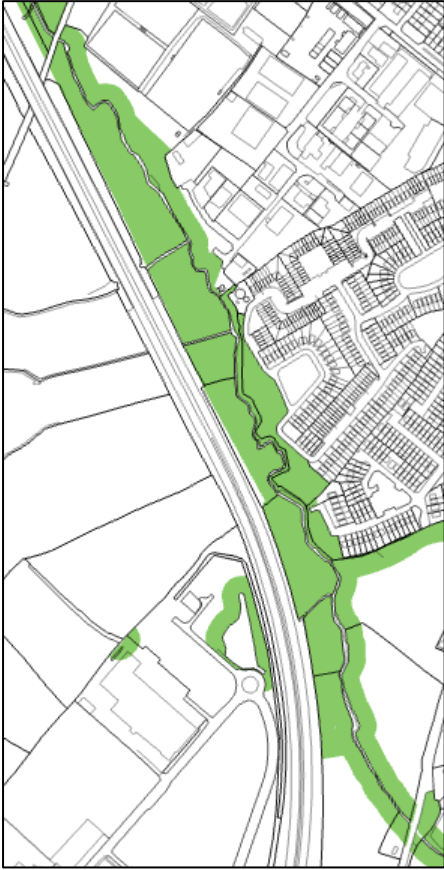
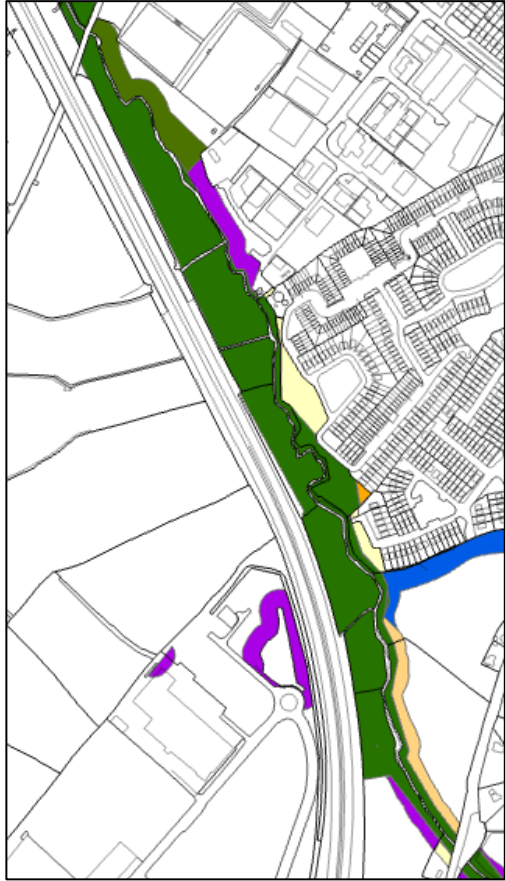
Recent site visits indicate that the site is regenerating with willow and other vegetation, with frog spawn, live frogs, and soil cracks observed during dry conditions. Two watercourses are present through the site, with ponding at the entrance to a culvert to the south of the site.

The subject site, or any equivalent wetland site, is not suitable for development and should instead be considered a prime candidate for ecological restoration and protection. The site is currently zoned for residential use but exhibits clear and multiple indicators of wetland habitat and woodland legacy. Rezoning to OS zoning (Open Space – to protect natural heritage and ecosystem function) is recommended, to align with local, national, and EU policy objectives for biodiversity, water quality, and climate resilience.

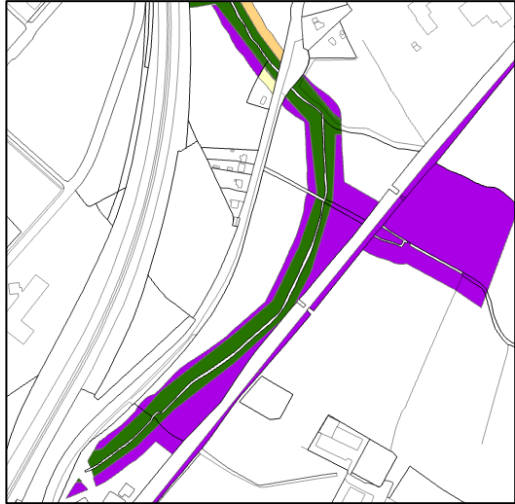
On the basis of the above, zone lands identified as GI assets, OS2 'Natural Areas'.

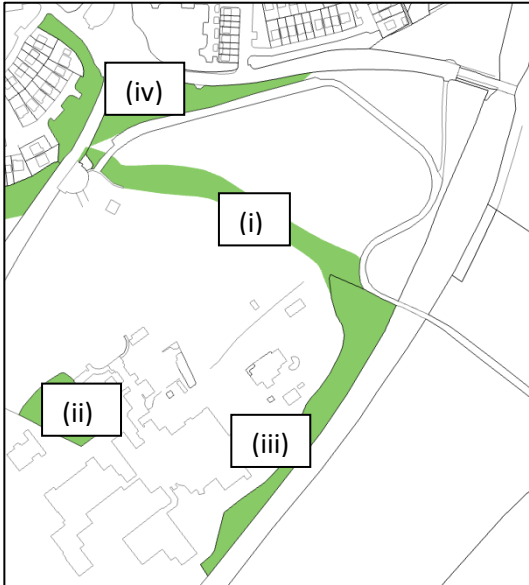
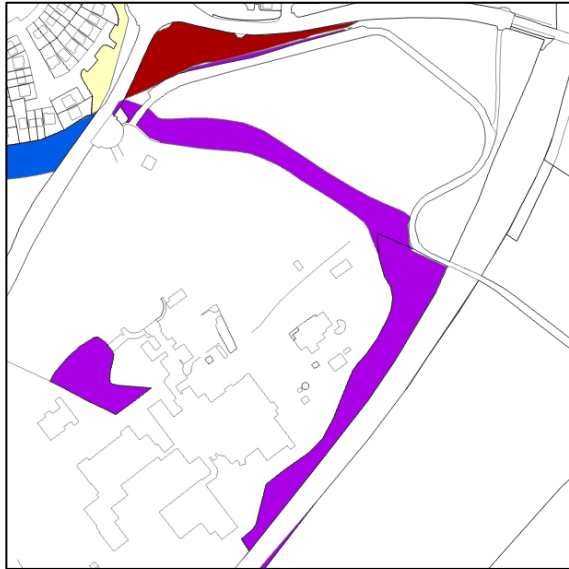
Location	M11 Buffer and parallel section of Ballyduff Stream (Emyvale)
Description	M11 Buffer and parallel watercourse and adjacent residential green space between Emyvale and Woodlands Vale estates
Map of GI asset	Land Use Zoning Arklow LAP 2018
	 OS2 'Passive Open Space', RE 'Existing Residential', R28 'New Residential'.
Key considerations impacting future zoning	Watercourse 25m riparian buffer zone CPO 17.26, existing green spaces adjacent to green corridors, previous zoning
Recommendation for New LPF	
Zone all lands identified as GI assets OS2 'Natural Areas'.	

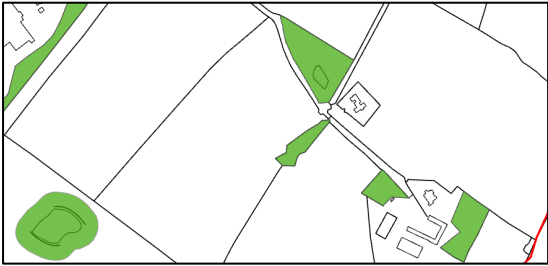
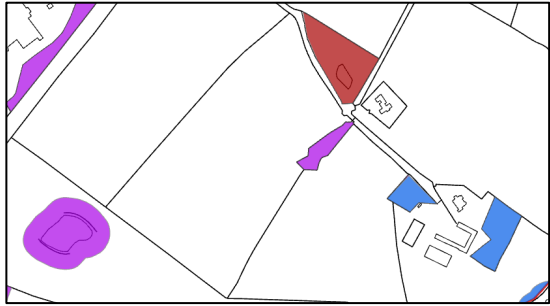
Location	M11 buffer section of Ballyduff Stream (Mill Meadows)
Description	M11 and adjacent parallel watercourse and greenfield sites between Johnstown and Knockenrahan Roads to the west of Mill Meadows
Map of GI asset	Land Use Zoning Arklow LAP 2018
	 OS2 'Passive Open Space', RE 'Existing Residential', R28 'New Residential'.
Key considerations impacting future zoning	Watercourse 25m riparian buffer zone CPO 17.26, Identified Urban Habitat, previous zoning
Assessment & Recommendation for New LPF	
In 2008 the watercourse area and the agricultural field to the east were identified together as an urban habitat site of moderate importance, with descriptions largely focused on the ecological corridor along the stream and on nearby hedgerows. Therefore, the area corresponding to the watercourse buffer is that most suitable for protection through land use zoning. Furthermore, the RE 'Existing Residential' lands were not identified as part of the habitat in 2008, however this site, if developed for housing, etc., would be the only barrier to an ecological corridor stretching from at least the south bank of the Avoca River to the Wexford Road south of Arklow and beyond. The stream is culverted in the vicinity of this site and may present opportunities for daylighting depending on its exact path. It is therefore vital for ecological connectivity in the area. On this basis, zone that part of the site corresponding to the watercourse buffer, the previous OS2 zoning, and the RE site to the north, OS2 'Natural Areas'.	

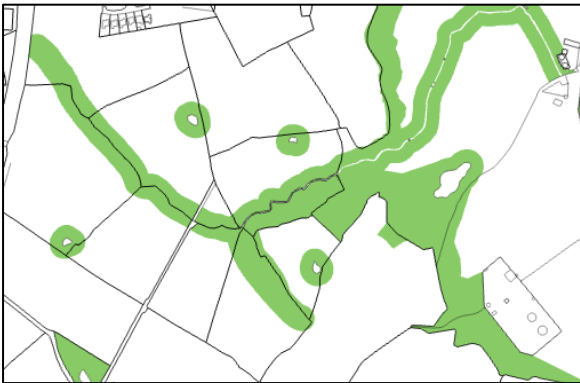
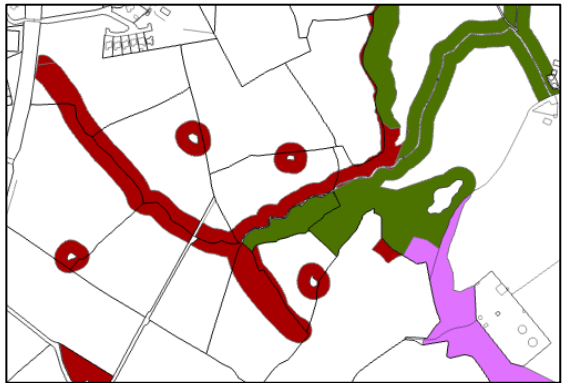
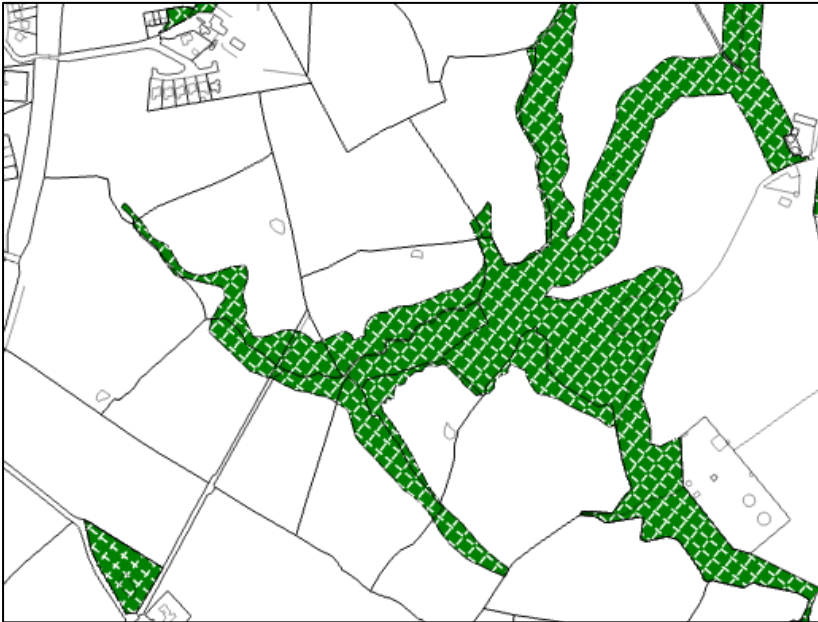
Location	M11 buffer and section of Ballyduff Stream (Meadowvale)
Description	M11 buffer and adjacent long section of Ballyduff Stream between Knockenrahan and Wexford Roads, to the west of Meadowvale, Knockmore, Croghan Industrial Estate, and Sporting Facilities.
Map of GI asset	Land Use Zoning Arklow LAP 2018
	 OS2 'Passive Open Space', E 'Employment', AOS 'Active Open Space', RE 'Existing Residential', R28 'New Residential', R20 'New Residential'.
Key considerations impacting future zoning	Watercourse 25m riparian buffer zone CPO 17.26, Identified Urban Habitat, Flood Risk.
Recommendation for New LPF	
Zone all lands identified as GI assets OS2 'Natural Areas'.	

Location	Section of Ballyduff Stream (Knockmore)
Description	Section of Ballyduff Stream along southern boundary of Knockmore, and a contiguous existing residential green space.
Map of GI asset	Land Use Zoning Arklow LAP 2018
	 T 'Tourism', RE 'Existing Residential'.
Key considerations impacting future zoning	Watercourse 25m riparian buffer zone CPO 17.26, green space adjacent to a green corridor.
Recommendation for New LPF	
Zone all lands identified as GI assets OS2 'Natural Areas'.	

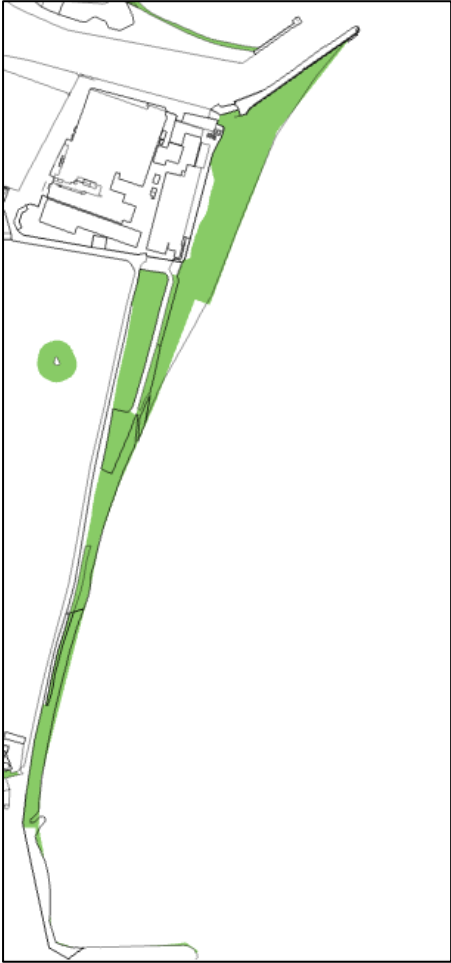
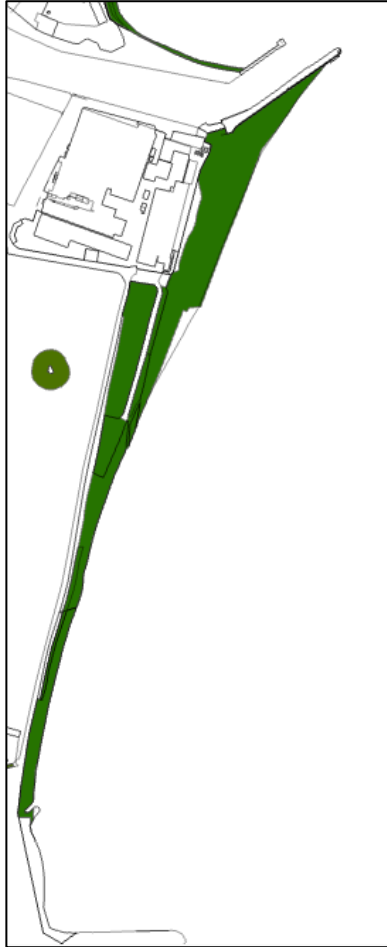
Location	Section of Ballyduff Stream (South)
Description	Section of Ballyduff Stream south of Wexford Road, which further splits passing east under the railway and meeting a permitted attenuation area. Small areas between the watercourse buffers and the railway line are included.
Map of GI asset	Land Use Zoning Arklow LAP 2018
	 OS2 'Passive Open Space', E 'Employment'.
Key considerations impacting future zoning	Watercourse 25m riparian buffer zone CPO 17.26, Permitted attenuation area.
Recommendation for New LPF	
Zone all lands identified as GI assets OS2 'Natural Areas'.	

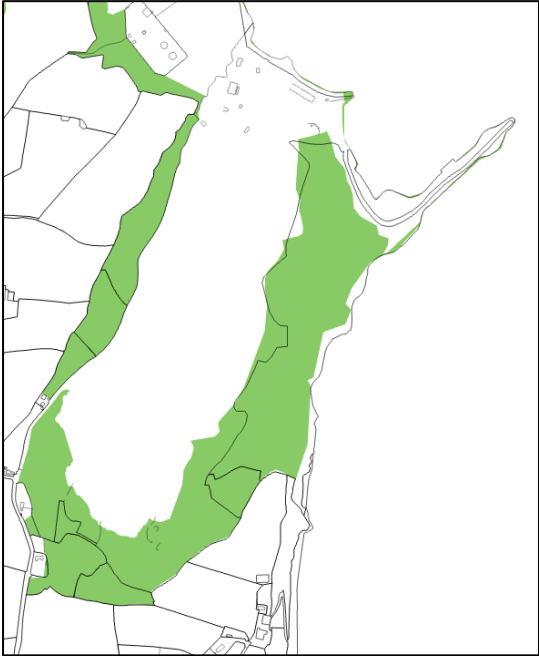
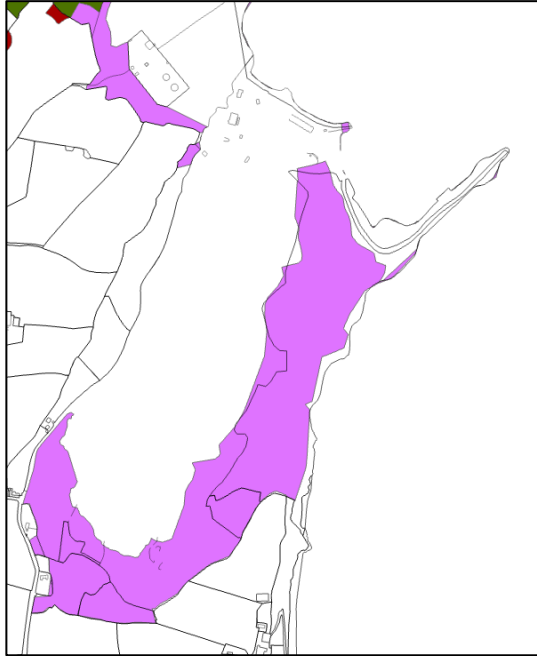
Location	Servier
Description	Wooded areas and the path of a culverted section of the Ballyduff stream through the Servier site.
Map of GI asset	Land Use Zoning Arklow LAP 2018
	 E 'Employment', MU 'Mixed Use'
Key considerations impacting future zoning	Site (i): Watercourse 25m riparian buffer zone CPO 17.26 Sites (ii), (iii), (iv): Existing areas of woodland/forestry CPOs 17.18-17.23
Assessment & Recommendation for New LPF	
The exact path of the culverted course may not be certain, as such it may not be appropriate to zone a watercourse buffer around it, though opportunities for daylighting may arise. The size of site (ii) would also indicate that it may be better protected as part of the development management process. On this basis, zone lands identified as GI assets, corresponding to sites (iii) & (iv), OS2 'Natural Areas'.	

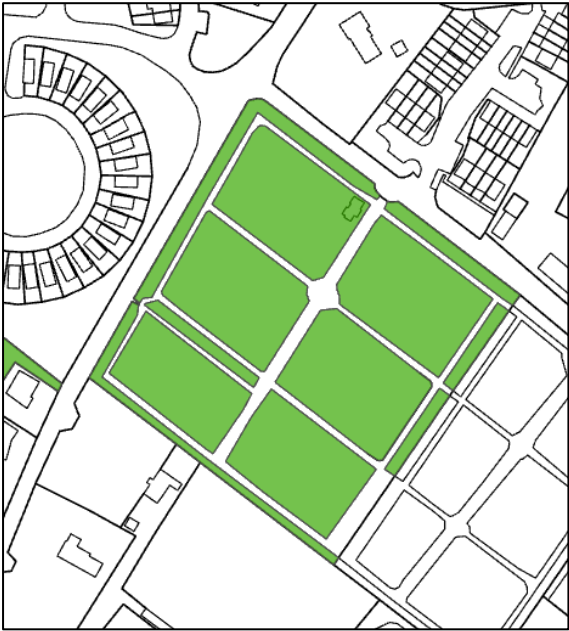
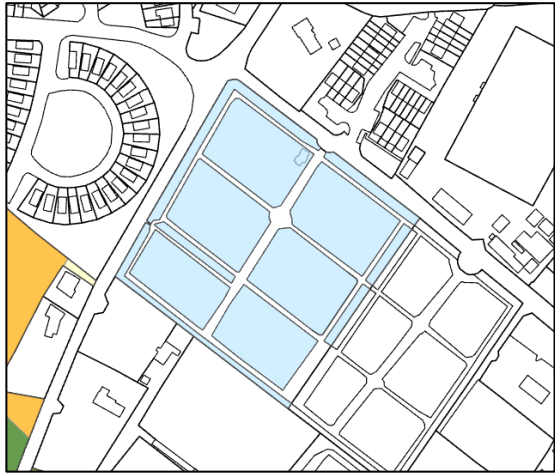
Location	Moneylands Farm
Description	Small wooded areas around farm buildings and a pond to the southwest
Map of GI asset	Land Use Zoning Arklow LAP 2018
	 E 'Employment', MU 'Mixed Use', T 'Tourism'.
Key considerations impacting future zoning	Watercourse 25m riparian buffer zone CPO 17.26, Existing areas of woodland/forestry CPOs 17.18-17.23
Assessment & Recommendation for New LPF	
On the basis of the small size of each feature, do not zone the lands identified as a GI asset OS2 'Natural Areas'.	

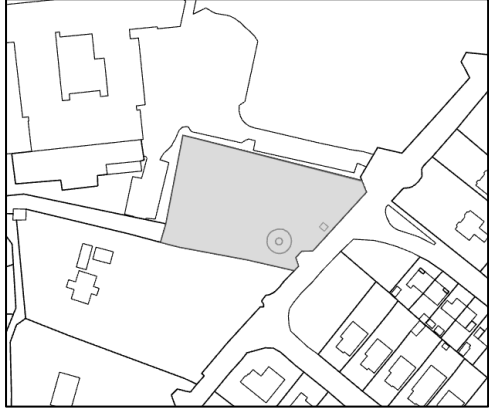
Location	Tinahask Upper
Description	Watercourse and wooded areas among agricultural fields. Small ponds spread throughout the area.
Map of GI asset	Land Use Zoning Arklow LAP 2018:
	
Key considerations impacting future zoning	MU 'Mixed Use', AOS 'Active Open Space', EX 'Extractive Industries';
Assessment & Recommendation for New LPF	
The ponds throughout the area may be not large enough to warrant a specific land use zoning and can be protected at development management stage. Furthermore, site layouts as permitted under WCC Reg. Ref. 24/325 will result in the substantial alteration of the GI Network in this area. As these layouts are permitted (for a period of 7 years) the zoning of the GI asset as shown above may not align with the eventual construction of this area. On this basis, one GI assets in this area, except the small ponds, OS2 'Natural Areas' as shown below (and reconfigure green corridors on the GI map to match):	
	

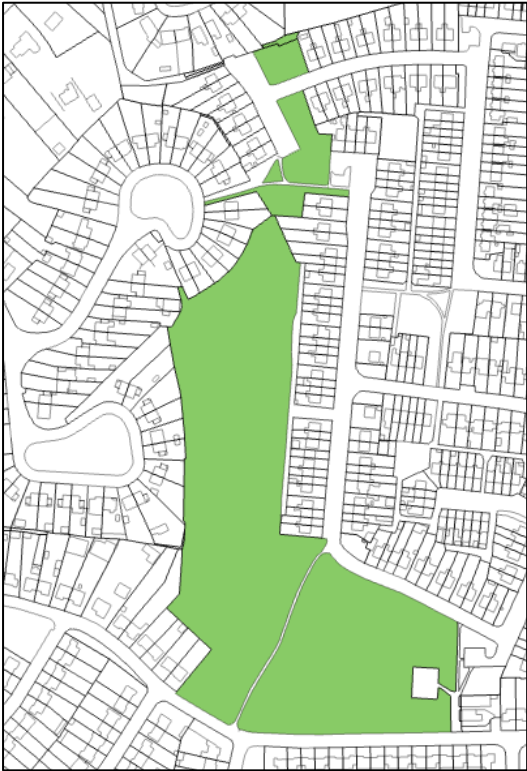
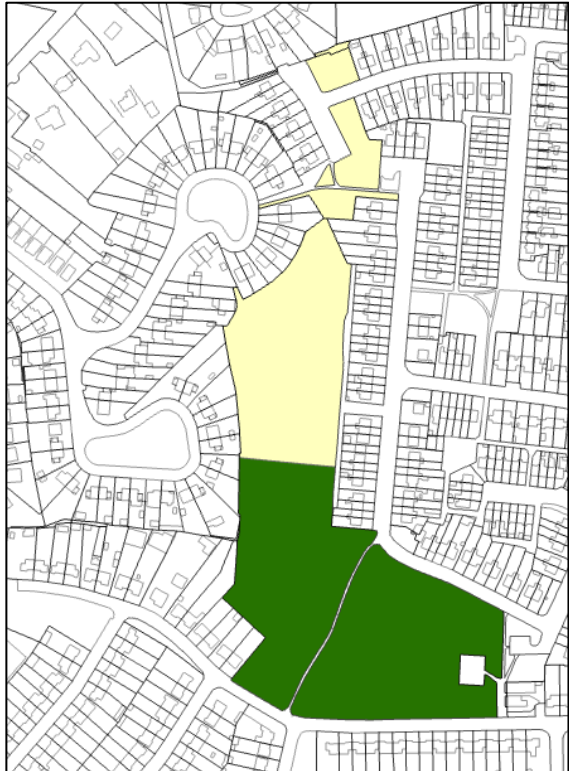
Location	Arklow Golf Club
Description	Watercourse and wooded areas through Arklow Golf Club.
Map of GI asset	Land Use Zoning Arklow LAP 2018
	
Key considerations impacting future zoning	Watercourse 25m riparian buffer zone CPO 17.26, Existing areas of woodland/forestry CPOs 17.18-17.23
Assessment & Recommendation for New LPF	
The ponds throughout the area may be not large enough to warrant a specific land use zoning and can be protected at development management stage. Zone all lands identified as GI assets, except the small ponds, OS2 'Natural Areas'.	

Location	Arklow South Beach
Description	Arklow South Beach to Quarry Lands
Map of GI asset	Land Use Zoning Arklow LAP 2018
	
Key considerations impacting future zoning	Previous Zoning, biodiversity area.
Assessment & Recommendation for New LPF	
Identified in Arklow Town Urban Habitat Mapping 2008, and resurveyed as part of the Arklow Biodiversity Plan 2021. Moore's Horsetail found on site. Zone all lands identified as GI assets OS2 'Natural Areas'.	

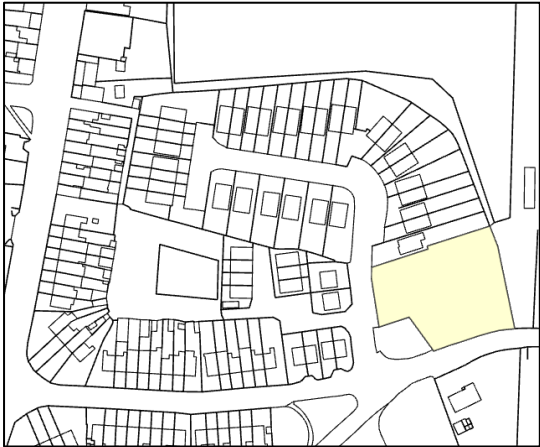
Location	Quarry Lands
Description	Quarry lands located outside of permitted extraction area, includes sections of the Arklow Rock – Askintinny pNHA. Part of the lands proposed to be zoned is currently outside the town/plan boundary.
Map of GI asset	Land Use Zoning Arklow LAP 2018
	 EX 'Extractive Industries', unzoned outside settlement boundary
Key considerations impacting future zoning	Designated Site, lands outside permitted extraction area to provide ecological link between the pNHA and the rest of the Arklow green corridor network.
Recommendation for New LPF	
Zone all lands identified as GI assets OS2 'Natural Areas' and amend plan boundary.	

Location	Cemetery
Description	Cemetery facing onto Emoclew and Knockenrahan Roads.
Map of GI asset	Land Use Zoning Arklow LAP 2018
	 CE 'Community & Education'.
Key considerations impacting future zoning	Identified Urban Habitat
Assessment & Recommendation for New LPF	
On the basis of recognising the existing cemetery use, retain the CE 'Community & Education' zoning. It is further recommended that general objectives in relation to the improvement of identified urban habitats of low conservation value be included.	

Location	Water Tower
Description	Uisce Éireann Infrastructure on grassed site.
Map of GI asset	Land Use Zoning Arklow LAP 2018
	 PU 'Public Utility'.
Key considerations impacting future zoning	Identified Urban Habitat.
Assessment & Recommendation for New LPF	
On the basis of recognising the existing water services use, retain the PU 'Public Utility' Zoning. It is further recommended that general objectives in relation to the improvement of identified urban habitats of low conservation value be included.	

Location	Marian Villas
Description	Large green area to west of Marian Villas, includes some existing residential green space.
Map of GI asset	Land Use Zoning Arklow LAP 2018
	 RE 'Existing Residential', OS1 'Open Space'.
Key considerations impacting future zoning	Identified Urban Habitat
Assessment & Recommendation for New LPF	
The site was identified as Site 22 during Arklow Urban Habitat Mapping 2008, where it was described as follows: 'Species Poor and of low conservation value'. No recommended management practices were set out for this site. The site was not resurveyed as part of the Biodiversity Action Plan for Arklow 2021. As a part parkland, part greenfield land, and part residential green space within an existing housing estate, which is not adjacent/contiguous with any green corridor, it is recommended that the site retains zonings to reflect the existing use, or alternatively similar compatible land uses. It is further recommended that general objectives in relation to the improvement of identified urban habitats of low conservation value be included.	

Location	Mayfair Court
Description	Land to rear of Mayfair Court and north of Tesco.
Map of GI asset	Land Use Zoning Arklow LAP 2018
	 TC 'Town Centre'.
Key considerations impacting future zoning	Identified Urban Habitat
Assessment & Recommendation for New LPF	
The site was identified as Site 23 during Arklow Urban Habitat Mapping 2008, where it was described as follows: 'Species Poor and of low conservation value'. No recommended management practices were set out for this site. The site was not resurveyed as part of the Biodiversity Action Plan for Arklow 2021. As greenfield land which is not adjacent/contiguous with any green corridor, it is recommended that the site retains its previous TC 'Town Centre' Zoning. It is further recommended that general objectives in relation to the improvement of identified urban habitats of low conservation value be included.	

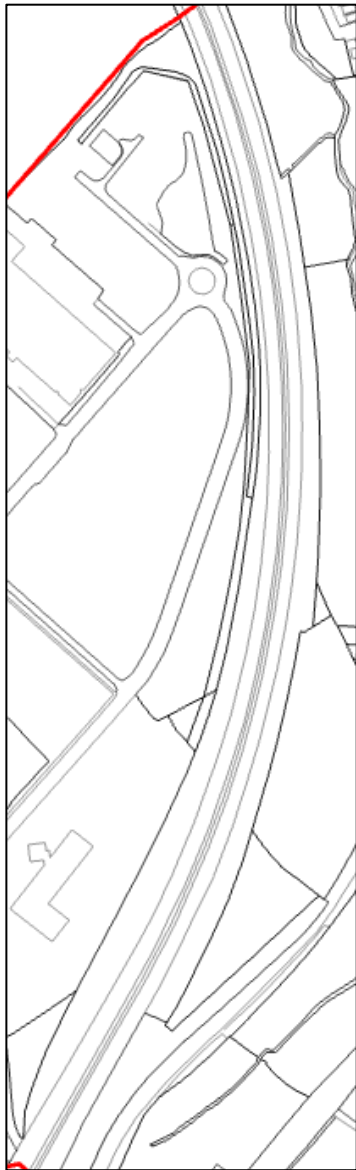
Location	Summerfield
Description	Green space at south-east corner of Summerfield estate.
Map of GI asset	Land Use Zoning Arklow LAP 2018
	
Key considerations impacting future zoning	Green Space adjacent to Green Corridor (railway line)
Assessment & Recommendation for New LPF	
This site has not been identified as an urban habitat in any previous studies and is not developed residential green space, but is rather a potential infill site. On this basis, it may be premature to zone this land OS2 'natural areas' and would be inappropriate to include in any green corridors. On this basis, retain the previous RE 'Existing Residential' zoning on the lands.	

Location	Navy Park
Description	Large park south of Arklow Train Station
Map of GI asset	Land Use Zoning Arklow LAP 2018
	 AOS –Active Open Space, RE 'Existing Residential'.
Key considerations impacting future zoning	Identified Urban Habitat
Assessment & Recommendation for New LPF	
On the basis of recognising the existing park use, retain the AOS ' zoning or similar compatible land use zoning and include adjacent areas of residential open space zoned RE 'Existing Residential'. A watercourse is culverted through this area which may present opportunities for daylighting. It is further recommended that general objectives in relation to the improvement of identified urban habitats of low conservation value be included.	

Location	Avalon
Description	Land to south east of Carysfort National School.
Map of GI asset	Land Use Zoning Arklow LAP 2018
	 AOS 'Active Open Space'
Key considerations impacting future zoning	Identified Urban Habitat.
Assessment & Recommendation for New LPF	
The site was identified as Site 5 during Arklow Urban Habitat Mapping 2008, where it was described as follows: 'moderate conservation value'. No recommended management practices were set out for this site. The site was not resurveyed as part of the Biodiversity Action Plan for Arklow 2021. As greenfield land which is not adjacent/contiguous with any green corridor, it is recommended that the site retains its previous AOS 'Active Open Space' zoning. It is further recommended that general objectives in relation to the improvement of identified urban habitats of low conservation value be included.	

Location	Abbey Street
Description	Large greenfield/brownfield land to rear of Abbey Street and Collins St.
Map of GI asset	Land Use Zoning Arklow LAP 2018
	 R28 'New Residential'
Key considerations impacting future zoning	Identified Urban Habitat.
Assessment & Recommendation for New LPF	
The site was identified as Site 23 during Arklow Urban Habitat Mapping 2008, where it was described as follows: 'It is of low conservation value and species poor. No recommended management practices were set out for this site. The site was not resurveyed as part of the Biodiversity Action Plan for Arklow 2021. As greenfield/brownfield land which is not adjacent/contiguous with any green corridor, it is recommended that the site retains its previous R28 'New Residential' zoning or similar compatible land use/zoning and is not included as part of any green corridor. It is further recommended that general objectives in relation to the improvement of identified urban habitats of low conservation value be included.	

Location	Old Chapel Ground
Description	Large green area to rear of Old Chapel Ground, north of Harbour Court.
Map of GI asset	Land Use Zoning Arklow LAP 2018
	 RE 'Existing Residential'
Key considerations impacting future zoning	Identified Urban Habitat, flood risk.
Assessment & Recommendation for New LPF	
The site was identified as Site 16 during Arklow Urban Habitat Mapping 2008, where it was described as follows: 'This site is species poor and of low conservation value.' No recommended management practices were set out for this site. The site was not resurveyed as part of the Biodiversity Action Plan for Arklow 2021. As greenfield/brownfield land which is not adjacent/contiguous with any green corridor, it is recommended that the site retains its previous RE 'Existing Residential' zoning and is not included as part of any greenfield corridor. It is further recommended that general objectives in relation to the improvement of identified urban habitats of low conservation value be included. Flooding will be addressed under the SFRA accompanying the draft LPF.	

Location	M11 verges
Description	Wooded verges of M11 north from Junction 21 providing ecological connectivity to GI assets on either side of the motorway
Map of GI asset	Land Use Zoning Arklow LAP 2018
	 No specific land use zoning
Key considerations impacting future zoning	Existing areas of woodland/forestry CPOs 17.18-17.23
Recommendation for New LPF	
Zone all lands identified as a GI asset OS2 'Natural Areas'.	

Location	IDA Arklow Business Park
Description	Pond and small area of riparian corridor
Map of GI asset	Land Use Zoning Arklow LAP 2018
	 E 'Employment'
Key considerations impacting future zoning	Watercourse 25m riparian buffer zone CPO 17.26
Assessment & Recommendation for New LPF	
The small area of riparian corridor leads outside the settlement boundary and is on land already development for employment purposes. On this basis, zone lands identified as part of the GI asset, around the pond only, OS2 'Natural Areas'.	

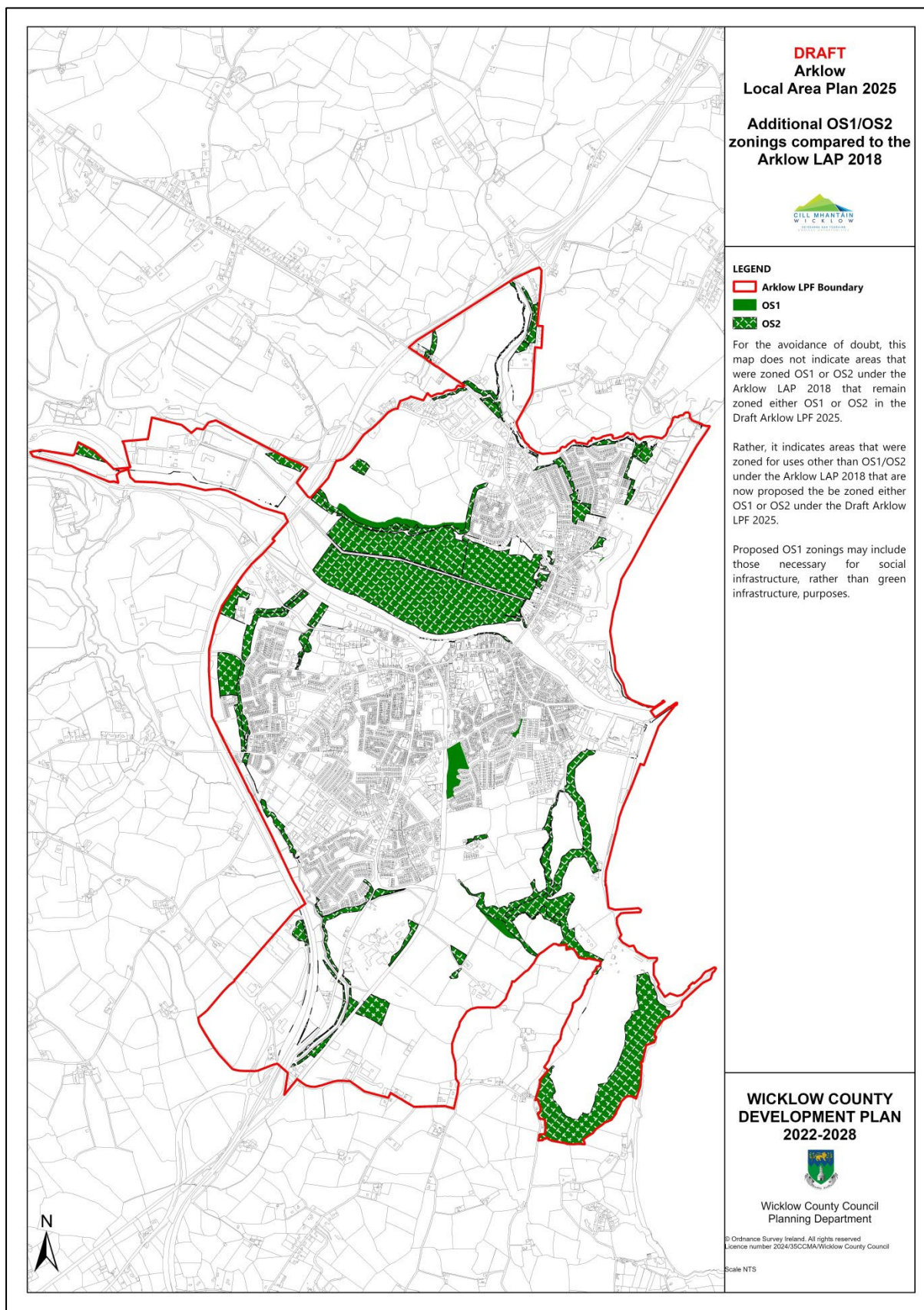


Figure 2: Additional areas proposed to be zoned OS1 or OS2 in the Draft LPF, arising from this Green Infrastructure Audit and other analyses (Social Infrastructure Audit, etc.).

Arklow Marsh pNHA Advisory Report

PREPARED FOR WICKLOW COUNTY COUNCIL

MAY 2025

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INTRODUCTION

Wicklow County Council Planning Department through Hannah O’Kelly Biodiversity Officer requested a short report prepared by an Ecologist focusing on appropriate protection measures for Arklow Marsh proposed Natural Heritage Area (pNHA) which is under development pressure, with a view to informing zoning with the new LPF with particular reference to the Kilbride lands.

Specifically, the report was requested to address:

- (1) Which parts of the marsh are most sensitive (given that access routes across/around the marsh are inevitable (and the better they work, the more pressure they relieve). This can directly inform zoning for OS1 and OS2 etc.
- (2) How can proposed development incorporate measures to ensure that there is no net biodiversity loss, and ideally there is gain, through for example, appropriate mitigation measures and restoration measures.

PROTECTION OF ARKLOW MARSH

Arklow Marsh is a Proposed National Heritage Area and, as such, is of National Conservation Importance.

The wetland area is also of significant importance in terms of the ecosystem services it provides including flood protection, climate change mitigation and biodiversity resources.

It is therefore considered appropriate, in light of its conservation importance and policies and objectives of the Wicklow County Development Plan (See appendix 3 for relevant policies), that the entire Arklow Marsh be protected as a sensitive ecological receptor.

As a wetland habitat, all of the Arklow Marsh can be considered sensitive and it is not possible based on desktop review and /or absence of detailed information on development proposals to delineate areas that may be less sensitive to development activities.

METHODOLOGY

This report was compiled following review of available desktop information, relevant guidance and previous surveys carried out on Arklow Marsh and the surrounding area. No ecological surveys were undertaken for the specific purposes of this report.

SURFACE WATER PROTECTION BUFFERS

Inland Fisheries Ireland (IFI) *Guidance on Planning for Watercourses in the Urban Environment* advises that recommended buffer zone width for larger river channels (>10m) is 35m to 60m and for smaller channels (<10m) is 20m or greater. The determined width should be tailored to site specific circumstances, **river reach** or lakeshore characteristics. It is important that the buffer zone is wide enough to protect the ecological integrity of the river (including emergent, marginal and bankside vegetation) and takes into account the human history of the area.

Wider buffer zones can be multifunctional in the urban environment if linked and managed appropriately, bringing greater benefits to the wider community.

In the case of the Avoca River, Arklow Marsh is within the floodplain of the river **and the river reach can be considered the extent of the marsh or more strategically the extent of Flood Zone B.**

METHODOLOGY USED TO DEFINE ARKLOW MARSH BUFFER ZONES

In order to assign a protection buffer zone, a GIS project was set up with the following layers:

- pNHA boundary Flood Zone B CDP_2022_2028
- WFD River Waterbodies Active Cycle 3
- Manually digitised wetland extent from satellite imagery, extent of flood zone B and OSI historic 6 inch maps
- Consolidated Zoning_CDP2022_2028

An adjusted “Wetland Marsh Area” was digitised to include Flood Zone B extent, the pNHA boundary and visible areas of wetland or semi-natural vegetation (from google satellite imagery) to the west of the pNHA boundary and along the northern marsh boundary.

Buffers zones of 20m, 50m and 100m were then assigned to the adjusted marsh boundary.

The Marsh Buffers were assigned taking into consideration the following:

- An initial protective buffer zone for the Arklow Marsh based on river reach is **60m** from the extent of Flood Zone B.
- Arklow Marsh is situated at the base of the valley slope within the floodplain and tidal floodplain of the Avoca and can be described as a coastal plain and inter tidal wetland as defined by Irish Wetland Types (IRWC, 2018).
- Hydrological Assessments for the Arklow FRS observed the marsh as being waterlogged over significant areas for long periods of the year.

According to the hydrological assessments undertaken for the FRS (Byrne Looby, 2020), water that is present in the Arklow Marsh comes from a number of sources, including:

- i. Rain falling on the marsh surface
- ii. Water entering underneath it from the Arklow River
- iii. Arklow River flooding events that inundated the marsh
- iv. Normal tidal cycle events and;
- v. Extreme storm/ wave surge events such as Charlie, Darwin, Opheila, Emma and most recently, Brendan.

According to EU (2011), in order for terrestrial ecosystems to be considered as part of the classification for groundwater bodies (GWBs), they need to be ‘directly dependent’ on the GWB. This means that the GWB should provide quantity (flow, level) or quality of water needed to sustain the ecosystems, where groundwater dependency forms a key reason for their ecological significance. This critical dependence upon a GWB would apply where groundwater supplies the GWDTE for a significant part or a significant time period of the year.

The Arklow FRS hydrological assessment does not specifically address the groundwater dependency of Arklow Marsh, however, groundwater was encountered in all exploratory holes (WCC, 2020 Arklow FRS).

The conclusion of the hydrological assessment were:

- There is a linkage between groundwater levels in the marsh and in the Avoca river,
- The marsh is waterlogged for significant periods of the year,
- River flow and rainfall levels can have a greater impact on water levels (i.e. flooding and

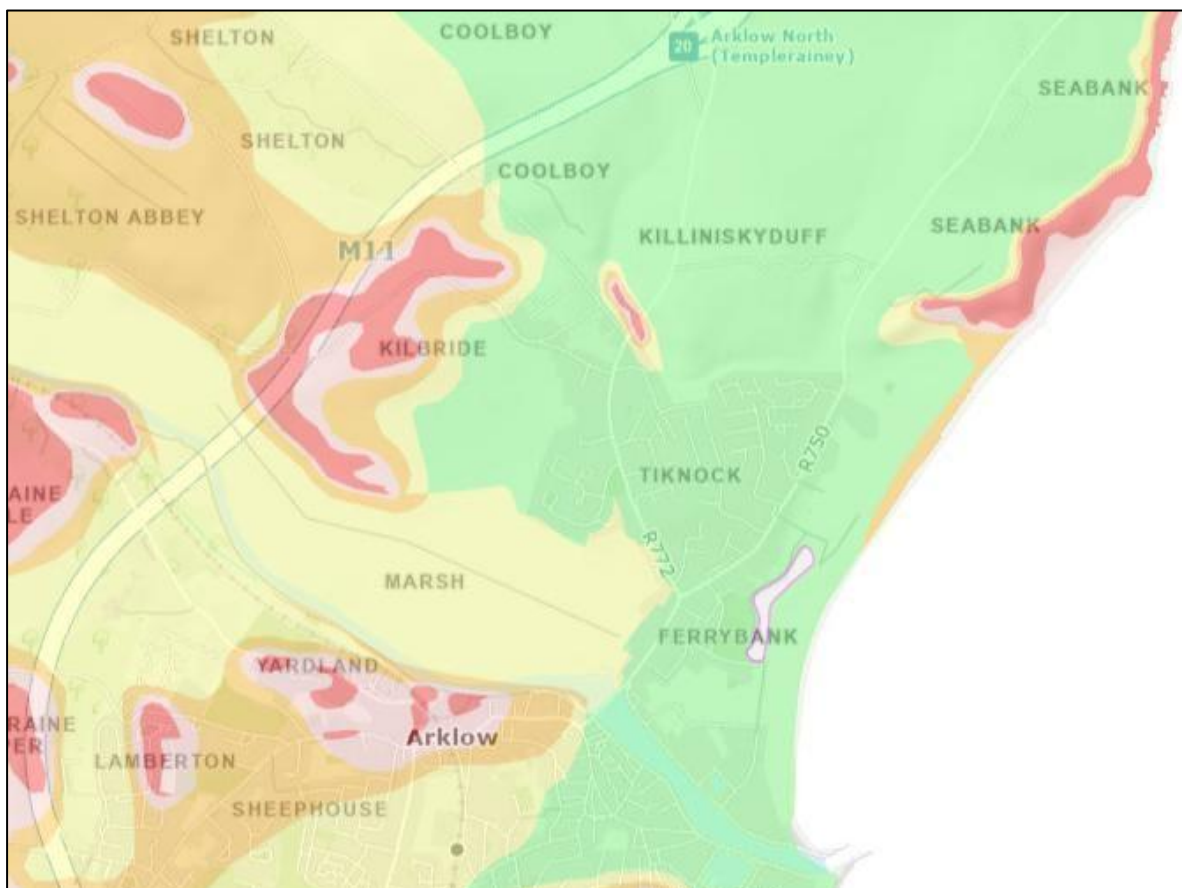
extreme rainfall conditions) in comparison to tidal contribution. These flood periods occur irregularly and have a short-term effect on the marsh; There is a natural variation in all sources of water that enter the marsh;

- Peak ground water levels are likely to be influenced by the river dredging by a maximum of 100mm;
- Taking the above into consideration, there will be minimum impact on the ecology of the marsh due to the proposed dredging works.

The Arklow Marsh is waterlogged for significant periods over extended periods and is situated at the base of a valley slope. Therefore, in addition to hydrological influence from the Avoca River and tidal regime, the marsh is likely to be influenced by groundwater flow and can therefore be considered **a groundwater dependent ecosystem** (at least partly dependent). **A hydrologist expertise input is advisable to confirm this assumption.**

Groundwater vulnerability mapping for the Kilbride lands varies from rock at the surface (red), to extreme (pink), to high (orange), to moderate (yellow), to low (green) vulnerability west to east across the lands as depicted in Figure 1 below.

Figure 1 GSI groundwater vulnerability mapping



Scottish Environmental Protection Agency SEPA (2024) provide guidance on assessing the impacts on Groundwater Dependent Terrestrial Ecosystems.

The relevant buffer zones for GWDTE for all proposed infrastructure (provided expected dewatering rates do not exceed 10m³/day) are:

- a) 10m radius of all activities;
- b) 100m radius of all subsurface activities less than 1m in depth;
- c) 250m of all subsurface activities deeper than 1m.

RECOMMENDED BUFFER ZONES

Marsh Protection Buffer

To protect the groundwater feeding the marsh from the Kilbride lands, both in terms of quality and quantity, it is recommended that a 100m buffer is applied to Arklow Marsh for all infrastructure development (buildings, road, drainage infrastructure) which are anticipated to require excavations up to 1m.

This 100m buffer should also provide sufficient protection for otter holts from construction activities, should they occur within the marsh (but confirmation subject to findings of development specific ecological surveys and ecological impact assessments).

A 100m buffer has been applied to the adjusted marsh boundary (which aligns with the FLOOD Zone B extent), pNHA boundary and/ or semi-natural vegetation at the boundary of the marsh in the map below.

Subject to hydrological impact assessment, consideration could be given to reducing the buffer 100m buffer to 50m over low to moderate groundwater vulnerability zones.

A 250m buffer referenced by Nature Scot (SEPA, 2024) was not delineated in this instance as the groundwater vulnerability mapping varies across the Kilbride zoned land, and the geological setting is complex. It was deemed necessary, therefore, that **development-specific hydrological impact assessments should inform the impact of development activities which will occur outside the 100m buffer zone.**

Therefore, any development activities (deep excavations, foundations, drainage infrastructure, road developments) outside of the 100m protection buffer should be accompanied by a hydrological impact assessment to assess the potential impacts on the hydrological regime and water quality of the marsh.

Surface Watercourse Protection

A buffer of 20m (in line with IFI guidance) was applied to the small watercourses identified from mapping as crossing the Kilbride lands, namely the Ferrybank first order stream and drainage ditch. While these watercourses are unlikely to have fisheries value given their location, they supply water to the marsh and should be protected.

Disturbance Buffer for Operational Noise Disturbance Impacts

An appropriate noise disturbance buffer for wetland birds was estimated from anticipated noise levels.

New cars are now required to meet Europe-wide noise limits. These have been progressively reduced from 82 decibels (dB (A)) in 1978 to the current limit of 72 dB (A) established in 2016 while a playground noise level is on average 80 db.

The Waterbird Mitigation Toolkit (Cutts et al., 2013) provides an overview table of noise disturbance and the standard distance decay rates for noise for calculation of the likely

disturbance effect for a given noise level and distance to receptor (the bird) from source.

The noise level 72b produced by a car will have dissipated to a noise level of approximately 50 db at 10m. For a playground / recreational area producing noise of 80db will require a buffer of 20m.

Therefore, a 20m buffer is applied for development of a vegetation buffer to prevent noise and visual disturbance to birds and other wildlife within the wetland habitat from cars and recreational noise. This wetland vegetation buffer is to be fenced to prevent access to the marsh by people and / or dogs, and planted up with native woodland species, predominantly thorny species such as blackthorn and hawthorn. This planting should provide an impenetrable vegetation barrier once mature.

This 20m buffer encloses 8% of the land previously zoned MU at Kilbride to be restricted for nature protection only.

The additional 80m (of the overall 100m hydrology buffer) designates an additional 13% of the MU for biodiversity enhancement. Walking trails could be permitted within this zone.

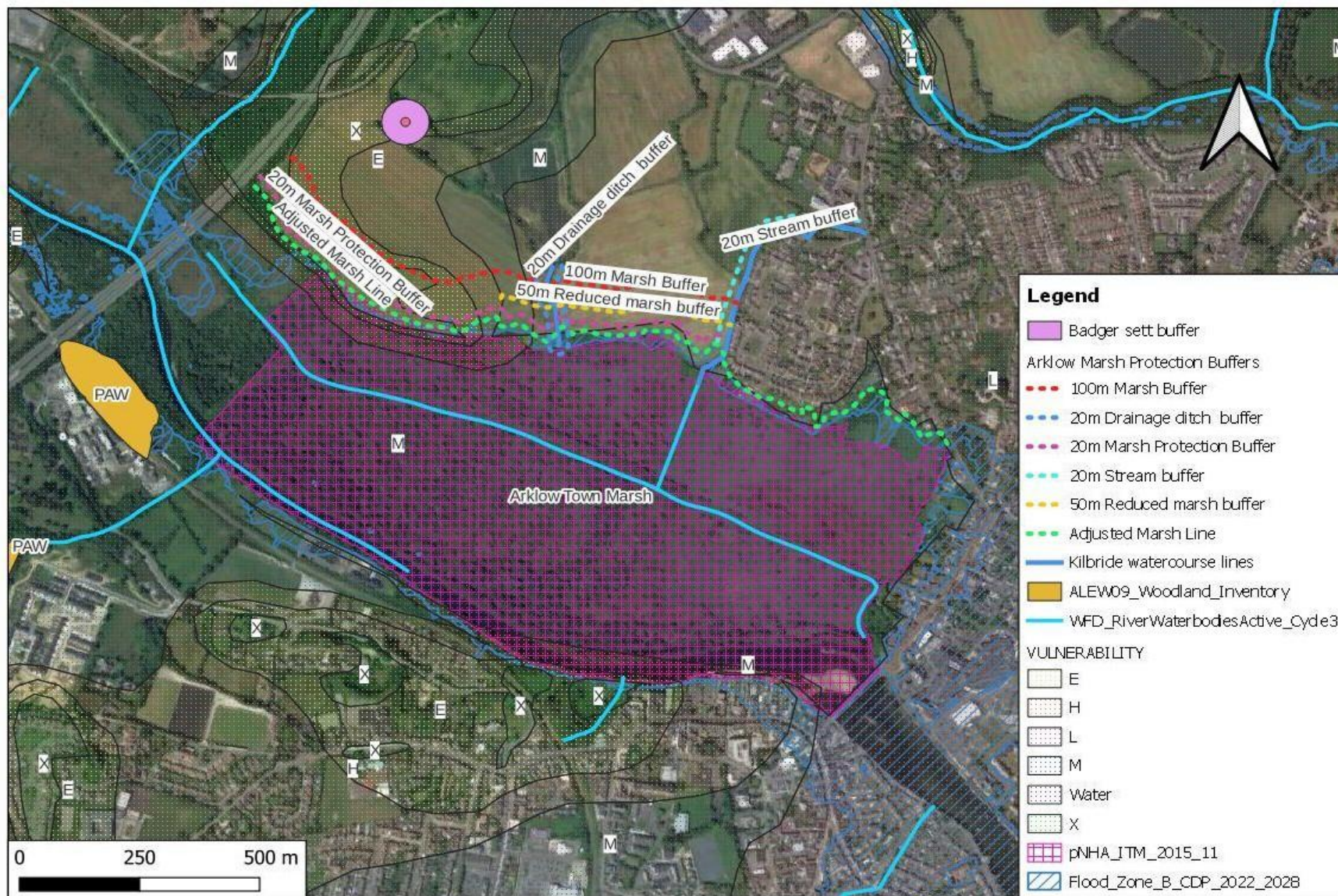
This additional 80m outer also encloses the area of rock at or near the surface in the south west of the Kilbride MU zoned land.

The total area allocated to biodiversity protection and enhancement is 21% aligning with the EU Nature Restoration target of 20% of the land by 2030.

These protective buffers are subject to further Ecological Surveys and Ecological Impact Assessments for other protected species and relevant guidance (for example, otters and badgers require protective buffers up to 150m in line with NRA/TII Guidelines, depending on circumstances). Therefore, where surveys identify other sensitive ecological receptors within the zone of influence of development activities, appropriate additional

protection buffers/licensing conditions will apply, as identified in Ecological Impact Assessments prepared for individual developments.

Type	Suggested Zoning	Area m ²	% of MU
Nature zone protected 20m	OS2 (no access)	50942.88	8
Outer 80m zone	OS2 hydrology protective zone / biodiversity enhancement (parkland/ walking trails allowed)	89298.23	13
Total nature + outer biodiversity zone = 100m	OS2	140241.11	21
MU as per previous LAP		643472.32	100



CONCLUSION AND RECOMMENDATIONS

1. Arklow Marsh is a pNHA of National Conservation Value and is the principal wetland in Arklow. It is currently a relatively secluded area with minimal disturbance by the public due to natural barriers to access, and should be afforded due protection, as outlined in Wicklow CDP policies for pNHA sites.
2. Arklow Marsh is also a component of a significant and important ecological corridor of Potential Ancient Woodland sites along the Avoca River and beyond to the Wicklow Mountains and should be retained and protected as the final link of this ecological corridor with the coast with reference to CDP objectives for ecological corridors.
3. Arklow Marsh, a wetland within an urban area, provides essential ecosystem services in terms of flood protection, climate mitigation and biodiversity resource and should be afforded protection to ensure that these ecosystem services are not undermined.
4. A protection buffer zone of 20m within which no development or recreational activities are carried out should be applied to Arklow Marsh. This 20m buffer zone should be fenced off and enhanced with dense scrub and woodland planting such that it acts as a natural disturbance barrier to prevent access to the marsh by people or dogs and a visual barrier to prevent visual disturbance to birds and other protected species and wildlife.
5. An outer buffer zone of additional 80m should be applied to the northern side of the marsh (Kilbride lands) which should be enhanced as a natural vegetation buffer (e.g. woodland /parkland buffer) within which no infrastructure development (e.g. foundations, roads or drainage i.e. no development requiring excavation up to 1m) is permitted in order to protect the groundwater resource and to further enhance the ecological corridor and ecological connectivity along the north side of the marsh.
6. This 100 m buffer zone could be reduced to 50m in the eastern extent of the Kilbride lands where ground water vulnerability is low or moderate but subject to hydrological assessment of the potential impact to the hydrological regime of the marsh.
7. A 20m protected riparian buffer zone is applied to the Ferrybank watercourse and the drainage ditch that arises on the Kilbride lands and enters the marsh.
8. Due to the high and extreme vulnerability rating for a significant portion of the development lands, all developments should be accompanied by a **hydrological impact assessment** to assess the potential impacts to groundwater both in terms of groundwater quality and quantity and groundwater flow pathways to protect the hydrological regime of the marsh.
9. Developments should ensure that the hydrological regime supporting the wetland habitat of Arklow Town Marsh is maintained, and that water quality is maintained or improved. Any surface water discharges should have appropriate SUDS design and/or nature-based treatment prior to any discharge of surface waters to the marsh. In particular, specific controls to prevent pollution from hydrocarbons and other contaminants from roads and carparking areas should be included.
10. The Hydrological Impact Assessment should include an assessment of the in-combination assessment of any hydrological impacts in terms of quantity and quality of water with other pressures on the water quantity and quality supporting the marsh e.g. an in-combination assessment with the impact of the Arklow Flood Protection Scheme is required.
11. Developments within or adjacent to Arklow Town Marsh should be informed by a detailed Ecological Impact Assessment and EIA Screening or EIAR as appropriate. The Ecological Impact Assessment should be informed by detailed desktop study

and detailed ecological surveys of the development lands and Arklow Marsh pNHA. These assessments should also include recommendations for the ecological enhancement of the developed lands and the ecological corridors.

12. Development of the lands at Kilbride should ensure the retention and protection of the **known badger sett** in the woodland around the old farm buildings and ensure that the woodland habitat is enhanced to protect the badger sett and **that badger commuting routes are retained and enhanced as part of the development**. Detailed badger surveys are required to identify the badger territory, established badger paths, commuting routes and foraging grounds to ensure retention of badger habitats (setts, commuting routes and access to feeding resources) to ensure no negative effect on the local badger population and no barriers to commuting routes and badger social interaction.
13. An assessment of the buildings, ruins and mature trees on the development sites for potential bat roosts is required. This should include a review of existing ecological surveys undertaken at the Arklow Pyramid Mausoleum site, which may provide relevant information on bat activity and flight paths. Connectivity for bats across the landscape should be considered, particularly in relation to lighting design, habitat fragmentation, and the retention of linear features that support bat movement.
14. The Ecological Impact Assessment should include an assessment of potential ecological effects of construction and operational phase impacts on Arklow Marsh pNHA and informed by surveys including but not necessarily limited to habitats and flora, winter and breeding bird surveys, mammal surveys (e.g. otter, badger), bat surveys and aquatic wetland species common frog, smooth newt and aquatic invertebrates.
15. The EclA should include an assessment on the potential impacts of hydrological regime change on the Marsh or habitat loss or alteration and disturbance from development activities to the marsh, and on the potential impacts on birds, mammals (e.g. otters and bats), amphibians and aquatic invertebrates within the marsh.
16. Ecological surveys of Arklow Marsh should be undertaken to update previous surveys and confirm the presence/ absence of EU Annex I habitat types, in light of increased knowledge and updated classification in Ireland of EU Annex I habitat types and / or habitat change since previous surveys were carried out. For example, wet woodland (WN6) has potential to correspond to the EU Annex I Alluvial Woodland (91E0). Marsh (GM1) may correspond to or contain patches of Annex I Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels (6430).
17. Botanical surveys should include targeted searches for rare and protected species previously recorded or potentially present on site, including *Eriophorum latifolium* (broad-leaved cottongrass) and *Orobancha rapum-genistae* (greater broomrape).
18. Development should contribute to the ecological restoration of Arklow Marsh through targeted control of invasive and non-native species. Priority should be given to listed Invasive Alien Species such as *Rhododendron ponticum*, *Impatiens glandulifera* (Himalayan balsam), *Persicaria wallichii* (Himalayan knotweed), and *Fallopia japonica* (Japanese knotweed). Other problematic species including *Buddleja davidii* (butterfly bush), *Cornus* spp. (dogwood), and *Chamaecyparis lawsoniana* (Lawson's cypress) should also be addressed to protect the ecological integrity of the marsh.
19. Part of the marsh is currently grazed by horses. Grazing of the marsh should continue preferably under a specified conservation grazing scheme, overseen by the Wicklow County Council Biodiversity Officer.
20. Developments within or adjacent to Arklow Marsh, including proposals for walkways,

must be designed to avoid disturbance and fragmentation of the marsh habitat. Any increased access should be limited to the upstream end of the marsh near the M11 bridge, where baseline disturbance already exists. Access routes should follow the edge of the marsh where possible, to minimise fragmentation and retain large undisturbed core areas. Design should also minimise lighting impacts and uncontrolled dog access and must be compatible with the continued conservation grazing of the marsh. External lighting has the potential to significantly impact the biodiversity value of the marsh. All developments must ensure there is no light spill into the marsh or adjacent OS2 protection zones. Existing lighting impacts should be assessed and reduced. Lighting design must be undertaken by a qualified lighting professional in collaboration with an ecologist and comply with current guidance (e.g. ILP/BCT GN08/23 or later updates). Impacts should be mitigated through enhancement measures as outlined in Recommendation 17.

21. It is recommended that **Potential Ancient Woodland Sites (PAW)** in Arklow of which there are several as identified by The Ancient Woodland Inventory are protected from development. Note that the definition of ancient and long-established woodland (Perrin et al., 2010) makes no distinction between the nature of the stands (semi-natural, mixed or conifer) at different points in history. In addition, coppicing or clear-felling is not regarded as a discontinuation of woodland cover. Therefore PAW sites in Arklow should be considered for protection even if the site is degraded or devoid of woodland cover. The soils on these sites may still be valuable in terms of woodland soil resources.

Potential Adjustment of Buffer Zones

In view of OS2 “open for consideration” terms, the following circumstances under which buffer zones could be reduced could be considered if deemed necessary for certain areas:

BUFFER	CONDITIONS UNDER WHICH REDUCED BUFFER CONSIDERED
Protected species buffers	Reduced protected species buffers <i>[Subject to protected species licensing where required, assuming no rock breaking or blasting, and assuming no demolitions]</i> Suitably qualified ecologist reviews works and latest available survey data, and advises the following (where necessary accompanied by a survey during the appropriate season): • Otter and badger breeding/resting sites are absent or sufficiently distant from zone of influence • Otter holt present within zone of influence but non-breeding* • Development works locations are visually screened from and/or mitigated to reduce noise disturbance to wetland birds OR works are seasonally restricted to the non-breeding season

BUFFER	CONDITIONS UNDER WHICH REDUCED BUFFER CONSIDERED
	- Operational disturbance impacts including unauthorised/informal access/ or designated walkways along the marsh have been assessed and suitably mitigated. - All other mitigations and/or seasonal protections in place for birds and other protected species as determined by an ecologist * To determine status of a holt/sett monitoring under licence required during an appropriate period prior to planning application/works, as determined by the ecologist Planning authority advises exemption from buffer in accordance with planning policy and subject to relevant conditions or licensing.
Reduced surface watercourse buffer	Works locations are outside predicted surface water and/or coastal food extents which could pose pollution risks to sensitive features Suitable construction and/or operation-phase surface water attenuation and pollution control measures are in place to mitigate risks to drainage ditches and/or risks of pollution by overland flow paths
Reduced Marsh buffer Reduced hydrology/groundwater buffer (non- exhaustive)	Hydrogeologist advises SEPA 100m buffer is not required, following appropriate hydrological assessment and review of desktop and/or field data, and review of specific development proposals Planning authority advises exemption from buffer in accordance with planning policy and subject to relevant conditions.

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APPENDIX 1 ZONING DEFINITIONS UNDER THE CDP 2022-2028

Open space (OS1) zoned land are formal / informal landscaped parks with off-road walking / cycling paths, as well as playgrounds, skate parks, 'Mixed Use Games Areas' and outdoor gyms.

To facilitate the further development and improvement of existing parks and casual play areas, to facilitate opportunities for the development of new high quality amenity open areas and to restrict developments / activities (such as the use or development of such lands for formal sports grounds for organisations that are not available for a broad range of the public) that would reduce the opportunities for use by the wider public.

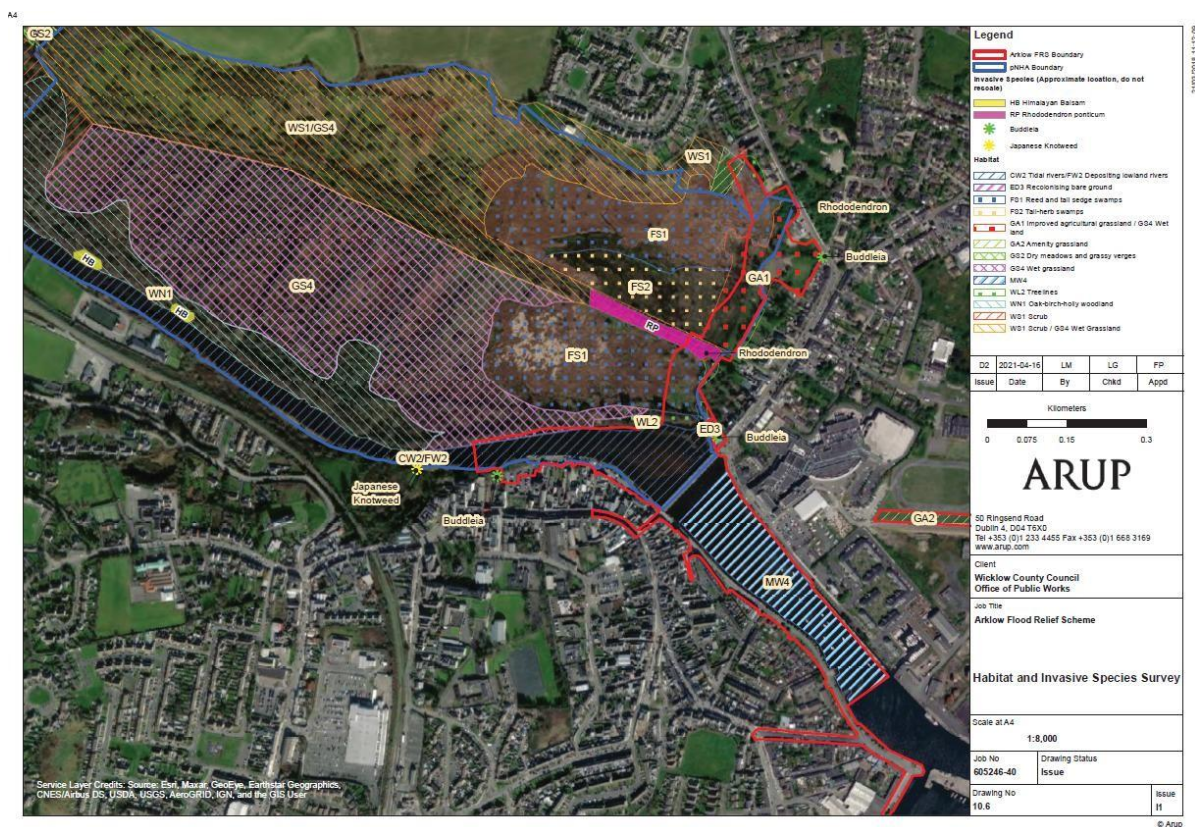
Open space (OS2) zoned land are uses that protect and enhance the function of these areas as flood plains, buffer zones along watercourses and rivers, green breaks between built up areas, green corridors and areas of natural biodiversity. As these open lands are not identified or deemed necessary for development for recreational purposes, other uses that are deemed compatible with proper planning and sustainable development may be open for consideration where they do not undermine the purpose of this zoning.

To protect, enhance and manage existing open, undeveloped lands that comprise flood plains, buffer zones along EU and nationally protected sites (Natura 2000 sites, NHAs etc), watercourses and rivers, steep banks, green breaks between built up areas, green corridors and areas of natural biodiversity.

AOS Active Open Space: To protect and enhance existing and provide for new active open space.

To facilitate the further development and improvement of existing active open spaces, formal exercise areas, sports grounds, playing pitches, courts and other games areas and to facilitate opportunities for the development of new high quality active recreational areas.

APPENDIX 2 HABITAT MAPS REVIEWED



Wicklow Wetland Survey 2012

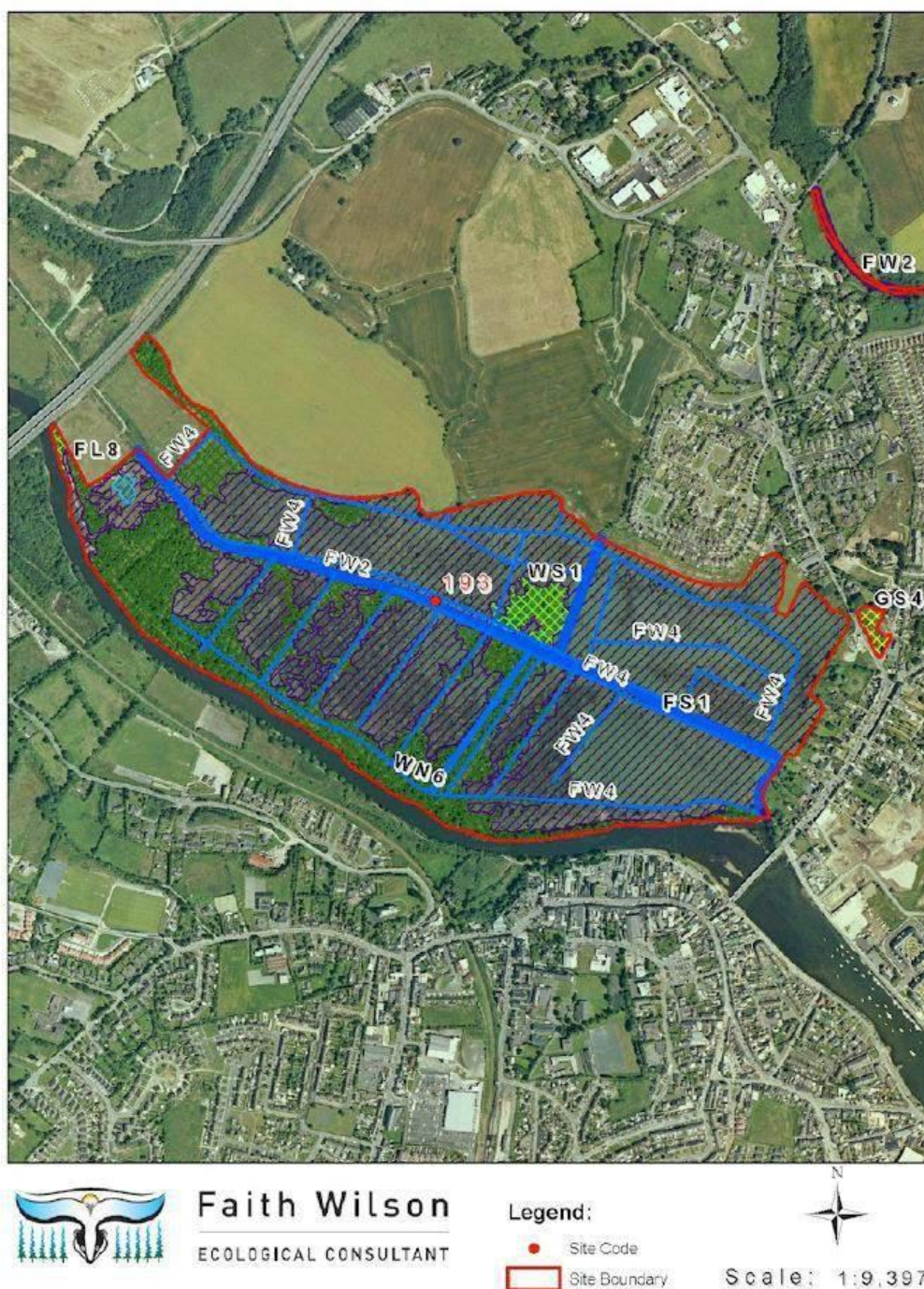


Figure 2. Habitat map of Arklow Town Marsh (site number WW193). Base map copyright Ordnance Survey of Ireland. Key to habitat symbols is presented at the start of this report.

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Key to Habitat Map Symbols

Wicklow Wetland Survey 2012

Legend:

-  Site Code
 Site Boundary

Fossitt Habitat Codes (Level 3)

 BL1	 FL5	 MW1
 FW1	 FL7	 PB1
 FW2	 FL8	 PB2
 FW4	 FP1	 PB3
 WL1	 FS1	 PB4
 WL2	 FS2	 PF1
 BL1	 FW1	 PF2
 BL3	 FW2	 PF3
 CB1	 FW4	 WD
 CD3	 GA1	 WD1
 CD5	 GA2	 WD2
 CM2	 GM1	 WD4
 CS1	 GM2	 WD5
 CS3	 GS1	 WL1
 CW1	 GS2	 WN1
 CW2	 GS3	 WN2
 ED1	 GS4	 WN4
 ED2	 HD1	 WN6
 ED3	 HH/PB/GS	 WN7
 ER1	 HH1	 WS1
 FL1	 HH3	 WS2
 FL2	 HH4	 WS4
 FL4	 LR1	 WS5

Habitats Recorded by Mays (2015) Mays (Shelton Abbey and Kilbride Lands)

FS1 Reed and large sedge swamps Common reed *Phragmites australis* dominated swamp occurs mainly in the eastern part of Arklow Town Marsh (Figure 4) and may reflect a brackish water influence in this area in addition to hydrological factors (Mays, 2015).

Tall sedge swamp dominated by Greater Pond sedge *Carex riparia* at northern marsh edge in Kilbride (Mays, 2015).

The Canal in its western section, there is little evidence of flow and the canal is vegetated with Sweet-grass and Duckweed. In shallower silty sections towards the east, Water-cress *Nasturtium officinale*, Fool's water-cress, Bulrush, Branched bur-reed, Reed canary-grass and Common reed, and Great willowherb occur (Plate 6). A smaller wet drainage ditch adjoins the northern side of the access track from the Sheepswalk stream eastwards; both the ditch and the canal extend eastwards into Arklow Town Marsh and provide a surface water flow into the marsh (Mays, 2015).

Existing hydrological impacts on the marsh include infilling at the western end, and past drainage. The effects of aerial pollution noted in the Site Synopsis (Appendix 1) are no longer apparent, with recovery and re-growth of willow within the marsh area and of trees on adjoining lands. It is likely that the marsh receives nutrient inputs from adjoining arable land to the north (Mays, 2015).

APPENDIX 3 RELEVANT CDP POLICIES AND OBJECTIVES

Wicklow County Council County Development Plan contains the following directly relevant objective CPO 17.7 **To maintain the conservation value of all proposed and future Natural Heritage Areas (NHAs)** and to protect other designated ecological sites in Wicklow.

In addition, the following CPOs are considered particularly relevant to the protection of Arklow Marsh due to the wildlife that it supports and in recognition of the ecosystem services it provides such as a flood plain, flood protection and water quality protection.

CPO 17.1 To protect, sustainably manage and enhance the natural heritage, biodiversity, geological heritage, landscape and environment of County Wicklow in recognition of its importance for nature conservation and biodiversity and as a non-renewable resource.

CPO 17.2 Ensure the protection of ecosystems and ecosystem services by integrating full consideration of these into all decision making.

CPO 17.3 To support and promote the implementation of the County Wicklow Heritage Plan and the County Wicklow Biodiversity Action Plan.

CPO 17.4 To contribute, as appropriate, towards the protection of designated ecological sites including Special Areas of Conservation (SACs) and Special Protection Areas (SPAs); **Wildlife Sites (including proposed Natural Heritage Areas)**; Salmonid Waters; Flora Protection Order sites; Wildfowl Sanctuaries (see S.I. 192 of 1979); Freshwater Pearl Mussel catchments; and Tree Preservation Orders (TPOs).

CPO 17.6 Ensure that development proposals, contribute as appropriate towards the protection and where possible enhancement of the ecological coherence of the European Site network and encourage the retention and management of landscape features that are of major importance for wild fauna and flora as per Article 10 of the EU Habitats directive.

CPO 17.8 Ensure ecological impact assessment is carried out for any proposed development likely to have a significant impact on **proposed Natural Heritage Areas (pNHAs)**, Natural Heritage Areas (NHAs), Statutory Nature Reserves, Refuges for Fauna, Annex I habitats, or rare and threatened species including those species protected by law and their habitats. Ensure appropriate avoidance and mitigation measures are incorporated into development proposals as part of any ecological impact assessment.

All projects and plans arising from this Plan will be screened for the need to undertake Appropriate Assessment under Article 6 of the Habitats Directive.

CPO 17.7 **To maintain the conservation value of all proposed and future Natural Heritage Areas (NHAs)** and to protect other designated ecological sites in Wicklow.

CPO 17.14 Ensure that development proposals support the protection and enhancement of biodiversity and ecological connectivity within the plan area in accordance with Article 10 of the Habitats Directive, including linear landscape features like watercourses (rivers, streams, canals, ponds, drainage channels, etc), woodlands, trees, hedgerows, road and railway margins, **semi-natural grasslands**, natural springs, **wetlands**, stonewalls, geological and geo-morphological systems, features which act as stepping stones, such as **marshes** and woodlands, other landscape features and associated wildlife where these form part of the ecological network and/or may be considered as ecological corridors or stepping stones that taken as a whole help to improve the coherence of the European network in Wicklow

CPO 17.15 To protect and enhance **wetland sites that are listed as being of C+ or higher importance** in the County Wicklow wetlands survey and any subsequent updates or revisions thereof and to implement the recommendations of the County Wicklow wetlands survey.

CPO 17.25 **Ensure that floodplains and wetlands are retained for their biodiversity and ecosystems services value and resist development and activities that would interfere with the natural water cycle to a degree that would interfere with the survival and stability of these natural habitats.**

CPO 17.26 Protect rivers, streams and other water courses by avoiding interference with river / stream beds, banks and channels and maintaining a core riparian buffer zone of generally 25m along watercourses (or other width, as determined by the Planning Authority having particular regard to 'Planning for Watercourses in the Urban Environment' by Inland Fisheries Ireland for urban locations) free from inappropriate development, with undeveloped riparian vegetation strips, wetlands and floodplains generally being retained in as natural a state as possible. Structures such as bridges should be clear span, and designed and built in accordance with Inland Fisheries Ireland guidance.

APPENDIX 4 EU NATURE RESTORATION POLICY AND REGULATIONS

Regulation (EU) 2024/1991 of the European Parliament and of the Council of 24 June 2024 on nature restoration and amending Regulation (EU) 2022/869 is commonly referred to as the Nature Restoration Law.

1. EU 2030 Biodiversity Strategy

The EU Biodiversity Strategy for 2030 sets out a commitment to legally protect a minimum of 30 % of the land, including inland waters, and 30 % of the sea in the Union, of which at least one third should be under strict protection, including all remaining primary and old-growth forests

2. EU Nature Restoration Law

EU Nature Restoration Regulation, effective from August 2024, mandates Member States to restore at least 20% of land and sea areas by 2030. It sets legally binding targets for ecosystems, including urban areas.

3. Convention on Biological Diversity
4. The Global Biodiversity Framework (COP to the convention) sets out action-oriented global targets for urgent action over the decade to 2030

Target 1 *is to ensure that all areas are under participatory, integrated and biodiversity inclusive spatial planning and/or effective management processes addressing land and sea use change;*

Target 2 *is to ensure that, by 2030, at least 30 % of areas of degraded terrestrial, inland water, and marine and coastal ecosystems are under effective restoration, in order to enhance biodiversity and ecosystem functions and services, ecological integrity and connectivity;*

Target 11 *is to restore, maintain and enhance nature's contributions to people, including ecosystem functions and services, such as the regulation of air, water and climate, soil health, pollination and reduction of disease risk, as well as protection from natural hazards and disasters, through nature based solutions and/or ecosystem-based approaches for the benefit of all people and nature by 2050, biodiversity is to be valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people.*

Arklow and Environs Hedgerow Survey 2024

WICKLOW COUNTY COUNCIL



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1 INTRODUCTION

The Urban Hedgerow Report for Arklow and its environs has been prepared by Deborah D'Arcy Ecology in response to recommendations from the County Wicklow Hedgerow Survey 2023. As part of the county's Hedgerow Habitat Action Plan, the survey emphasised the need for focused actions to preserve and enhance hedgerows. Among these, under the Hedgerow Legacy Actions, is the recommendation to conduct targeted assessments of urban native hedgerows, aiming to promote and improve management practices that support biodiversity.

This report provides a detailed look at hedgerows in Arklow, through a compilation of baseline surveys on the context, structure, composition and condition of hedgerows in Arklow and its environs, and use of this information to develop recommendations for the conservation and management of hedgerows to foster ecological resilience and enhance local biodiversity.

The Arklow Hedgerow surveys, data analysis and reporting was completed by Caoife D'Arcy with assistance, oversight, input and review by Deborah D'Arcy.

1.1 OBJECTIVES

The objectives of the Arklow Hedgerow Survey are:

- To carry out a detailed field survey of hedgerows in Arklow using the standardised sampling approach developed in the Hedgerow Survey Appraisal System¹.
- To gather information on the context, construction, management, composition, and ecological connectivity of the hedgerow resource in Arklow and in the undeveloped lands of the Arklow LAP.
- To collate and map the data in accordance with best practice.
- To identify any rare or vulnerable species.
- To compile a species list including ground flora for Arklow hedgerows.
- To identify areas of Arklow and its environs which may have ancient hedgerows or hedgerows which are remnants of old woodland.
- To prepare recommendations on conservation and management priorities.

1.2 ARKLOW AND ENVIRONS

A review of historical mapping (6-inch and 25-inch editions) along with aerial photographs from 1996, 2011, 2015, 2018, and recent years reveals that Arklow has evolved from a compact riverside town bordered by marshland, woodland, coastal habitats, and agricultural fields into a larger urban centre with expanding residential and commercial areas. The growth is visible in the increase in building density, extended road networks, and the gradual encroachment into previously rural areas, especially to the west and south. The Avoca River remains a central feature around which the town has grown, but modern infrastructure now defines much of the area. This progression showcases Arklow's evolution from a small settlement to a larger, organised urban area.

Hedgerow loss to development and agricultural improvement is evident, particularly along townland boundaries and historical field boundaries with the expansion of the town which underlines the

¹ (Foulkes, Fuller, Little, McCourt, & Murphy, 2013)

importance of robust local policies to encourage their retention and to promote planting new native hedgerows and appropriate management of hedgerows in urban environments to preserve and enhance the ecological corridors.

1.2.1 Wicklow County Council Policy Objectives

The current Wicklow County Development Plan 2022-2028 designates Arklow as a Level 3 *Self Sustaining Growth* Town. It is considered to be a town with a moderate level of jobs and services with good transport links and capacity for continued commensurate growth to become more self-sustaining. The Plan states that Level 3 towns are targeted for growth of 25-30%, with slight variations based on capacity/past trends.

The County Policy Objectives outlined in the table below reflect County Wicklow's commitment to preserving and enhancing biodiversity, natural heritage, and ecological connectivity. These objectives are designed to ensure that ecosystems, biodiversity, and key landscape features such as hedgerows, woodlands, and wildlife corridors are protected and managed sustainably. The policies emphasise integrating biodiversity considerations into all planning and decision-making processes, preventing habitat loss, and supporting ecological networks. Additionally, the objectives highlight the importance of pollinator-friendly practices, the control of invasive species, and the preservation of mature trees and hedgerows as vital components of the county's environmental and cultural heritage.

Table 1-1 County Policy Objectives

General	
CPO 17.1	To protect, sustainably manage and enhance the natural heritage, biodiversity, geological heritage, landscape and environment of County Wicklow in recognition of its importance for nature conservation and biodiversity and as a non-renewable resource.
CPO 17.2	Ensure the protection of ecosystems and ecosystem services by integrating full consideration of these into all decision making.
CPO 17.3	To support and promote the implementation of the County Wicklow Heritage Plan and the County Wicklow Biodiversity Action Plan.
Sites & Corridors of Ecological & Biodiversity Value	
CPO 17.12	To protect non-designated sites from inappropriate development, ensuring that ecological impact assessment is carried out for any proposed development likely to have a significant impact on locally important natural habitats, species or wildlife corridors. Ensure appropriate avoidance and mitigation measures are incorporated into development proposals as part of any ecological impact assessment.
CPO 17.13	To facilitate, in co-operation with relevant stakeholders, the ongoing identification and recording of locally important biodiversity areas and species in County Wicklow, not otherwise protected by legislation and ensure that consideration is given to these in the development management process.
CPO 17.14	Ensure that development proposals support the protection and enhancement of biodiversity and ecological connectivity within the plan area in accordance with Article 10 of the Habitats Directive, including linear landscape features like watercourses (rivers, streams, canals, ponds, drainage channels, etc), woodlands, trees, hedgerows, road and railway margins, semi-natural grasslands, natural springs, wetlands, stonewalls, geological and geo-morphological systems, features which act as stepping

	stones, such as marshes and woodlands, other landscape features and associated wildlife where these form part of the ecological network and/or may be considered as ecological corridors or stepping stones that taken as a whole help to improve the coherence of the European network in Wicklow
CPO 17.16	Require pollinator friendly landscape management and planting within new developments and on Council owned land
CPO 17.17	Work with statutory authorities to prevent and control the spread of invasive plant and animal species and require, where appropriate Invasive Species Management Plans to be prepared as part of the development management process where necessary.
Woodlands, Trees and Hedgerows	
CPO 17.18	To promote the preservation of trees, groups of trees or woodlands in particular native tree species, and those trees associated with demesne planting, in the interest of the long-term sustainability of a stable ecosystem amenity or the environment generally, as set out in Schedule 17.05 and Maps 17.05 and 17.05A - H of this plan
CPO 17.19	To consider the making of Tree Preservation Orders (TPOs) to protect trees and woodlands of high amenity value.
CPO 17.20	Development that requires the felling of mature trees of environmental and/or amenity value, even though they may not have a TPO in place, will be discouraged.
CPO 17.21	To strongly discourage the felling of mature trees to facilitate development and encourage tree surgery rather than felling if such is essential to enable development to proceed
CPO 17.22	To require and ensure the preservation and enhancement of native and semi-natural woodlands, groups of trees and individual trees, as part of the development management process, and require the planting of native broad leaved species, and species of local provenance in all new developments.
CPO 17.23	To require the retention, wherever possible, of hedgerows and other distinctive boundary treatment in the County. Where removal of a hedgerow, stone wall or other distinctive boundary treatment is unavoidable, provision of the same type of boundary will be required of similar length and set back within the site in advance of the commencement of construction works on the site (unless otherwise agreed by the Planning Authority).

1.2.2 Arklow and Environs Local Area Plan

A key feature of the Planning and Development Act 2000-2012 was the introduction of local area plans (LAPs) within the context of higher-level plans, such as Regional Planning Guidelines and City or County Development Plans. LAPs provide detailed planning policies for specific areas where significant development or change is expected, allowing for targeted planning without requiring extensive detail across all areas within broader city or county development plans.

The Arklow and Environs Local Area Plan 2018-2024: Built and Natural Heritage objectives included in Table 1-2 emphasise the protection and enhancement of natural heritage, including proposed and future Natural Heritage Areas (NHAs), such as the Arklow Marsh. They aim to safeguard the ecological and aesthetic value of important landscapes, ensure the preservation of architectural and archaeological heritage, and promote the sustainable development of green infrastructure and connectivity. The policies also highlight the importance of maintaining the area's coastal character,

fostering public appreciation of natural and maritime heritage, and protecting designated ecological sites to ensure long-term environmental quality and biodiversity conservation.

Table 1-2 Built and Natural Heritage Objectives

Sites & Corridors of Ecological & Biodiversity Value	
HT1	To maintain the favourable conservation status of all proposed and future Natural Heritage Areas (NHAs) in the plan area in particular the Arklow Marsh and to support environmentally sensitive measures to enhance the understanding and enjoyment of such natural areas.
HT2	To protect the listed prospect of special amenity (from the R750/coast road towards the sea) from development that would either obstruct the prospect from the identified vantage point or form an obtrusive or incongruous feature in that prospect. Due regard will be paid in assessing development applications to the span and scope of the prospect and the location of the development within that prospect.
HT3	Protect and enhance the character, setting and environmental quality of natural, architectural and archaeological heritage, and in particular those features of the natural landscape and built structures that contribute to its special interest. The natural, architectural and archaeological heritage of the area shall be protected in accordance with the objectives set out in the Wicklow County Development Plan
HT4	To consolidate and safeguard the historical and architectural character of Arklow town centre through the protection of individual buildings, structures, shopfronts and elements of the public realm that are of architectural merit and/or contribute greatly to this character.
HT5	To maintain the coastal character of the settlement and to provide for its enjoyment as a recreational and natural asset.
HT6	To facilitate the enhancement of facilities such as the Arklow Maritime Museum which increase public awareness and appreciation of the town's maritime heritage.
HT7	To facilitate the development of initiatives to highlight Arklow's maritime heritage in the public realm.
HT8	To facilitate the development and enhancement of green infrastructure resources, including access to, connectivity between areas of interest and linkages between green spaces including the coast, where feasible within Arklow and environs settlement boundary (see Map No. 10.1).
HT9	To maintain the conservation value of all proposed and future Natural Heritage Areas (NHAs) and to protect other designated ecological sites in Arklow and Environs.

1.2.3 Area Action Plans

Under the Land Use Zoning Objectives map² for Arklow and its environs, additional lands are proposed to accommodate further expansion of the town to accommodate the growing population. These Action Area Plans (AAP) identified within the Arklow and Environs Local Area Plan 2018–2024, are located to the north and south of Arklow town.

² Arklow and Environs Local Area Plan 2018-2024: *Land Use Zoning Objectives Map No.: 1* Wicklow County Council

AAP1 and AAP2 are bounded by the residential neighbourhood of Arklow to the north, the golf club and quarry site to the east, open farmland to the south, and a railway line to the west, covering the Tinahask Upper - Abbeylands (AAP1) and Tinahask Lower Money Little & Money Big (AAP2) sites.

AAP 3 and AAP4 are located to the west and northwest of Arklow town within the townlands of Kilbride and Coolboy.

The proposed areas primarily consist of greenfield lands with varying topography and established hedgerows. These lands are zoned as 'MU – Mixed Use' to support a combination of residential zones (R20 & R28), employment (E1), local shops and services (LSS), community amenities (CE), and open space zones (AOS, OS1). Three of the four AAP include the following objectives, as they relate to sites of heritage value, habitats of biodiversity value and appropriate buffer zones:

- **ACTION AREA PLAN 1 TINAHASK UPPER – ABBEYLANDS:** Any development proposals shall have regard to the setting and curtilage of structures and sites of heritage value, and habitats of biodiversity value and appropriate buffer zones/mitigating measures shall be provided as required;
- **ACTION AREA PLAN 2 TINAHASK UPPER - MONEY LITTLE AND MONEY BIG:** Any development proposals shall have regard to the setting and curtilage of structures and sites of heritage value, and habitats of biodiversity value and appropriate buffer zones-/mitigating measures shall be provided as required.
- **ACTION AREA PLAN 3 KILBRIDE:** Any development proposals shall have regard to the setting and curtilage of structures and sites of heritage value, and habitats of biodiversity value and appropriate buffer zones-/mitigating measures shall be provided as required.

2 THE VALUE OF HEDGEROWS

Hedgerows as linear mini woodlands provide important refuges for wildlife in our agricultural and urbanised landscapes. Hedgerows offer critical habitats for a diverse array of wildlife, including birds, bats and other small mammals, invertebrates and plants. They serve as shelter, nesting sites, and food sources, supporting biodiversity and contributing to the conservation of native species.

Hedgerows are essential corridors for wildlife maintaining links between larger patches of woodland, wetlands, semi-natural grasslands and other important habitats. These corridors for nature are crucial for connecting fragments of habitats and wildlife populations aiding the dispersal of species and gene flow between populations critical to the persistence of wildlife species in the landscape and conserving biodiversity.

The value of hedgerows to biodiversity conservation and in maintaining wildlife connectivity and ecological coherence of the landscape is reflected in the EU Habitats Directive (EC, 1992) under Article 10 which obliges Member States to endeavour in their land use planning and development policies to encourage the management of continuous features such as rivers and field boundaries which are essential for the migration, dispersal and genetic exchange of wild species.

2.1 HISTORICAL ASPECTS OF HEDEGROWS

Following the last Ice Age, Ireland's landscape was largely wooded, with 80% forest cover that included juniper, birch, pine, and hazel. Around 8,000 years ago, fertile soils supported forests of elm, oak, yew, ash, and hazel, while poorer soils hosted Scots pine and sessile oak. A wetter climate around 7,000 years ago saw the spread of alder and a decline in Scots pine. Archaeological and pollen evidence dates the first significant deforestation, linked to early agriculture, to around 6,000 years ago. By the end of the Bronze Age, much of Ireland's woodland had been cleared, replaced by blanket bog on mountain summits and open fields for grazing.

During the early Christian period (around 800 AD), population growth increased deforestation for livestock grazing, and coppicing practices provided timber for fencing. By the 1650s, only 2-12% of Ireland's original forests remained, primarily as secondary growth. Final woodland clearance occurred with charcoal production and timber export for British expansion in the 19th century, leaving native woodlands mostly confined to private estates and remote areas.

Ireland's hedgerow network largely developed during the Enclosure movement from the mid-1700s to mid-1800s, with older hedgerows dating back to Gaelic Ireland (5th-8th centuries) as markers of townland boundaries. Enclosure accelerated in the late 17th century, with further expansion in the 18th century, spurred by agricultural improvements and infrastructure development. Some eastern areas had been cultivated and settled continuously since medieval times, and evidence of Anglo-Norman and native Irish field patterns remains³.

By the time of the first Ordnance Survey maps in 1840, the present enclosure pattern in eastern Ireland was largely established. In County Wicklow, older hedgerows often correspond to townland boundaries, medieval villages, hamlets, or historical features like raths. Brehon Laws highlight the cultural value of trees in Gaelic Ireland, classifying trees into categories with penalties for their removal based on their importance. Trees such as oak, yew, and Scots pine were highly valued, while shrubs provided fruits, fodder, or bedding.

Today, hedgerows and trees are increasingly valued, with protective policies in place at national and local levels. Agri-environment schemes, like ACRES, encourage the protection and expansion of hedgerows within the agricultural sector, recognising their ecological and cultural importance⁴.

2.2 URBAN HEDGEROWS

Agricultural and urban native hedgerows serve similar functions but differ in structure, plant species composition, and primary purpose. The benefit of agricultural hedgerows is examined in more detail in the County Wicklow Hedgerow Survey. This report examines several environmental, social and aesthetic benefits of hedgerows in the urban environment, these include⁵⁶:

- **Biodiversity:** Hedgerows provide habitats for a variety of wildlife, from birds and small mammals to beneficial insects like pollinators and pest controllers. This biodiversity supports a healthier urban ecosystem.

³ (Hickie, 2004)

⁴ (Deborah D'Arcy Ecology, 2023)

⁵ (McDowell, 2024)

⁶ (Wild Oxfordshire, 2022)

- **Pollution Reduction:** Hedgerows capture airborne pollutants like particulate matter from traffic and industrial activities, improving air quality. They can also absorb nitrogen dioxide and carbon monoxide, which are prevalent in urban areas.
- **Noise Reduction:** Dense hedgerows can act as a sound barrier, muffling urban noise, especially in residential areas near busy roads. This can improve the quality of life by reducing stress from noise pollution.
- **Carbon Sequestration:** By absorbing carbon dioxide, hedgerows play a small yet valuable role in reducing urban carbon footprints. Their role in carbon sequestration makes them part of urban climate mitigation strategies.
- **Water Management:** Hedgerows help manage stormwater by intercepting rainfall, which reduces runoff and lowers the risk of flooding. This can be particularly valuable in urban areas where impermeable surfaces (like roads and pavements) dominate.
- **Aesthetic and Social Value:** Hedgerows contribute to the green aesthetic of urban areas, making urban spaces more pleasant and appealing. They also create a sense of privacy and natural boundary in shared spaces, which can be especially valuable in residential and community areas.

2.3 INTEGRATING RURAL HEDGEROWS IN THE URBAN ENVIRONMENT

When a town expands into the rural landscape and incorporates rural hedgerows, it can bring a unique character, ecological value, and a sense of continuity to the urbanised area. These hedgerows, often centuries old, offer a physical and visual link to the land's agricultural past, grounding the town in its historical roots. The established plant structures and biodiversity within these hedgerows foster habitats that support local wildlife, adding ecological diversity uncommon in new urban developments. The hedgerows' mature, dense growth can form natural boundaries between new developments and provides green corridors for wildlife, facilitating movement and species resilience within urban environments.

From a landscape perspective, these hedgerows facilitate a gradual transition between urban and rural areas, promoting a cohesive integration of natural and developed environments. These hedgerows contribute to urban green infrastructure by assisting in stormwater management, improving air quality, and establishing ecological corridors for wildlife movement. Additionally, when effectively managed, these hedgerows provide aesthetic value, with seasonal changes in foliage and flowering that create visual interest and promote a sense of place and well-being among residents.

The integration of hedgerows within expanding urban areas, such as Arklow, supports the retention of historical and ecological identity and promotes the creation of distinctive, biodiverse neighbourhoods that honour both natural heritage and sustainable urban development in line with Wicklow County Development Plan 2022-2028 and Arklow Local Area Plan policy objectives. To maximise these benefits, ongoing management strategies are recommended to preserve the structural and ecological integrity of these hedgerows within the urban landscape.

2.4 ARKLOW LOCAL BIODIVERSITY ACTION PLAN 2017-2020

The **Arklow Local Biodiversity Action Plan (2017–2020)**⁷ outlines strategies for protecting and enhancing biodiversity in Arklow through community engagement and practical actions. It emphasises the conservation of existing habitats such as hedgerows, woodlands, and wetlands while promoting

⁷ Meehan S. and D'Arcy D. (2017)

the creation of new habitats like meadows, woodlands, and pollinator-friendly spaces. The plan integrates the objectives of the All-Ireland Pollinator Plan to support pollinator species and suggests projects like tree planting, invasive species management, and public education through events and citizen science initiatives. Collaborative efforts with local groups aim to create sustainable biodiversity improvements while enhancing the town's ecological corridors and green spaces for both wildlife and residents.

The report highlights the significance of hedgerows and ecological corridors in enhancing biodiversity and connectivity in Arklow. Key points in relation to hedgerows and ecological corridors addressed within the report include:

Existing Ecological Corridors:

- Hedgerows and linear strips of woodland south of Arklow connect habitats towards Arklow Rock.
- A railway line through the town acts as a linear ecological corridor with potential for enhancement through hedgerow and tree planting.
- Woodland and treelines along streams south of the town link to woodlands at Glenart.

Opportunities for Enhancement:

- Planting hedgerows, mini woodlands, tree groves, and orchards can strengthen ecological corridors.
- Areas such as the green space at Harbour Court and Church View estate could be improved with tree planting and meadow creation.
- Rough grasslands and derelict sites, such as those near Collins Street, could serve as small community-managed nature parks or stepping stones for wildlife.

Urban Biodiversity:

- Semi-natural habitats, unmanaged areas, and amenity grasslands in urban settings provide critical refuges and stepping stones for wildlife.
- Enhancing underutilized green spaces by altering grass-cutting regimes and incorporating meadow grasslands or wildflower lawns can benefit both people and wildlife.

Overall, hedgerows and ecological corridors are vital for maintaining connectivity and biodiversity, and their conservation and enhancement should be prioritized.

3 METHODOLOGY

The Arklow and Environs Hedgerow Survey was carried out following the *Hedgerow Appraisal System (HAS) Best Practice Guidance on Hedgerow Surveying, Data Collation and Appraisal*⁸. The Hedgerow Appraisal System (HAS) was developed by Woodlands of Ireland in collaboration with The Heritage Council and includes a standard recording methodology and a method for appraisal of the heritage value in terms of their ecological, historical and landscape significance and for assessing the condition of hedgerows.

Hedgerow surveys carried out consistently with the HAS methodology permit an assessment at the county level of the quantity, quality, structure, and condition of the hedgerow resource and permit comparisons of the results with other county hedgerow surveys.

The objective of the methodology is to record:

- floristic composition, context, physical structure, condition and management of hedgerows (qualitative survey)

3.1 DEFINITION OF A HEDGEROW

For the purposes of this survey hedgerows are defined as:

“Linear strips of woody plants with a shrubby growth form that cover more than 25% of the length of a field or property boundary. They often have associated banks, walls, ditches (drains), or trees”.

Hedges that have developed into lines of trees which no longer display a shrubby growth form (remnant hedgerows) are also considered for recording purposes.

To maintain consistency with standard habitat classification in Ireland, hedgerows and treelines as classified in the A Guide to Habitats in Ireland (Fossitt, 2000) are included in the hedgerow surveys.

Fossitt (2000) describes hedgerows (WL1) as *Linear strips of shrubs, often with occasional trees, that typically form field or property boundaries. Dimensions of hedgerows are taken here as being mainly less than 5m high and 4m wide. When wider or taller than this, or dominated by trees, the habitat should be considered as a narrow strip of scrub or woodland, or as a treeline - WL2.*

Some hedgerows may be overgrown or fragmented if management has been neglected, but they should still be considered in this category unless they have changed beyond recognition. Linear strips of low scrub are included in this category if they occur as field boundaries.

Treelines (WL2) are described as: a narrow row or single line of trees that is greater than 5 m in height and typically occurs along field or property boundaries. This category includes tree-lined roads or avenues, narrow shelter belts with no more than a single line of trees, and overgrown hedgerows that are dominated by trees. The presence or absence of hedgerow or scrub at the base should be noted. If treelines are greater than 4 m wide at the base they should be considered as narrow stretches of woodland.

⁸ (Foulkes, Fuller, Little, McCourt, & Murphy, 2013)

3.2 SELECTING THE SAMPLE

Sampling Method

The sampling method follows the Hedgerow Appraisal System (HAS) and was adapted for the urban environment. For the Arklow Urban Hedgerow Survey, this methodology was adapted to a smaller scale, focusing on individual 1 km grid squares within the Arklow and Environs Local Area Plan (LAP). Aerial mapping and a preliminary walk-over survey were conducted to locate and identify hedgerows within these grid squares.

Study Area and Grid Square Selection

The Arklow and Environs LAP area is divided into 13 grid squares (G1-G13). Two of these grid squares, G9 and G12, are situated within Area Action Plans (AAPs) for specific areas south of Arklow town:

- AAP1: Abbeylands and Tinahask Lower
- AAP2: Tinahask Lower, Money Little, and Money Big

Three grid squares (G3, G10, and G13) were excluded from field surveys due to the absence of hedgerows, as confirmed through aerial imagery:

- G3: Marshland
- G10: Golf course
- G13: Quarry

As a result, the survey was carried out in the remaining 10 grid squares (G1, G2, G4-G9, G11, G12). Additionally, one hedgerow located just outside the Arklow and Environs LAP area, on the R772 approach road in Arklow North, was included.

Field Survey Preparation and Data Collection

Each hedgerow selected for survey within the designated grid squares was digitised and labelled using QGIS software. Survey maps were generated to illustrate the sampled native hedgerows. Hedges around properties and along roads were not mapped in the area, as the great majority of hedges in such settings are not native hedgerows. Townland boundaries were included on the maps to provide context for each location within the survey.

Field surveys were conducted within each grid square to evaluate and record hedgerow characteristics in accordance with the HAS criteria: quantity, quality, structure, and condition of the hedgerow resources in Arklow and the environs.

Hedgerow Mapping

Hedgerows were mapped using a combination of points taken out in the field using GPS handheld devices (Garmin E-Trex), GIS datasets and aerial photography review.

3.3 FIELD SURVEY

The field survey was carried out by Caoife D’Arcy Environmental Scientist and Deborah D’Arcy Ecologist both of whom had also completed surveys for the County Wicklow Hedgerow survey.

3.3.1 Data Collection

Field data was recorded in Microsoft Excel on a Samsung tablet on a pre-prepared survey sheet kindly provided by Hedgerows Ireland. A Garmin Etrex GPS was used to record location data in the field. Photographs were taken of sampled hedges and other features of note.

3.3.2 Context, Structure, Condition and Management

The attributes covered by the methodology are grouped into five sections on the recording sheets. These are:

1. Context
2. Construction
3. Structure and Condition
4. Management
5. Floristic data

The *Hedgerow Appraisal System* assigns scores of 0-4 against several criteria: connectivity, historical significance, shrub/tree diversity, ground flora diversity, landscape value, and structures and other features. A hedgerow that scores 4 in any one category, a cumulative score of 6 or more in the historical, shrub/tree diversity and structural categories, or a cumulative score of 16 or more over “the five categories” is considered to be a “heritage hedgerow” under that system.

Other criteria, such as hedgerow height, breadth and the presence of gaps, have been used in some hedgerow evaluation schemes. These criteria have been separated in the Hedgerow Appraisal System⁹ as being measures of hedgerow condition rather than value or importance.

A 30m strip is generally accepted as a representative sample size for recording woody hedge species. This sample size standardisation allows for comparison of hedges of different lengths. Irish hedges tend to show high degrees of variation in species composition from one end of a hedge to the other (Foulkes et al., 2013). For this reason, two 30m strips were recorded for sample hedges unless the hedge was short (<100m) and/or generally consistent regarding species composition along its length.

For each 30m sample strip, the percentage cover of woody shrub species was recorded using the DOMIN scale. Vegetation cover of climbers and non-hedge-forming shrubs were recorded using the DAFOR¹⁰ scale, respectively. Additional species occurring outside the 30m strips were separately noted when time allowed.

⁹ (Foulkes, Fuller, Little, McCourt, & Murphy, 2013)

¹⁰ DAFOR: Dominant, Abundant, Frequent, Occasional, Rare

The ground flora at the base of the hedge was examined for the presence of 32 target herbaceous ground flora species and eight species of ferns (and horsetails) listed in the Woodlands of Ireland Hedgerow Appraisal System. Additional ground flora species were recorded where time permitted.

3.3.3 Target Notes

When relevant, observations were recorded on any anomalies, unique attributes, or distinct features within the sample square or pertaining to specific hedges.

3.3.4 Period of Field Work

Fieldwork commenced in September 2024 and was concluded in October 2024. Weather conditions were favourable.

3.3.5 Difficulties encountered during the course of the surveys

During the field surveys, the main challenge faced was gaining access to both sides of the hedgerow due to restricted access and permissions.

In the hedgerows located in the AAP lands, the main challenge faced was gaining access to the lands. Additionally, cows were located in fields which prevented safe access for the survey. These challenges considerably delayed the survey process. On a number of occasions, alternative hedgerows had to be selected, different from the ones initially selected, to continue with the survey.

3.4 DESKTOP RESEARCH

A Geographical Information System (GIS) project was set up for the survey. Other publicly available data was imported into the GIS including Wicklow County Council Tree Preservation Orders, Wicklow Landscape Character Categories and townland boundaries.

Other GIS layers imported into the GIS included NPWS designated sites boundary data and habitat datasets including Ancient and Long-established Woodland (ALEW), National Survey of Native Woodlands (NSNW), Irish Semi-natural Grassland Survey (ISGS) and Coastal Monitoring Survey. These layers were examined in GIS for overlap with the survey area and to identify ecological corridors to these habitats.

OS historical first and second edition maps were reviewed to record the history of the boundary feature noting for example whether the hedgerow was a townland boundary, indicated as a treeline on the historical maps or an internal boundary which gave some insight into the potential longevity of the hedgerow. The Site and Monuments Record (SMR) dataset was also included in as a GIS layer for analysis of hedgerows with linkages to historical sites.

Other desktop information was gathered from CORINE landcover map 2018 EPA and soil mapping. Desktop information was recorded in the Hedgerow Appraisal Excel Survey sheet along with the field data for subsequent analysis.

3.4.1 Protected Species Records

Recent and historical records indicate the presence of rare, scarce, and threatened plant species within the town and the encompassing 10km square (T27), as documented by the National Biodiversity Centre (NBDC), the NPWS and the Biodiversity Action Plan for Arklow.

Historically, Darnel (*Lolium temulentum*) and Dwarf Spike-rush (*Eleocharis parvula*) were recorded, though the latter species was lost following the destruction of its estuarine habitat due to harbour wall construction¹¹.

The Arklow Rock, located south of the town, is a significant site for several rare and scarce species, including Bird's-foot (*Ornithopus perpusillus*), Climbing Corydalis (*Ceratocarpus claviculata*), Greater Broomrape (*Orobancha rapum-genistae*), and Lanceolate Spleenwort (*Asplenium billotii*). Notably, Greater Broomrape has also been observed along the Avoca River near Shelton.

In addition, the Green-winged Orchid (*Orchis morio*) was recorded at the former Kynoch's Works site¹². Meadow saxifrage (*Saxifraga granulata*), Wild Asparagus (*Asparagus prostratus*), Yellow Horned-poppy (*Glaucium flavum*), Round-leaved Crane's-bill (*Geranium rotundifolium*), Spring Vetch (*Vicia lathyroides*), and Dune Fescue (*Vulpia fasciculata*) were documented in the Ferrybank area and the dunes further north.

Furthermore, Moore's Horsetail (*Equisetum moorei*) is present at Ferrybank and the Arklow Ponds¹³, as well as in dunes south of the town. Two rare clover species, Slender Trefoil (*Trifolium micranthum*) and Knotted Clover (*Trifolium striatum*), are also recorded within this vicinity.

4 RESULTS

The data gathered from the field together with the desktop research data were collated in Microsoft Excel and analysed using standard analysis to provide quantitative and qualitative analyses of the hedgerows of Arklow

A total of 18 hedgerows were surveyed in Arklow. Thirteen hedgerows were surveyed in the urban area of Arklow, as allocated by the Local Area Plan. A single hedgerow is located outside the local area plan area on the Arklow North (R772) approach road. An additional four hedgerows were surveyed in the Area Action Plan (AAP) lands which are still in agricultural use.

4.1 GENERAL CONTEXT

The species composition, structure, and biodiversity value of individual hedgerows are shaped by various environmental factors, including their location within the landscape, local climate, geology, soils, hydrology, surrounding habitats, adjacent land use, historical longevity, and management practices. The ecological value of hedgerows as wildlife corridors is largely determined by their

¹¹ (Wilson, 2021)

¹² (Wilson, 2021)

¹³ (Wilson, 2021)

connectivity to other hedgerows and semi-natural habitats. To better understand the ecological context of the hedgerows, a range of these factors was recorded for each sampled hedgerow.

4.1.1 Corine Land Cover

CORINE Land Cover (CLC) is a pan-European land cover and land use inventory. The land cover and land use inventory divides land into 44 thematic classes. Land class was assigned from desktop for each hedgerow sampled. In Arklow, sample hedges occurred in four of the land cover classes. The majority (50%) of hedgerows surveyed were allocated to Artificial Surfaces, 28% of hedges surveyed were allocated to Pastures, with 4 (22%) of these hedgerows in the undeveloped AAP lands. Eleven percent of hedges were within arable land and 11% were within Artificial Surfaces - Sports and Leisure.

Table 4-1 Frequency of occurrence of sampled hedgerows in CORINE Land Cover Classes

Corine Land Use	Number of Hedges	Percentage %
Agricultural areas - Arable Land	2	11
Artificial Surfaces - Urban Fabric	9	50
Artificial Surfaces - Sports and Leisure	2	11
Agricultural areas - Pastures	5	28

4.1.2 Adjacent Land use

Hedgerows in the urban environment delineate boundaries between lands rather than serving as an agricultural management technique. The biodiversity value of hedges is related to the general ecology of an area and their connection with other natural and semi-natural habitats. Hedgerows change over time in response to management practices and may be influenced by the adjacent land use.

Roadside constitutes the majority of adjacent land use of the sampled Arklow hedgerows. Figure 4-1 illustrates the land use adjacent to the surveyed Arklow hedgerows.

- **Roadside (39%):** The majority of the sampled hedgerows are adjacent to roadsides, making this the most significant land use category in the context of urban hedgerows in Arklow.
- **Curtilage (22%):** A proportion of hedgerows are located near curtilage areas, such as gardens or property boundaries.
- **Cattle (17%):** Hedgerows adjoining cattle grazing areas make up 17% of the total. This includes the hedgerows surveyed in the undeveloped AAP lands.
- **Amenity / Golf Course / Playing Field (11%):** These areas represent recreational or landscaped spaces where hedgerows serve as natural boundaries.
- **Tillage (11%):** A smaller but notable proportion of hedgerows are adjacent to tillage (cropped) fields.

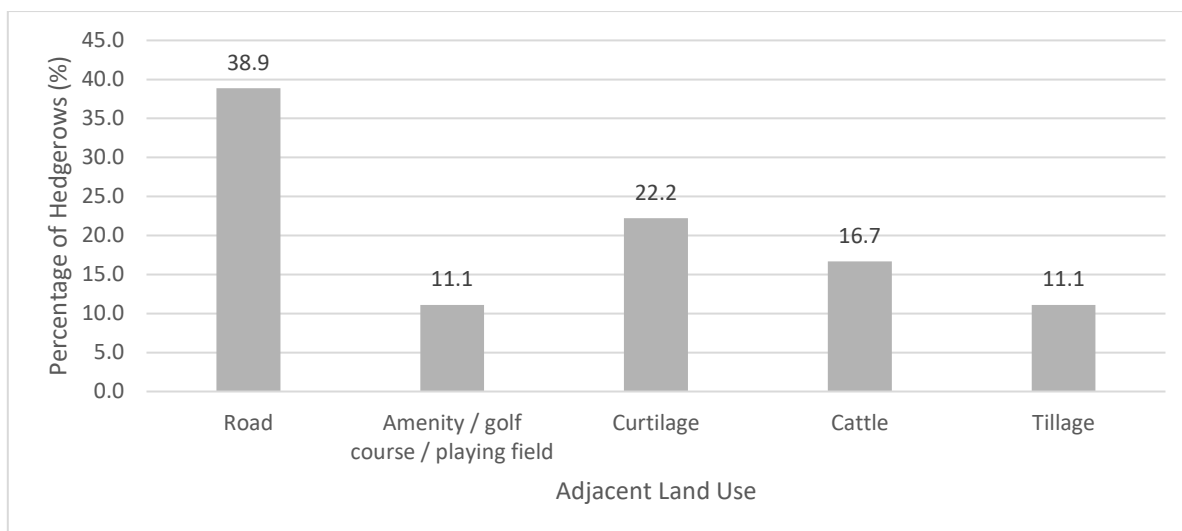


Figure 4-1 Adjacent land use of sampled Arklow hedgerows

4.1.3 Adjacent land classification

The biodiversity value of hedges is related to the general ecology of an area and their connection with other natural and semi-natural habitats. To examine the overall ecological context of Arklow's hedgerow resource, a record is made of both the habitat classification of land adjacent to the sampled hedgerow and any link the hedgerow makes with other habitat types. Habitats were classified to level II Fossitt classification (Fossitt, 2000).

Figure 4-2 shows the breakdown of the habitat classification of the land each side of the sampled hedgerows. Forty-four (44%) of land adjacent to the surveyed hedgerows in Arklow is classified as buildings and artificial surfaces, as the majority of the hedgerows surveyed were along a roadside. Only 5.6% of hedgerows sides had adjacent semi-natural grassland and only 2.8 % had adjacent scrub/transitional woodland.

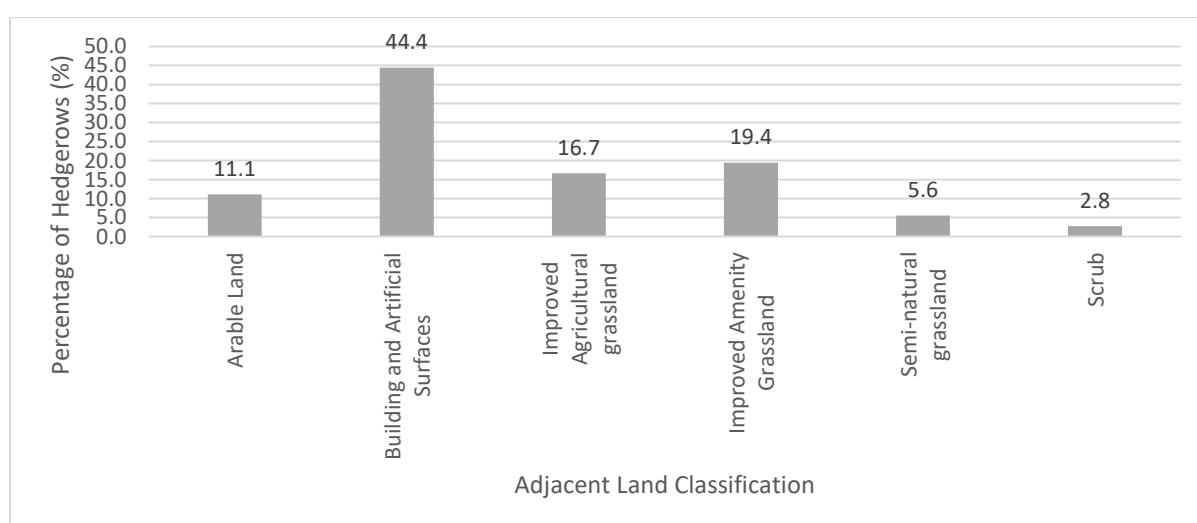


Figure 4-2 Habitat classification adjacent to sampled Arklow Hedgerows



Plate 4-1 Roads are 39% of adjacent land in Arklow

4.1.4 Hedgerow Connectivity

The corridor role of hedgerows in facilitating the movement and distribution of wild flora and fauna through the landscape is enhanced significantly if hedgerows connect to other semi-natural habitat particularly other hedgerow/treelines or another wooded habitat. This is particularly important in the urban environment where semi-natural habitats are fragmented.

Figure 4-3 shows the breakdown of how the end points of the sampled hedges connected with other habitat types. Hedgerows sampled in Arklow linked to nine different habitat types.

Of the sampled hedgerows:

- 36% of hedgerows did not connect with any semi-natural links and connected with habitat types such as built land, improved grassland or a quarry which are not considered to be effective corridor habitat links.
- 25% of end links were with other hedgerows, the majority of these were located on land still in agricultural use.
- 19% connected with treelines and 14% connected with scrub habitat.
- 3% connected with semi-natural grassland.

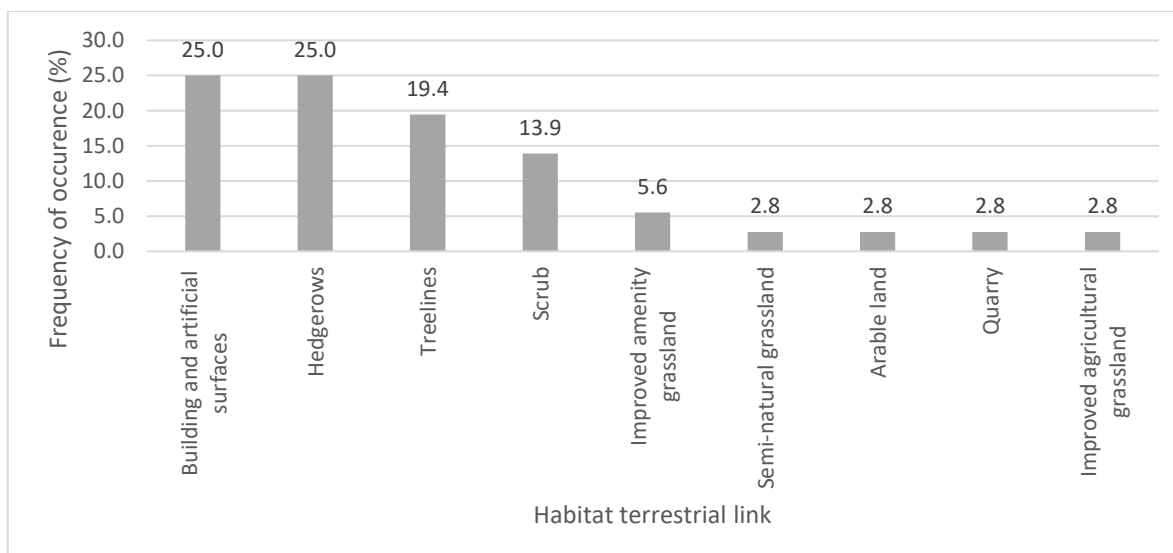


Figure 4-3 Habitat links of sampled hedgerows in Arklow

Connections of hedgerows to watercourses, drainage ditches and other wetland features were also recorded

- Eighty-three percent (83%) did not link to a drain, river or wetland habitat at either end.
- Where an aquatic link was recorded, most hedgerows linked to drainage ditches (11%) and 6% to watercourses (FW).

Hedgerow connectivity

The effectiveness of the corridor role in the landscape increases with the number of connections a hedgerow makes especially other wooded habitats. The level of connectivity of each hedgerow sampled was collected by recording the number of links a sampled hedge made with another wooded habitat type (i.e. with other hedgerows, woodland or scrub). How this is recorded is illustrated below.

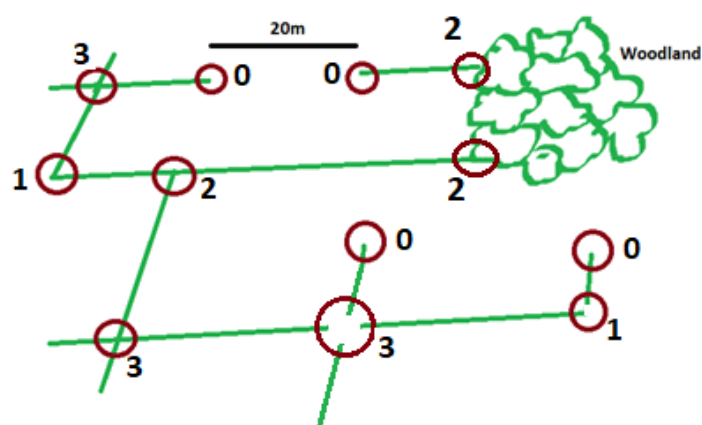


Illustration from The Great British Hedgerow Survey Guidelines¹⁴

¹⁴ (People's Trust for endangered species, 2024)

- In Arklow, 36% of hedgerows did not connect with any semi-natural links and connected with habitat types such as built land or improved grassland which were not considered to be effective corridor habitat links.
- 44% connected with one link at one end.
- Just 19% had a double links and these were located on land still in agricultural use.

It is insightful to compare the Arklow survey findings to the level of connectivity of the hedgerow network in the county-wide survey¹⁵, which examines areas outside the urban environment. This comparison highlights the loss of connectivity of hedgerows as a result of urbanisation.

In the County Wicklow Hedgerow survey:

- Just 1% of hedgerows had no connection to other hedgerows or woodland at either end.
- 39% of hedgerow ends had a single connection.
- 45% of hedgerow ends had double connections.
- 4% of hedgerow ends had triple connections.

4.2 CONSTRUCTION OF HEDGEROWS IN ARKLOW

Hedgerow construction refers to the physical structure, including the linearity of woody shrubs and associated features like banks, walls, shelves, and drains. These characteristics can be indicative of the period of origin of the hedge. Features such as banks, stone walls, drainage ditches, and grassy verges contribute to the overall habitat diversity of the hedgerow ecosystem.

In Arklow, 72% of surveyed hedgerows were linear, while 28% were non-linear. Of these, 89% were single-line hedgerows, and 11% were double-line. A third (33%) had an associated hedge bank, 6% were on a stone wall, and another 6% on a shelf, while 56% had no associated bank, wall or shelf.

Of the hedgerows surveyed, 17% featured external drains, all of the hedgerows with drains are situated on land actively used for agricultural purposes. In contrast, drains were not observed in urban environments. In built-up areas, surface water runoff has traditionally been managed using gullies and underground pipe systems designed to quickly convey water away.

However, this traditional approach often neglects important aspects of drainage, such as water resource management, community amenity creation, landscaping opportunities, and the support of diverse wildlife habitats. In contrast, Sustainable Urban Drainage Systems (SuDS) and Nature-based Solutions (NbS) offer an alternative approach by incorporating natural drainage features that manage rainfall close to where it falls, enhancing biodiversity and public amenities.

Hedgerows serve as effective nature-based solutions for water management and boundary treatment, where feasible and planned to align with sustainable water management and environmental and policy objectives.

¹⁵ (Deborah D'Arcy Ecology, 2023)

4.2.1 Structure and Condition

Hedgerow structure refers to its physical dimensions, such as height, width, profile, basal density, and the quantity and age of trees. These characteristics influence its habitat value for wildlife, carbon capture capacity, and biomass. Structure also provides insights into the management practices or absence of management.

Taller, wider, and denser hedgerows create more complex habitats, offering a greater variety of niches to support diverse wildlife. Birds, for example, rely on hedgerows for nesting, with larger hedgerows and trees providing better shelter, reducing predation, and enhancing species diversity and abundance¹⁶. Dead or decaying trees within hedgerows further benefit wildlife by offering nesting sites, foraging areas, and perches.

Variation in hedgerow structure across the network is important, as no single configuration suits all species. Greater diversity within a well-connected hedgerow network that also connects to other semi-natural habitats enhances habitat variety and supports a wider range of species. Effective management, ideally by rotational practice, ensures the long-term structural integrity and ecological viability of hedgerows¹⁷.

The structural condition of a hedgerow significantly impacts its value as wildlife habitat. Dense, multi-layered hedgerows with minimal gaps support greater biodiversity¹⁸. Key indicators of structural health include the percentage of gaps, density of basal growth, bank erosion, and overall vigour, which also reflect the hedgerow's long-term sustainability.

4.2.2 Hedge Height

Hedgerow height is largely determined by management methods, but height can also be influenced by altitude, exposure and soil quality. Hedgerows need to be a minimum of 1.5m high for birds to have adequate cover for nesting. **Figure 4-4** depicts the percentage of sampled hedgerows in each height category. Only 11% of sampled hedges in Arklow were recorded in the lowest height category. The majority of hedgerows (33%) are in the 1.5–2.5 m height range, suggesting this is a preferred or managed height in the urban setting, potentially due to its suitability along roadsides for sightlines, manageability and property delineation. Taller hedgerows (2.5–4 m and 4–5 m) have an equal proportion, each making up 22% of the hedgerows. These represent taller hedgerows that provide more substantial vertical structure. Similar to the shortest category, 11% of hedgerows exceed 5 metres in height, representing a minority of very tall hedgerows which were classified according to Fossitt as Treelines (WL2).

- <1.5m: 11% of hedgerows fall into this shortest category, indicating a relatively small proportion of low hedgerows.
- 1.5–2.5m: This is the most common height range, encompassing 33% of the hedgerows, indicating that medium-height hedgerows are predominant in the urban environment.
- 2.5–4m and 4–5m: Both height ranges making up 16.7% and 22% of the hedgerows respectively. These represent taller hedgerows that provide more substantial vertical structure.

¹⁶ (Shelley A. Hinsley, 2000)

¹⁷ (People's Trust for endangered species, 2024)

¹⁸ (Staley et al., 2015).

- 5+ m: 16.7% of hedgerows exceed 5 meters in height, representing very tall hedgerows which are dominated by trees (treelines).

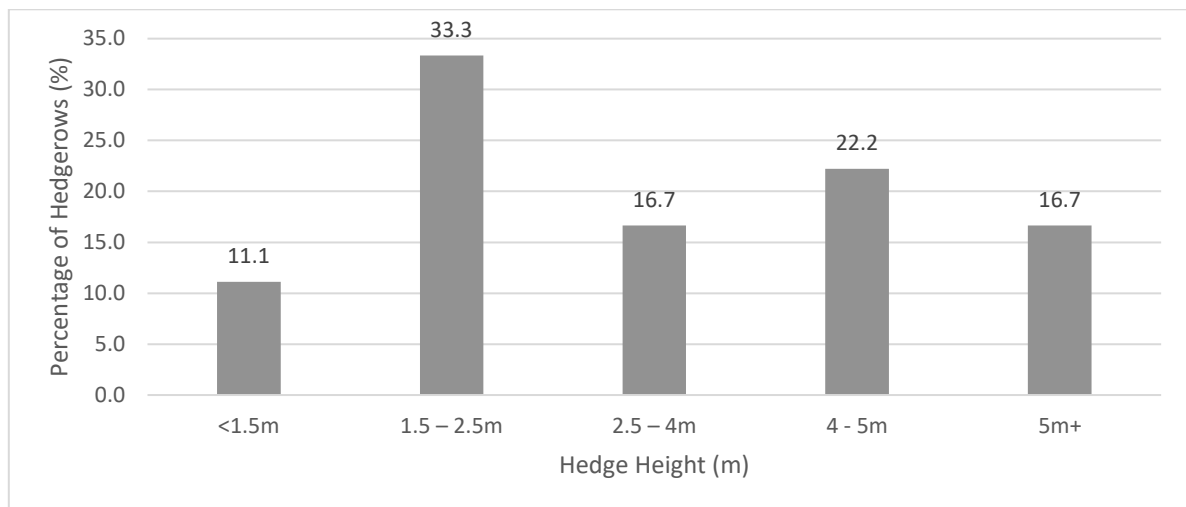


Figure 4-4 Proportion of Hedgerows in each height category

4.2.3 Hedge Width

As shown in Figure 4-5, the results of the survey show that over a third (39%) of hedgerows were 1-2 m in width which is the minimum width to be an adequate habitat for wildlife. Hedgerows should be a minimum width of 1.3m for nesting birds¹⁹. There is a balance between narrow and wider hedgerows in the survey results with an equal representation of <1m (28%) and 2–3m (28%) categories. This means that 28% of the urban hedgerows were not sufficiently wide enough for nesting birds. Only 6% of sampled hedgerows were in the largest width category of greater than 3 meters.

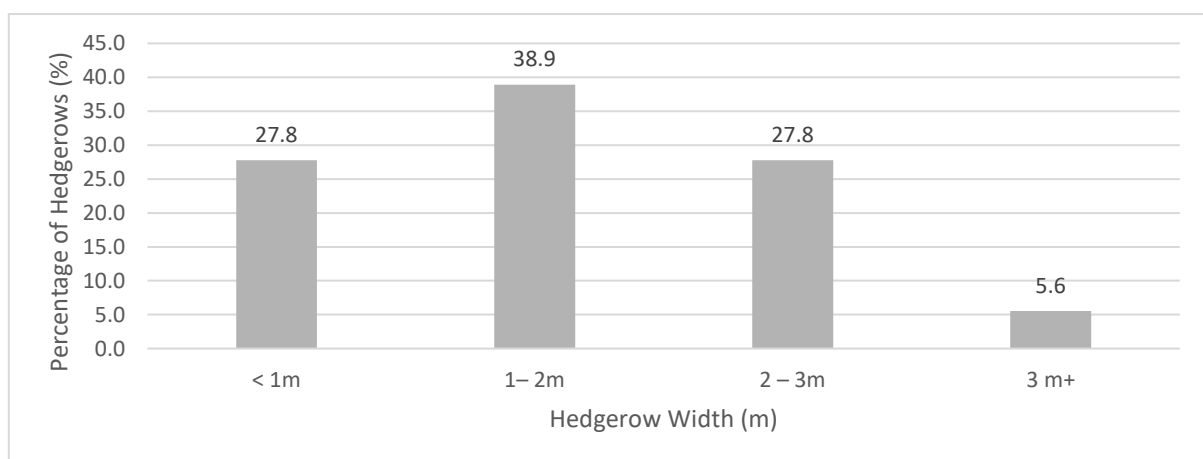


Figure 4-5 Proportion of hedgerows in each width category

¹⁹Irish Hedgerows Networks for Nature

4.2.4 Percentage of Gaps

Over-trimming or a lack of management can lead to stem loss and gaps in the hedge structure, eventually causing hedgerows to become remnants with only a few shrubs remaining. The percentage and frequency of gaps, whether general or specific, was assessed along the entire length of the hedgerows. In some cases, gaps might be obscured by growths like bramble or bracken, making it difficult to estimate the percentage of gaps. According to the Hedgerow Appraisal System (HAS), hedgerows are considered in unfavourable condition when gaps exceed 10% of the hedge length or when an individual gap is greater than 5 meters. Favourable condition is defined as having gaps covering less than 5% of the hedge length and no specific gaps. The distribution of percentage gaps in the sampled hedgerows is illustrated in Figure 4-6.

A maximum of 45% of hedgerows attain favourable condition. Only 5.6% was recorded as complete and 11% of hedgerows achieved favourable continuity based on the percentage of gaps over their length and 16% of hedgerows had gaps over more than 50% of their length.

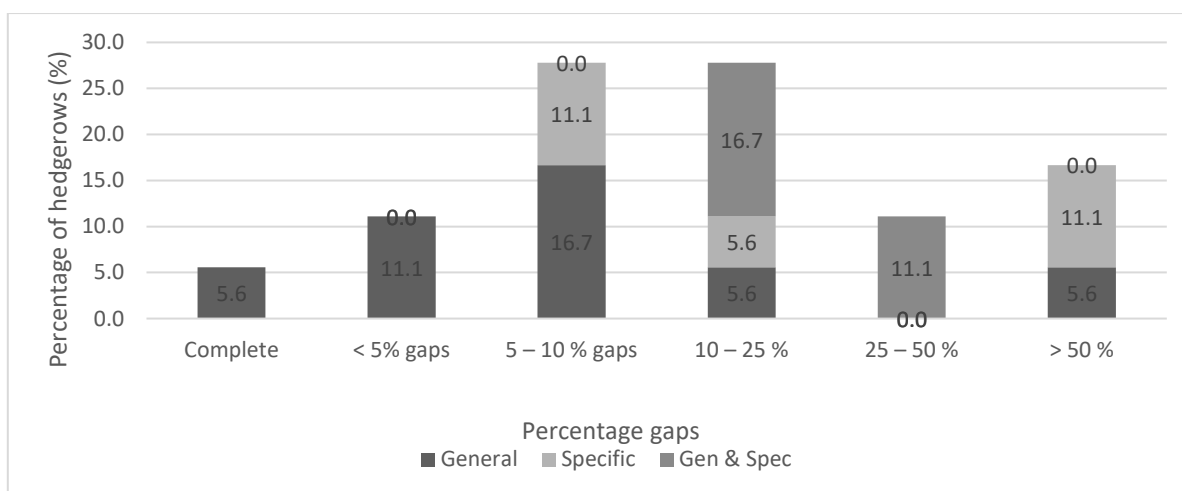


Figure 4-6 Proportion of hedges in 'percentage gaps' categories

When comparing the Arklow Urban Hedgerow Survey results with those of the county-wide Wicklow Hedgerow Survey, both surveys identify a limited proportion of complete hedgerows, highlighting that structural gaps are prevalent in both urban and rural settings. Moderate "gappiness" (5–25%) is a dominant category in both contexts, emphasising ongoing challenges in hedgerow management and maintenance while presenting opportunities for strategic infill planting to improve connectivity and overall structural health of hedgerows.

4.2.5 Basal Density

The basal density assessed in the field as porosity of the hedgerow to light is an assessment of the basal growth and/or horizontal mesh of stems growing particularly in the bottom 1m of the hedge.

Hedges that are overgrazed, over trimmed or overgrown may show decreased basal density. In the HAS condition assessment, to achieve a favourable score for this criterion, hedgerows should be at least semi-opaque. In the Arklow hedgerow survey, over 56% had favourable basal density, 44% fail this criterion. Figure 4-7 shows the proportion of hedgerows according to basal density categories.

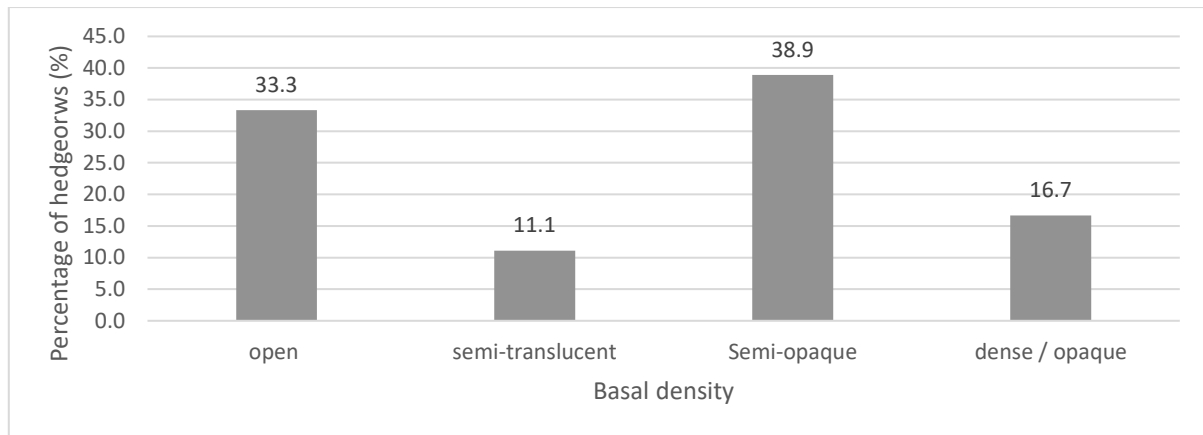


Figure 4-7 Proportion of hedges in basal density categories

4.2.6 Hedge Profile

The overall profile of the hedge is influenced by management regime and climatic factors such as degree of exposure. Without management, hedge structure can decline due to apical dominance and increased shading as a tree canopy develops. The hedge profile is assessed by looking at the overall shape and the degree of outgrowths of vegetation at the base of the hedge. A favourable profile is given to hedgerows that are managed (box cut /A shaped or straight sided) and overgrown or top heavy and undercut but that still showing outgrowths at the base). **Figure 4-8** displays the distribution of hedgerow profiles in percentages across seven categories:

- Remnant: 11% of hedgerows are classified as remnants, indicating hedges that are no longer displaying shrubby, dense growth form in the bottom 1-2 metres of the hedge.
- Relict (derelict): 28% of hedgerows are relict or derelict, indicating they are unmanaged or in a state of decline.
- Boxed / A-shape: 17% of hedgerows are managed into a boxed or A-shape profile, a traditional management style often associated with healthier and functional hedgerows.
- Irregular / Freeform: 31% are irregular or freeform, representing the most common profile type. These hedges may be unmanaged but still retain some structural diversity.
- Top-heavy / Undercut: 6% are classified as top-heavy or undercut.
- Straight-sided: 8% have a straight-sided profile, a more managed profile.
- Wind-shaped: 0% of hedgerows were wind-shaped, meaning this profile was not observed in the survey.

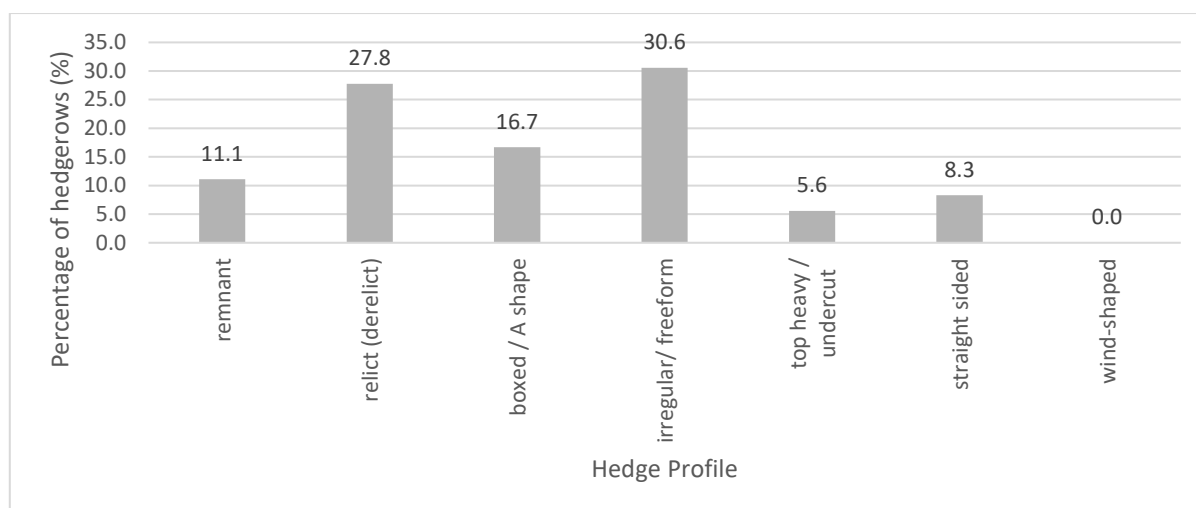


Figure 4-8 Proportion of hedgerows in Profile categories

A number of key comparisons emerge when examining the differences between hedgerow profiles at a county-wide scale and those within the urban context of Arklow, as shown in Table 4-2. Arklow exhibits a higher proportion of remnant, derelict, boxed, and top-heavy hedgerows, which suggests a more fragmented and less actively managed hedgerow network compared to the county-wide survey.

In contrast, the county-wide survey shows a greater prevalence of irregular and straight-sided hedgerows. This may reflect more active maintenance practices or a naturally more diverse hedgerow profile in rural or semi-natural areas outside the urban environment.

These findings may underline the distinct characteristics of urban hedgerows and their management, emphasising the need for targeted strategies and policies to preserve and enhance hedgerow management in the urban setting.

Table 4-2 Comparative analysis of hedgerow profiles: County-Wide vs Urban Context

Profile	Wicklow County Hedgerow Survey 2023	Arklow Urban Hedgerow Survey 2024
Remnant Hedgerows	5.0%	11.1%
Relict (Derelict):	20.0%	27.8%
Irregular/Freeform:	36.7%	30.6%
Boxed/A-Shape:	13.9%	16.7%
Top-Heavy/Undercut	2.8%	5.6%
Straight-Sided:	21.7%	8.3%
Wind-Shaped:	0.0%	0.0%



Plate 4-2 A box cut hedgerow along a road in Arklow

4.2.7 Hedgerow Trees

The abundance and age composition of hedgerow trees were assessed within the hedgerows. For the purpose of this study, hedgerow trees are defined as those that have attained tree proportions, characterised by a diameter at breast height (DBH) greater than 8 cm. Such trees may arise either through deliberate management practices, where certain trees are left uncut to mature, or due to reduced or infrequent hedgerow management, such as side-trimming only, allowing trees to grow beyond typical hedgerow dimensions.

Results are shown in Figure 4-9. Over half (50%) of “hedgerows” had abundant trees or were dominated by trees (>75% of length). Hedges with no trees accounted for 22% of the sample hedges with a further 22% with few trees (up to 15%) and 6% scattered (15-30%) trees.

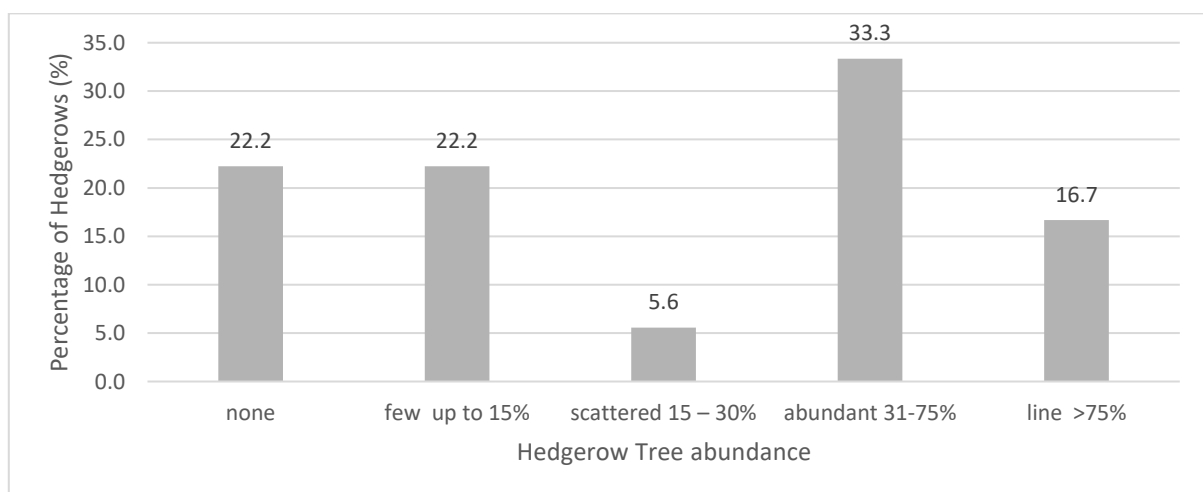


Figure 4-9 Proportion of hedges in abundance level of hedgerow trees categories



Plate 4-3 Abundant trees within a hedgerow (31-75%)

4.2.8 Tree Age composition

A hedgerow with a balanced mix of young (immature), semi-mature and mature trees would indicate that the hedgerow is healthy, regenerating naturally and has long term viability. Immature trees are defined as having a diameter at breast height (DBH) of less than 8 cm. In 39% of hedges that contained trees the hedgerow trees were either exclusively or predominantly mature. Mixed age range hedgerows comprise 22%, equal to the percentage of hedgerows with no trees. Predominantly immature hedgerows account for 17%.

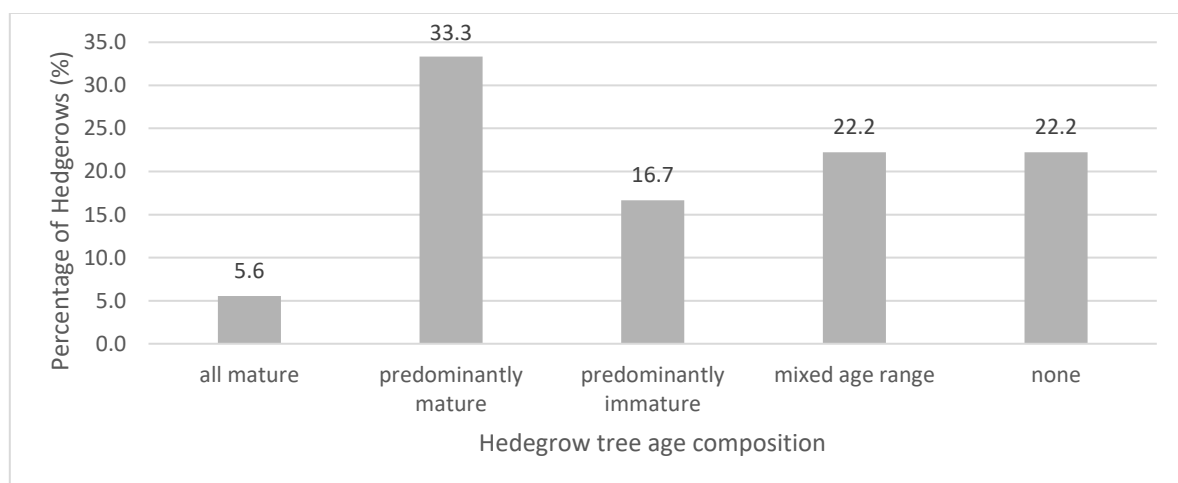


Figure 4-10 Proportion of hedgerows in tree age composition categories

4.2.9 Bank/wall degradation

Bank or wall degradation can negatively impact on the long-term viability and vigour of the hedge. A disturbed or degraded bank with little vegetation cover is more vulnerable to erosion by heavy rainfall or flooding. Bank erosion may result in root exposure and decrease the stability of the hedge structure leading to increased windfall. Trees may become more susceptible to disease. Where bank erosion is extensive this may also significantly impact the ground flora abundance and diversity.



Plate 4-4 Example of a degraded bank possibly due to herbicide treatment

4.2.10 Verge/Margins

A verge / margin refers to a permanent strip of undisturbed vegetation adjacent to a hedge. Along the roadside, it refers to the strip of land between the roadside and the hedgerow. On arable land, it refers to an unploughed or unplanted strip. In grassland situations, a verge is where the edge of the field is not reseeded, managed or used the same as the rest of the field e.g. where a hedge is fenced off prohibiting livestock access.

The presence of a verge or margin increases the biodiversity a value of a hedge and can also protect the hedge from damage from livestock poaching, herbicide sprays or from ploughing up too close to the hedge. In the urban context, along roadsides, a verge may protect the boughs of hedgerow trees from being hit by passing trucks. Grassy margins provide additional cover for small mammals and shelter, provide an opportunity for wildflowers to grow, feeding a greater diversity of insects. In general, the wider the margin, the greater the benefit is for both wildlife value and protection.

Figure 4-11 shows the proportion of hedges in verge margin width categories. Both sides of the hedgerow were assessed for the presence of a margin. In Arklow, 25% did not have a margin, and

most hedgerows (36.1%) had a verge of less than 1m. Twenty-five percent (27.8%) had a margin between 1-2m and Just 11% had a margin in the range of 2-4m.

As discussed in Section 4.1.2, the majority of hedgerows surveyed (38.9%) were on roadsides. Many roadside verges have become smaller or have been removed altogether due to road widening and placing footpaths next to roads.

Herbicide use, recorded when evident over greater than 20% of the length of the hedge, was noted in 11.1% of hedges. It was noted that 5.6% had been poached (by livestock). This was located in the lands still in agricultural use. Plate 4-5 Example of a poached hedgerow with no verge/margin in the AAP of the Arklow LAP. shows an example of poaching by livestock on a hedgerow in the AAP lands of the Arklow LAP.

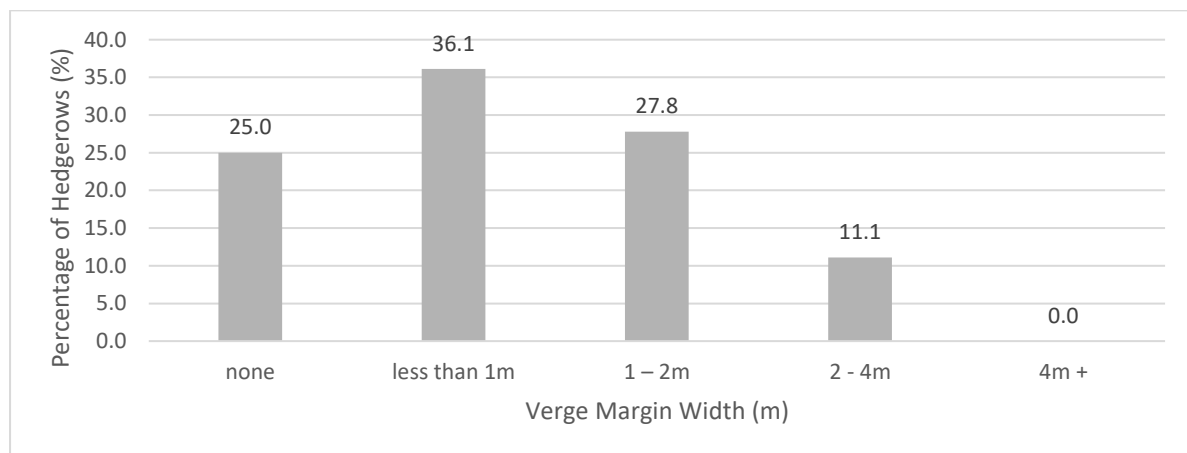


Figure 4-11 Proportion of hedges in verge margin width categories



Plate 4-5 Example of a poached hedgerow with no verge/margin in the AAP of the Arklow LAP.

4.2.11 Vigour

The vigour of the hedge was assessed as the annual increment of new growth along the length of the hedge and is summarised in **Error! Reference source not found.** Key findings include:

- Poor vigour was observed in 22% of the sample, indicating limited new growth across these hedges.
- Poor in part hedgerows, where certain sections showed reduced vigour, accounted for 11% of the sample.
- Basal decay, indicative of structural decline or aging, was identified in 6% of hedgerows.
- Average vigour, representing a moderate level of growth, was the most common category, comprising 33% of the hedgerows.
- Good vigour, a marker of healthy and robust growth, was noted in 28% of the hedgerows, suggesting that nearly a third of the sample exhibited optimal growth.

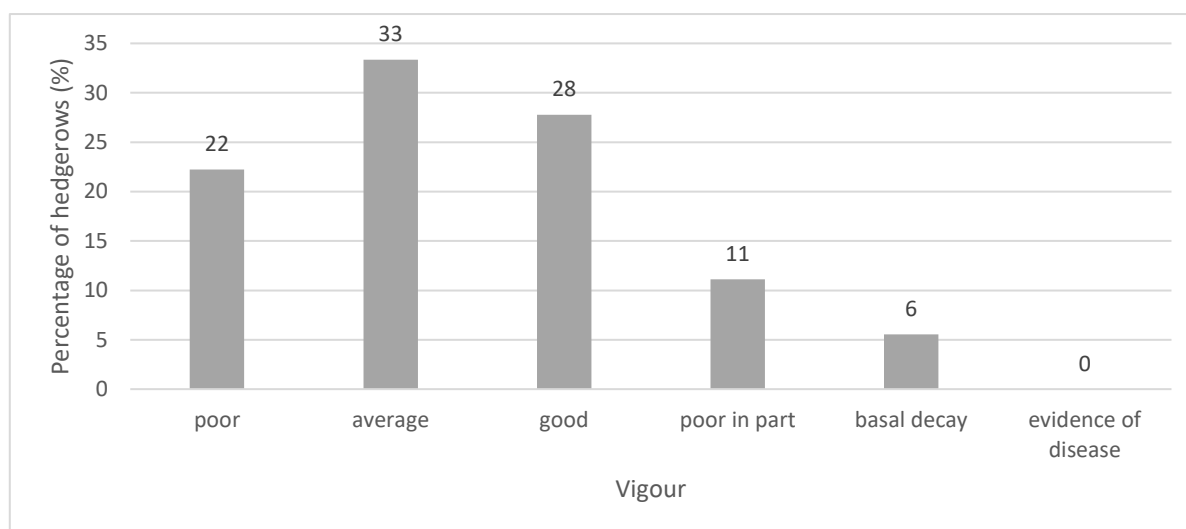


Figure 4-12 Proportion of sampled hedgerows in different vigour categories

4.3 MANAGEMENT

Management of hedges has undoubtedly undergone changes with respect to management techniques and the desired end goal. With the introduction and prevalence of fencing. The old practices of coppicing and laying of the hedge are rarely carried out and machinery is the most common method of hedgerow management.

The focus of hedgerow management has now shifted towards encouraging the management of hedgerows for the benefit of wildlife, for the provision of ecosystem services including carbon capture however management is an important aspect of maintaining the long-term viability of the hedge and its functions and the correct balance has to be found.

4.3.1 Hedge laying and coppicing

No hedgerows showed evidence of recent rejuvenation through coppicing or laying. A single hedge (5.6%) showed evidence of past coppicing and one hedge (5.6%) showed evidence of past laying.

4.3.2 Hedge fencing

The original function of hedges was to act as stock-proof barriers. The Hedgerow Appraisal System looks at to what extent stock proofing is reinforced by fencing. Each side of the hedge was assessed for the presence of fencing.

Fifty-five percent of hedges had no fencing on either side reflecting the urban environment with reduced requirement for livestock fencing. Forty-four percent (44%) had at least one fence. Electric wire and sheep wire was not recorded in any of the hedgerows surveyed.

4.4 SPECIES COMPOSITION

Hedgerows in Arklow contain a mix of both native and non-native tree species. Native plants are defined as those that arrived in Ireland naturally since the end of the last glaciation, without human assistance, or species that were already present at that time. Native species are particularly beneficial for biodiversity, as they are well-adapted to the Irish environment, and many other plant and animal species have evolved to coexist with them.

The species composition of hedgerows was assessed individually for the following species composition layers:

- Shrub layer: the primary woody vegetation below tree height;
- Tree layer: larger trees forming the upper canopy;
- Ground flora or herb layer: the understory of non-woody plants and herbaceous species.

4.4.1 Shrub layer

The shrub layer includes shrubs such as thorns (hawthorn, blackthorn, gorse) and tree species that have a shrubby growth form, normally due to management such as cutting or sapling trees species in the understorey of the hedge.

Twenty-eight species were recorded in the shrub layer of the sampled hedges. Of these, 20 species are native to Ireland. Willow and birch species were not always recorded to species level due to difficulties with species identification and the occurrence of hybrids. However, where willow was recorded as *Salix* spp., it was allocated to the native species list although it is possible that some of these may be non-native willow species.

Hawthorn was the most frequently recorded species occurring in the shrub layer of 83% of Arklow's hedgerows with blackthorn occurring in 66% and holly in 44% of hedges. Gorse, and ash, are the next most commonly recorded species with the frequency of occurrence between 33-39% of hedges. Willow was recorded in 21% of the shrub layers. The cover of species was relatively even with most species contributing between 11-25% cover in the hedge. Sycamore and beech, commonly occurring non-native species occurred in the shrub layer 33% and 17% of hedgerows respectively.

Other non-native species included Griselinia (*Griselinia littoralis*), Escallonia spp., Spotted laurel (*Aucuba japonica*), Cherry laurel (*Prunus laurocerasus*) and Rhododendron (*Rhododendron ponticum*).

Table 4-3 Frequency and abundance of woody shrub species in sampled hedgerows in Arklow

Botanical Name *Non-native species	Common Name	Frequency of occurrence (%)	Mean % abundance/Domin	
<i>Crataegus monogyna</i>	Hawthorn	83.3	36.6	34-50%
<i>Prunus spinosa</i>	Blackthorn	66.7	22.6	11-25%
<i>Ilex aquifolium</i>	Holly	44.4	18.4	11-25%
<i>Fraxinus excelsior</i>	Ash	38.9	16.1	11-25%
<i>Ulex europaeus</i>	Gorse	33.3	25.5	26-33%
<i>Acer pseudoplatanus</i> *	Sycamore	33.3	16.1	11-25%
<i>Fagus sylvatica</i> *	Beech	16.7	16.3	11-25%
<i>Griselinia littoralis</i> *	Griselinia	16.7	20.5	11-25%
<i>Salix cinerea</i>	Grey willow	16.7	30.0	26-33%
<i>Corylus avellana</i>	Hazel	11.1	31.1	26-33%
<i>Betula spp.</i>	Birch	11.1	18.0	11-25%
<i>Escallonia spp.</i> *	Escallonia	11.1	7.0	4-10%
<i>Salix spp.</i>	Willow	11.1	18.1	11-25%
<i>Sorbus aucuparia</i>	Rowan	11.1	12.5	11-25%
<i>Aucuba japonica</i> *	Spotted laurel	5.6	2.5	<4%
<i>Malus domestica</i> *	Apple	5.6	2.5	<4%
<i>Tilia spp.</i> *	Lime	5.6	29.5	26-33%
<i>Taxus baccata</i>	Yew	5.6	18.0	11-25%
<i>Quercus petraea</i>	Sessile oak	5.6	2.5	<4%
<i>Quercus spp.</i>	Oak Spp.	5.6	18.0	11-25%
<i>Prunus avium</i>	Wild Cherry	5.6	7.0	4-10%
<i>Rhododendron ponticum</i> *	Rhododendron	5.6	2.5	<4%
<i>Sambucus nigra</i>	Elder	5.6	23.8	11-25%
<i>Salix aurita</i>	Eared willow	5.6	7.0	4-10%
<i>Euonymus europaeus</i>	Spindle	5.6	7.0	4-10%
<i>Alnus glutinosa</i>	Alder	5.6	7.0	4-10%
<i>Prunus laurocerasus</i> *	Cherry Laurel	5.6	29.5	26-33%

4.4.2 Climbers and woody non-hedge forming shrub species

The shrub layer of the hedgerows includes non-woody climbers, which are analysed separately as they contribute to the hedgerow's structure but are not classified as "hedge-forming" species. The results of the survey of climbers and woody non-hedge-forming shrub species are presented in Table 4-4.

- **Bramble (*Rubus fruticosus* agg.):** Present in 100% of the sampled 30m hedgerow strips in Arklow, with abundance recorded in 28% of hedges. An abundance of bramble may indicate a hedge with a high percentage of gaps where light is reaching the base of the hedge and leading to a proliferation of bramble growth.
- **Ivy (*Hedera helix*):** Found in 94% of hedges, with abundant or dominant coverage in 25%. While ivy growth does not cause tree decline, dense growth can exacerbate the decline of already weakened trees. On the positive side, bushy ivy offers valuable nesting habitats for birds.
- **Dog rose (*Rosa canina* agg.) and field rose (*Rosa arvensis*):** Recorded in 22% and 17% of sample strips, respectively.

- **Honeysuckle (*Lonicera periclymenum*)** and **German ivy (*Delairea odorata*)** (a non-native climber): Each found in 5.6% of the sampled 30m strips.

Table 4-4 Frequency and abundance and non-hedge forming woody species

Botanical Name	Common Name	as %	"D" %	"A" %	"F" %	"O" %	"R" %
<i>Rubus fruticosus</i>	Blackberry	100.0	15.6	12.5	9.4	43.8	18.8
<i>Hedera helix</i>	Ivy	94.4	7.1	17.9	10.7	50.0	14.3
<i>Rosa arvensis</i>	Field Rose	22.2	0.0	20.0	20.0	60.0	0.0
<i>Rosa canina</i> _agg.	Dog Rose	16.7	0.0	0.0	0.0	33.3	66.7
<i>Lonicera periclymenum</i>	Honeysuckle	16.7	0.0	0.0	0.0	0.0	100.0
<i>Calystegia sepium</i>	Bindweed	5.6	0.0	0.0	0.0	0.0	100.0
<i>Delairea odorata</i>	German ivy	5.6	0.0	0.0	0.0	100.0	0.0



Plate 4-6 Field rose (*Rosa arvensis*)

4.4.3 Hedge species diversity

The species diversity of a hedge is defined as the number of shrub species identified within a 30-metre representative sample strip. When two strips were sampled for a single hedge, the average number of species from both strips was used as the representative diversity figure. The species diversity found in the sample hedges is presented in **Table 4-5**.

The average species diversity in Arklow hedgerows was 3.81 species per 30m sample strip (native and non-native) and 2.94 native species only. These values are slightly lower than the 2023 Wicklow County averages of 3.48 (native and non-native) and 3.18 (native).

Thirty-eight percent (38%) of hedgerows in Arklow contained two or fewer native species per 30m strip. Hedgerows with four or more native woody species are considered species-rich in Ireland; 22% of the sampled hedgerows in Arklow met this criterion.

Table 4-5 Average number of shrub species per 30m sample

Average Number of species (all species)	Native and non-native species (% of hedges)	Native species only (% of hedges)
1	0.0	0.0
1.5	5.6	5.6
2	16.7	33.3
2.5	5.6	11.1
3	11.1	16.7
3.5	11.1	11.1
4	11.1	5.6
4.5	16.7	5.6
5	11.1	11.1
5.5	0.0	0.0
6	5.6	0.0
6.5	0.0	0.0
7	0.0	0.0
7.5	0.0	0.0
8	5.6	0.0

4.4.4 Tree Layer

‘Hedgerow trees’ (tree layer) are any trees within the hedge that have been deliberately or incidentally allowed to grow distinct from the shrub layer of the hedge. Hedgerow trees were recorded in 89% of hedgerows in Arklow, reflecting the prevalence of tall hedgerows and treelines in the area. The frequency of tree species is recorded in Table 4-6.

A total of 23 tree species were recorded, 16 of which were native. The most common hedgerow tree was hawthorn (*Crataegus monogyna*), found in 56% of hedgerows, indicating that many hedgerows in Arklow have been allowed to grow tall, allowing hawthorn to "escape" management.

Non-native species included sycamore (*Acer pseudoplatanus*), present in 37% of hedgerows, and beech (*Fagus sylvatica*), recorded in 25%.

Table 4-6 Frequency of tree species occurring as trees in sampled Arklow hedgerows

Botanical Name *Non-native species	Common Name	Frequency of occurrence as % of total hedgerows containing trees
<i>Crataegus monogyna</i>	Hawthorn	56.3
<i>Fraxinus excelsior</i>	Ash	37.5
<i>Acer pseudoplatanus</i> *	Sycamore	37.5
<i>Prunus spinosa</i>	Blackthorn	31.3
<i>Ilex aquifolium</i>	Holly	31.3
<i>Corylus avellana</i>	Hazel	25.0
<i>Fagus sylvatica</i> *	Beech	25.0
<i>Salix spp.</i>	Willow	25.0
<i>Sorbus aucuparia</i>	Rowan	18.8
<i>Betula spp.</i>	Birch	18.8
<i>Quercus spp.</i>	Oak	18.8
<i>Malus domestica</i> *	Apple	12.5
<i>Pinus sylvestris</i>	Scott's Pine	12.5
<i>Salix cinerea</i>	Grey Willow	12.5
<i>Tilia spp.</i> *	Lime	6.3
<i>Aesculus hippocastanum</i> *	Horse Chestnut	6.3
<i>Alnus glutinosa</i>	Alder	6.3
<i>Euonymus europaeus</i>	Spindle	6.3
<i>Taxus baccata</i>	Yew	6.3
<i>Prunus avium</i>	Wild Cherry	6.3
<i>Populus tremula</i>	Aspen	6.3
<i>Cupressus × leylandii</i> *	Leyland cypress	6.3

4.4.5 Tree Species diversity

The number of different tree species (occurring as hedgerow trees) per hedgerow was calculated. The breakdown of percentages for the different levels of species diversity found in the sample hedges is shown in Table 4-7.

Eleven percent of hedgerows sampled had no hedgerow trees. These are hedgerows that are managed as either box-shaped or A-shaped and no trees or only occasional trees (which were not captured in the 30m sample) are allowed to grow up and also unmanaged gorse dominated hedgerows. Hedgerows with four native tree species were the most commonly recorded (22%).

Table 4-7 Frequency of tree species occurring as trees in sampled Arklow hedgerows

Number of species (all species)	Native and non-native species (% of hedges)	Number of species (native species only)
0	11.1	16.7
1	11.1	16.7
2	22.2	16.7
3	0.0	0.0

Number of species (all species)	Native and non-native species (% of hedges)	Number of species (native species only)
4	16.7	22.2
5	5.6	16.7
6	11.1	0.0
7	11.1	11.1
8	5.6	0.0
9	0.0	0.0
10	5.6	0.0

4.4.6 Ground flora

The ground flora within each 30m sample strip was examined for a target list of herbaceous species and fern and horsetail species listed in the Hedgerow Appraisal System. The target list of ground flora species are typical woodland flora species of hedgerows and uncommon species that may be indicative of long standing or ancient hedgerows. The target list contains 31 herb species, 10 ferns and 2 horsetails.

The list of target ground flora species recorded can be considered the minimum of target species actually present as the overgrown nature of some hedgerows restricted visibility of the hedge base in the AAP lands. The field survey was conducted during September and October.

In addition, a total of 33 other ground flora species which occurred within 1m of the hedge were recorded incidentally during the field survey. A list of all species recorded is provided in Appendix A.

The grass verge of Hedgerow 1 along the Dublin Road in north Arklow had been sown with wildflower seed where the verge had been disturbed during road widening to include a pedestrian and cycling lane. Some annual wildflowers of non-native origin were evident including marigold (*Calendula* species) and Californian poppy (*Eschscholzia californica*) were noted.

Table 4-8 Target ground flora species recorded

Botanical Name	Common Name	Frequency of occurrence (%)	"D" %	"A" %	"F" %	"O" %	"R" %
Herbaceous species							
<i>Geranium robertianum</i>	Herb Robert	34.4	0.0	0.0	5.3	42.1	52.6
<i>Anthriscus sylvestris</i>	Cow parsley	25.0	0.0	0.0	0.0	50.0	50.0
<i>Viola spp.</i>	Dog violets	15.6	0.0	0.0	0.0	33.3	66.7
<i>Potentilla sterilis</i>	Barren strawberry	9.4	0.0	0.0	0.0	0.0	100.0
<i>Hypericum androsaemum</i>	Tutsan	9.4	0.0	0.0	0.0	0.0	100.0
<i>Geum urbanum</i>	Wood avens	6.3	0.0	0.0	0.0	0.0	100.0
<i>Digitalis purpurea</i>	Foxglove	6.3	0.0	0.0	0.0	50.0	50.0

<i>Conopodium majus</i>	Pignut	3.1	0.0	0.0	0.0	0.0	100.0
<i>Centaurea nigra</i>	Common Knapweed	3.1	0.0	0.0	0.0	0.0	100.0
<i>Arum maculatum</i>	Lords and Ladies	3.1	0.0	0.0	0.0	100.0	0.0
<i>Stellaria holostea</i>	Greater stitchwort	3.1	0.0	0.0	0.0	0.0	100.0
<i>Veronica spp.</i>	Speedwell species	3.1	0.0	0.0	0.0	0.0	100.0
<i>Lapsana communis</i>	Nipplewort	3.1	0.0	0.0	0.0	0.0	100.0
Ferns and Allies							
<i>Polystichum setiferum</i>	Soft shield fern	18.8	0.0	0.0	0.0	0.0	100.0
<i>Phyllitis scolopendrium</i>	Hart's tongue fern	6.3	0.0	0.0	0.0	33.3	66.7
<i>Dryopteris dilatata.</i>	Broad buckler fern	3.1	0.0	0.0	0.0	0.0	100.0
<i>Equisetum telmateia</i>	Great Horsetail	3.1	0.0	0.0	0.0	100.0	0.0

4.4.7 Noxious Weeds

The frequency of occurrence and abundance of noxious weeds in the sampled Arklow hedgerows was recorded. Broadleaved dock was the most commonly occurring noxious weed, occurring in 56% of hedgerows. Ragwort was the next most common species (44%). Field thistle and spear thistle were recorded in 17% and 11% of hedgerows surveyed. Common horsetail (*Equisetum arvensis*) was recorded as Frequent-Abundant in 17% of hedgerows surveyed. This is a native species but can be problematic with invasive tendencies and where noted to be invasive was recorded as a noxious weed in this survey.

Table 4-9 Frequency and abundance of noxious weed species occurrence in sampled hedgerows

Botanical Name	Common Name	Frequency of Occurrence (%)	Level of Abundance (DAFOR)				
			"D" %	"A" %	"F" %	"O" %	"R" %
<i>Rumex obtusifolius</i>	Broadleaved dock	56	0	0	0	50	30
<i>Senecio jacobaea</i>	Ragwort	44	0	0	0	25	75
<i>Cirsium arvense</i>	Field thistle	22	0	0	50	25	0
<i>Equisetum spp.</i>	Horsetails spp.	17	0	67	33	0	0
<i>Cirsium vulgare</i>	Spear thistle	11	0	0	0	0	0
<i>Rumex crispus</i>	Curled dock	6	0	0	0	0	0



Bush vetch (*Vicia sepium*)

4.4.8 Species diversity of townland boundaries and hedgerows with old treeline or woodland links

Hedgerows are an integral feature of the landscape, providing critical habitats for a wide variety of flora and fauna. Understanding the factors that influence species diversity within these linear ecosystems is vital for conservation and management efforts. One intriguing question is whether the longevity of a hedgerow contributes to increased species diversity. While it is acknowledged that various external factors, such as hedgerow management practices or degradation over time, may obscure any direct associations, a preliminary assessment was conducted to explore this relationship.

To address this question, a comparison was made between different types of hedgerows categorised by their historical context. The analysis focused on three specific hedgerow types: those marking townland boundaries, those linked to woodland as illustrated on the First Edition Ordnance Survey (OS) maps, and those serving as boundaries featuring treelines as depicted on the same maps. These were compared against all other hedgerows that lacked significant historical context. Figure 4-13 shows the results of this analysis. The analysis revealed notable variations in species diversity across these categories suggesting that historical and structural factors may play a role in fostering greater biodiversity within hedgerows.

Highest Species Diversity: Hedgerows which were treelines on OS 6 inch maps have the highest total average number of species (approximately 12.3), with 5.5 species in all shrubs, 3.3 native shrubs, 2.5 herbaceous ground flora, and 0.3 ferns and allies.

Native Shrub Trends: Old treeline link hedgerows (3.3) support more native shrubs. Townland boundary hedgerows and Old woodland link hedgerows have a lower shrub diversity (2.8 and 2.0 species, respectively).

Target Herbaceous Ground Flora: Herbaceous flora diversity is highest in **Old woodland link hedgerows** (3.5 species).

Ferns and Allies: Across all types, ferns and allies contribute minimally to species diversity, ranging from 0.3 to 0.6 species per category.

Lowest Species Diversity: All other hedgerows without significant historical context supported fewer species on average (around 8.2), with 3.6 for all shrubs, 3.0 native shrubs, 1.3 herbaceous ground flora, and 0.3 ferns and allies.

This initial assessment underscores the potential importance of historical longevity and structural features in supporting diverse plant communities within hedgerows. Further studies that account for confounding factors, such as management practices and environmental conditions, would provide a clearer understanding of the mechanisms underlying these patterns. Nonetheless, these findings highlight the value of conserving historically significant hedgerows as reservoirs of biodiversity within the landscape.

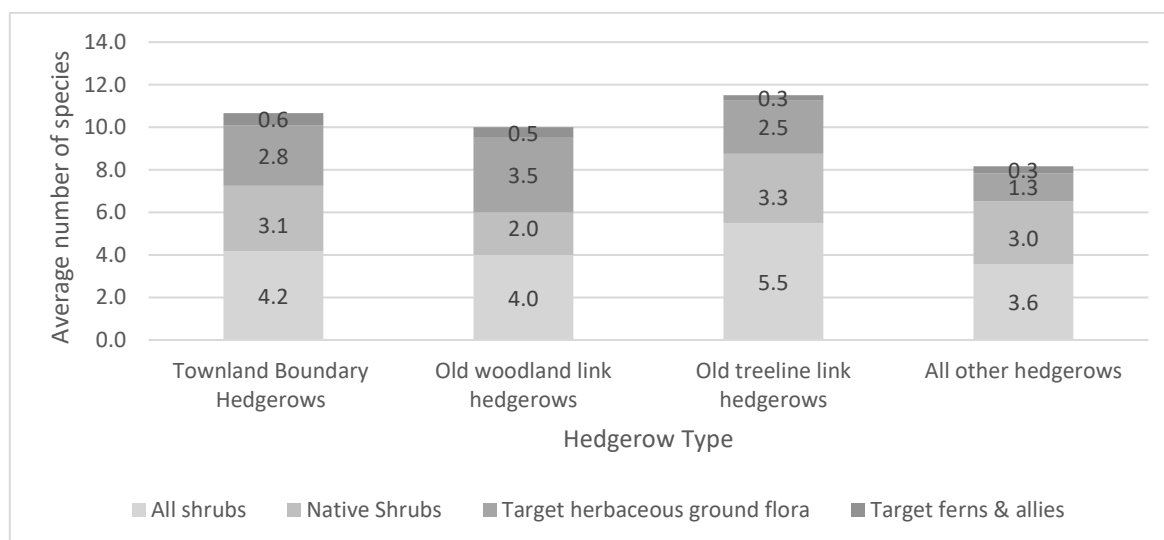


Figure 4-13 Average number of species in hedgerows of different historical context

5 HEDGEROW APPRAISAL ASSESSMENT

The ecological, historical and cultural importance of hedgerows warranted the development of a standardised assessment for assessing the conservation value and condition of the hedgerow network. A methodology for the survey and assessment of hedgerows was developed by Woodlands of Ireland funded by the Heritage Council and supported by the National Biodiversity Data Centre²⁰. Hedgerows are rated for their significance across several criteria and hedgerows achieving a defined threshold score are considered Heritage Hedgerows. Hedgerows are rated for their significance across

²⁰ Foulkes, N., Fuller, J., Little, D., McCourt, S. and Murphy, P. (2013). Hedgerow Appraisal System - Best Practise Guidance on Hedgerow Survey, Data Collation and Appraisal. Woodlands of Ireland, Dublin.

several criteria and hedgerows achieving a defined threshold score are considered Heritage Hedgerows.

Hedgerows can also be considered of high significance (*Heritage Hedgerows*) if they record a cumulative score of 6 or greater in the Historical, Species Diversity or Structural Categories, or a cumulative score of 16 or greater over the six categories. These hedges should be considered as high priority in terms of conservation and/or restoration if applicable. Hedges recording lower scores may still be of value depending on the context.

5.1.1 Heritage Hedgerows

Hedgerows are first scored based on whether they scored Highly Significant in any category. Those that did not score Highly Significant in any category were then assessed for a cumulative score of 6 or more for Historical, Species Diversity, Ground flora diversity and Structure, Construction & Associated Features significance. The remaining hedgerows not found to be Heritage Hedgerows, were then assessed for a cumulative score of 16 or more across the 6 categories. Hedgerows that did not qualify as Heritage Hedgerows in any of the aforementioned categories, were deemed not to be Heritage Hedgerows.

The overall summary results presented in Table 5-1 indicate that 61% of the hedgerow sample were highly significant in one of four categories (assessed for all six but notably, there was no hedgerows that scored Highly Significance in Ground Flora Species Diversity or Structure, Construction and Associated Features): Historical Significance, Species Diversity Significance, Habitat Connectivity Significance or Landscape Significance. A further 6% achieved Heritage Hedgerow status when scored cumulatively under the historical, species diversity, ground flora diversity and structure criteria. Thirty-three percent of the sampled hedgerows were deemed not to be Heritage Hedgerows.

Table 5-1 Number and percentage of baseline survey hedgerows assessed to be Heritage Hedgerows

Category of Heritage Hedgerow	Number of Hedgerows	% of Total Hedgerows
Highly Significant in any category	11	61
Cumulative score of 6 or more in Historical, Species Diversity, Ground flora species diversity and Structure, Construction & Associated Features Significance	1	6
Cumulative score of 16 or more across the 6 categories	0	0
Hedgerows that are NOT Heritage / Highly Significant Hedgerows	6	33

Table 5-2 below shows the number of hedgerows that achieved Heritage Hedgerows status under any one category. Note that any individual hedgerow may have been highly significant in more than one category (which is the reason that numbers and percentages in the table below add up to more than 18 hedgerows / 100%).

Thirty nine percent of sampled hedgerows were highly significant for an historical significance criterion. These hedgerows were mostly townland boundaries and those depicted as treelines on the historic OSI maps or connected to old woodland on the 1st edition OSI map. Townland boundary hedgerows hold historical and cultural value, as they often represent long-standing demarcations within the landscape.

A further 39% were found to be highly significant due to their tree/shrub species diversity. There were no hedgerows significant for ground flora diversity. Hedgerows with reduced verges and bank degradation can also negatively affect ground flora diversity.

Surveys of hedgerows during springtime may yield better results for ground flora diversity as the target ground flora species are characteristic spring flowering woodland flora species.

Table 5-2 Number and percentage breakdown of hedgerows scoring as Heritage Hedgerows under individual categories

Category	Number of Hedgerows	% of Total Hedgerows
Historical Significance	7	39
Species Diversity (Trees, Shrubs + Climbers)	7	39
Ground Flora Species Diversity	0	0
Structure, Function & Associated Features	0	0
Habitat Connectivity	2	11
Landscape	3	17

Table 5-3 - Table 5-8 summarise the results for each scored category, highlighting the features that contribute to the significance of the hedgerows. The results indicate that many Arklow hedgerows have high historical and woody species diversity significance, reflecting strong cultural and biodiversity value. However, structural and ground flora diversity were limited, with most hedgerows lacking advanced structural features or species rich ground flora. This appraisal identifies opportunities to enhance structural complexity and habitat connectivity to improve the ecological significance of hedgerows in Arklow.

1. Historical Significance

- 39% of hedgerows were classified as "Highly Significant," connected to features such as old woodland links or historical townland boundaries.
- It is notable that 89% of hedgerow are boundaries present on the first edition OS map. The OS surveys were mostly carried out in 1837 making the majority of the sample hedgerows at least 187 years old.
- Only 11% had low historical significance, these hedgerows could not be classified based on historical maps or aerial imagery, indicating newly established hedgerows or gaps in historical record or changes in land use over time.

2. Woody Species Diversity Significance

- 39% of hedgerows were "Highly Significant," with 10+ woody species.
- Moderate to slightly significant hedgerows accounted for 50% of the total, with 11% having low species diversity (1–3 species).

3. Ground Flora Species Diversity Significance

- The majority (56%) of hedgerows had low significance due to sparse ground flora or dominance by noxious weeds.
- 28% were classified as "Significant," with 6–7 species or 3–5 ferns.
- No hedgerows reached "Highly Significant" status for ground flora diversity.

4. Structural Significance

- 50% of hedgerows were of low structural significance, with no walls or banks.
- 33% were "Significant," featuring walls or banks over 1m or wet ditches/drains.
- No hedgerows were "Highly Significant" in structural features, such as double drains or streams.

5. Habitat Connectivity Significance

- 33% of hedgerows were "Moderately Significant," with multiple links to semi-natural habitats.
- Only 11% were "Highly Significant," linking to designated areas.
- 17% were of low significance, with no connection to semi-natural habitats.

6. Landscape Significance

- The majority (78%) of hedgerows were of low landscape significance.
- 17% were "Highly Significant," located in Areas of Outstanding Natural Beauty (AONB).
- Hedgerows with mature trees or wind-shaped characteristics were rare (6% moderately significant; 0% slightly significant).

Table 5-3 Summary of Historical Significance of Hedgerows

Historical Significance	Feature	Number of hedgerows	% of total hedgerows surveyed
Low Significance (0)	Recently established	2	11
Slightly Significant (1)	Internal Field Boundary / past laying or coppicing	0	0
Moderately Significant (2)	Roadside / rail / canal / farm boundary	0	0
Significant (3)	Boundary appears on 1st Ed OS / non linear	9	50
Highly Significant (4)	Connected to feature on SMR / old woodland link / Historical townland boundary	7	39

Table 5-4 Summary of Woody Species Diversity Significance of Hedgerows

Species Diversity Significance	Number of species	Number of hedgerows	% of total hedgerows surveyed
Low Significance (0)	1-3 species	2	11
Slightly Significant (1)	4/5 species	4	22
Moderately Significant (2)	6/7 species	3	17
Significant (3)	8/9 species	2	11
Highly Significant (4)	10+ species	7	39

Table 5-5 Summary of Ground Flora Species Diversity Significance of Hedgerows

Summary Ground Flora Significance	Number of species	Number of hedgerows	% of total hedgerows surveyed
Low Significance (0)	<2 species / dominated by noxious weeds	10	56
Slightly Significant (1)	2-3 species	3	17
Moderately Significant (2)	4-5 species	0	0
Significant (3)	6-7 species / 3-5 ferns	5	28
Highly Significant (4)	> 7 species / > 5 ferns	0	0

Table 5-6 Summary of Structural Significance of Hedgerows

Structure, Construction & Associated Features	Feature	Number of hedgerows	% of total hedgerows surveyed
Low Significance (0)	Wall /Bank = none	9	50
Slightly Significant (1)	Wall / Bank < 0.5m	1	6
Moderately Significant (2)	Wall / Bank 0.5 - 1m / dry ditch	2	11
Significant (3)	Wall / Bank > 1m / wet ditch or drain	6	33
Highly Significant (4)	Double Drain / stream	0	0

Table 5-7 Summary of Habitat Connectivity Significance of Hedgerows

Habitat Connectivity Significance	Feature	Number of hedgerows	% Hedgerows
Low Significance (0)	No connection with other semi-natural habitat	3	17
Slightly Significant (1)	Single link with semi-natural habitat incl. hedgerow	6	33
Moderately Significant (2)	Multiple links with other semi-natural habitats including other hedgerows	6	33
Significant (3)	Link with woodland / forest habitat	1	6
Highly Significant (4)	Link with designated area, particularly woodland	2	11

Table 5-8 Summary of Landscape Significance of Hedgerows

Summary Landscape	Feature	Number of hedgerows	% Hedgerows
Low Significance (0)		14	78
Slightly Significant (1)	Wind-shaped	0	0
Moderately Significant (2)	Mature Hedgerow trees	1	6

Summary Landscape	Feature	Number of hedgerows	% Hedgerows
Significant (3)	Area covered by AHA	0	0
Highly Significant (4)	Area covered by AONB	3	17

6 CONDITION ASSESSMENT

The hedgerow sample was assessed for condition following the methodology in the Hedgerow Appraisal System (Foulkes et al., 2013).

The hedgerow condition assessment scores hedgerows (0-unfavourable to 3 - highly favourable) under criteria in three categories: structure, continuity and other negative indicators such as bank degradation, poaching, ploughing up to the base of the hedge, herbicide use, nutrient enrichment and the presence of invasive plant species. The higher the recorded score, the more favourable the condition. A score of 0 in any category represents a hedgerow in unfavourable condition.

Table 6-1 shows that over half (55.6%) of hedgerows were found to be in favourable (38.9%) to highly favourable (16.7) structural condition with 44.5% of hedges found to be in unfavourable condition. The majority of hedgerows in unfavourable condition in this category were due to the hedgerows being either remnant or relict hedgerows.

Table 6-1 Structural Condition of Hedgerows

Structural Variables	Feature	Number of Hedgerows	% of Total Hedgerows
Unfavourable	Unfavourable Height / Width / Profile / Basal Density	7	38.9
Adequate	Adequate Height / Width / Profile / Basal Density	1	5.6
Favourable	Favourable Height / Width / Profile / Basal Density	7	38.9
Highly Favourable	Highly Favourable Height / Width / Profile / Basal Density	3	16.7

The condition assessment for continuity scored poorly, as shown in **Table 6-2**. Specific gaps (greater than 5% of the hedgerow's length) and general gaps (less than 5%) were recorded. Sixty-one percent of hedgerows were classified as having unfavourable to adequate continuity. All six unfavourable hedgerows in this category had gaps exceeding 10% of their length, and five hedgerows categorised as adequate exhibited specific gaps. Only one hedgerow (5.6%) was found to be highly favourable with no gaps, representing continuous hedgerow structure.

Table 6-2 Hedgerow condition assessed for continuity

Continuity	Feature	Number of Hedgerows	% of Total Hedgerows
Unfavourable	% gaps > 10% / General and Specific gaps.	6	33.3
Adequate	5 – 10% gaps / Specific gaps.	5	27.8

Continuity	Feature	Number of Hedgerows	% of Total Hedgerows
Favourable	< 5% gaps / General gaps.	6	33.3
Highly Favourable	No gaps / continuous hedgerow	1	5.6

Table 6-3 shows how the hedgerows scored for negative indicators. The results highlight the prevalence of negative indicators and degradation issues that may affect the long-term viability of hedgerows. A vast majority (88.9%) of hedgerows are classified as unfavourable, which stem from bank degradation, herbicide use, poaching and frequent noxious weeds. These factors may compromise the health and ecological function of the hedgerows.

Only 11.1% of hedgerows fall under the **favourable** category, exhibiting minor degradation or having verges wider than 2 meters. Notably, there are no hedgerows rated as **adequate** (with isolated degradation affecting less than 10% of their length) or **highly favourable** (showing no degradation and well-maintained verges on both sides).

Table 6-3 Negative indicators impacting hedgerow condition

Negative Indicators / Degradation / Issues affecting long-term viability	Feature	Number of Hedgerows	% of Total Hedgerows
Unfavourable	Severe degradation / >10% degradation extent / herbicide use / ploughed / frequent noxious weeds	16	88.9
Adequate	Isolated degradation (<10% length of hedge)	0	0
Favourable	Minor Degradation / Verge > 2m	2	11.1
Highly Favourable	No degradation / Both Verges > 2m	0.0	0.0

The results of the condition assessment are depicted in the graph presented in Figure 6-1 . In summary, the results of the condition assessment highlight that bank and verge degradation (verges less than 2m) is the primary negative indicator affecting hedgerows in Arklow. As discussed in Section 4.1.2, a number of the hedgerows surveyed were located adjacent to roads, the results show that verge degradation, often resulting from road widening or inappropriate management practices, is affecting the condition of hedgerows in Arklow. Additionally, the lack of appropriate management or its complete absence has led to poor basal density and a high percentage of structural gaps within hedgerows.

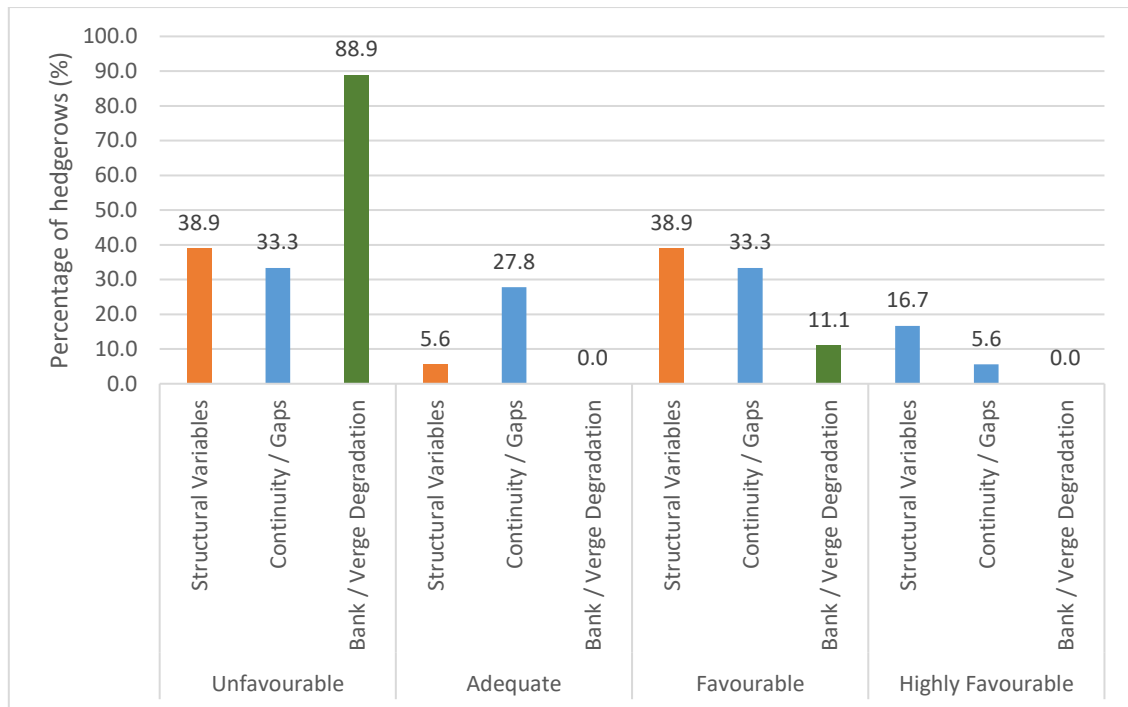


Figure 6-1 Results of the condition assessment for each category



Plate 6-1 Hedgerow verge is less than 1m due to footpath and road widening.

7 RECOMMENDATIONS

The Wicklow County Hedgerow Habitat Action Plan was developed as an integral part of the comprehensive Wicklow County Hedgerow Survey conducted by Deborah D’Arcy Ecology in 2023. This ambitious plan outlines a series of strategic actions designed to enhance awareness, facilitate conservation efforts, and promote sustainable management of hedgerows throughout the county.

As a subset of this broader initiative, this section of the Arklow Urban Hedgerow Report focuses on recommendations for urban hedgerows within the Arklow area. Drawing directly from the results of the survey, this report provides a set of targeted recommendations tailored to the unique challenges and opportunities associated with hedgerow management in the urban environment and its environs. These recommendations aim to address the specific needs of Arklow’s hedgerows while contributing to the overarching goals of biodiversity conservation, ecological connectivity, and community engagement outlined in the county-wide action plan. In addition, the recommendations for hedgerows surveyed are included in **Appendix B**. These recommendations should be read in conjunction with the maps in **Appendix C**.

By emphasising both the ecological significance and the practical benefits of urban hedgerows, this section aims to encourage proactive conservation management, foster collaboration among stakeholders, and ensure the continued vitality of hedgerows as important green infrastructure within the urban landscape of Arklow.

Hedgerow Awareness and Conservation

- Collaborate with council staff to prioritise hedgerow conservation in infrastructure and other development projects.
- Native hedgerows should be incorporated in projects whenever possible, whether by retaining existing ones or establishing new ones or both.
- Integrate biodiversity rich ‘porous’ boundaries at the master planning stage of residential and commercial development.
- Work with the planning section to integrate hedgerow value into planning policy and improve hedgerow reinstatement practices. This includes considering translocating high value or historic hedgerow boundaries, saving soils from hedgerows removed to be used in when planting new hedgerows, selecting locally or regionally appropriate native species, and planting hedgerows with a bank and/or incorporating open drainage ditches as a part of nature based sustainable urban design.
- Ensure hedgerow protection in the undeveloped lands of the AAP lands.

Town Council Hedgerow Training

- Provide training workshops for council staff and contractors on the value of hedgerows and best practice management.
- Compile and share resources on best practices for hedgerow management.

Arklow Hedgerow Restoration

- With reference to the information provided in Appendix B and C of this report, identify and plant up the hedgerows that would benefit from supplemental planting with native species

such as hawthorn (*Crataegus monogyna*), blackthorn (*Prunus spinosa*), holly (*Ilex aquifolium*), and elder (*Sambucus nigra*).

- Ensure the hedging trees planted are of local provenance i.e. grown in Ireland and preferably Wicklow.
- Ensure mechanical trimming of hedgerows is conducted sensitively, avoid flails on thick stems to prevent structural damage and disease vulnerability.
- Conduct regular maintenance (every 2-3 years) to prevent overgrowth and ensure hedgerows function effectively as boundaries and wildlife corridors.
- Plan utility works carefully to minimise root damage or hedge removal, particularly along roadsides.

Hedgerow Management Strategy for Arklow

Develop a hedgerow management strategy for Arklow that includes best practice and scheduling for maintaining native hedgerows.

- (1) Identify the hedgerows that are managed routinely by Arklow Municipal District and map. Draw up a management schedule for each hedgerow with the management specified taking into account its location, condition and restoration target.
- (2) Review management practices taking road safety constraints into account- aim to allow roadside hedgerows to grow wide, dense and tall where space permits. Cutting a bit further out each year allows hedgerows to grow wider and taller.
- (3) Where space is limited, side trim allowing some bushes to grow tall as trees which can flower.
- (4) Schedule each hedgerow cutting aiming for every 3 years to allow hedgerows to flower (hawthorn flowers on the second years growth)
- (5) Cut the hedgerow to an A shape rather than a box cut.
- (6) Avoid having all the hedges cut the same year, so that there is always some that will bloom and fruit in the every year or cut one third of the hedge annually
- (7) Practice “strategic targeted cutting” at tight corners to maintain visibility for traffic where necessary rather than cutting the whole length of hedge every year.
- (8) Where annual trimming is necessary ensure the other side of the hedge is left to flower

Grass verge management

Consider the grassy verge management to maintain and increase diversity -minimise mowing (a) 1 cut per year or (b) reduce the frequency of mowing to that necessary for health and safety.

- (a) Annual mow in September with the cuttings collected - this will help increase the wildflower diversity of the grassy verge.
- (b) Reduced mowing regime. Five cuts per year starting in mid-April after dandelions have flowered. (Usually every 6 weeks or so during the growing season). Collect all cuttings. The cutting height should be set at 3 inches (10cm)

The All-Ireland Pollinator Plan *Councils: actions to help pollinators*²¹ provides the following guidance for when mowing is contracted out.

- Identify at least ten locations and mow under a pollinator friendly regime - five cut and lifts per year. Mowing height should be set to 3 inches.
- First cut after the 15th April (Dandelions are a vital food source for pollinators in spring)
- Second cut at end of May
- Third cut in mid-late July (maximises growth of Clovers and other wildflowers)
- Fourth cut at the end August
- Fifth cut after mid-October If necessary, this can be increased or decreased depending on the use of the area, but grass should not be cut from the beginning of March until mid-April or from the end of May until mid-July.

Community Actions

- Promote the ecological benefits of less tidy, flowering hedgerows through outreach to Tidy Towns groups and farmers.
- Collaborate with local stakeholders, such as GAA clubs, to encourage biodiversity-friendly hedgerow management on sports grounds and to plant new native hedgerows with the aim of increasing the extent of native hedgerows and also to increase hedgerow connectivity.
- Work with Tidy Towns groups and schools on projects that highlight hedgerow biodiversity and encourage community hedgerow planting and recording initiatives.
- Maintain a list of groups and projects contributing to biodiversity efforts in Arklow to foster collaboration on hedgerow projects.

Addressing Threats to Hedgerows

- Preserve original hedgerow boundaries, which include the verges in road infrastructure projects by relocating (translocating) rather than removing them to maintain ecological connectivity.
- Where hedgerows must be removed to accommodate road improvements ensure that they are replaced with native hedgerow species only.
- Grassy verges where disturbed from works should be allowed to regenerate naturally or be lightly sown with a grass seed mix containing fine leaved grasses such as fescue and bent grass which will allow the regeneration of the existing native flora from the seed bank in the soil. Sowing of commercially available wildflower seed should be strongly discouraged particularly along roadsides. A policy of not sowing wildflower seed should be incorporated into a re-instatement policy for road schemes. This policy aligns with the All-Ireland Pollinator Plan²²
- Where adjacent landowners in urban areas accommodating road widening works insist on a “non-native garden hedge” suggest planting privet (*Ligustrum vulgare*) instead and encourage the landowners to only trim in late autumn/winter or early spring (February). This will allow privet to flower (May to July) and produce berries (autumn) that will feed wildlife and also avoids the bird nesting season.
- Avoid frequent cutting or cutting during bird nesting season to protect local ecosystems.

²¹ Councils: actions to help pollinators. All-Ireland Pollinator Plan, Guidelines 4. National Biodiversity Data Centre Series No.12, Waterford. November, 2016.

²² See <https://biodiversityireland.ie/faq/should-i-buy-wildflower-seed/>

- Avoid herbicide use on verges and banks - trim instead. See additional guidance on herbicide use in *Councils: actions to help pollinators*
- Engage with landowners to encourage hedgerow retention and maintenance.

Management of Invasive Species

- Develop and implement an Invasive Species Management Plan (ISMP) for controlling invasive species such as Winter heliotrope (*Petasites fragrans*) and Montbretia (*Crocasmia x crocosmiiflora*) in the grassy verges.
- Eradicate or control the growth of invasive plant species through appropriate management practices. Use manual control methods and only use herbicides as a last resort when other methods fail.
- Follow best practices outlined in relevant guidelines for invasive species control, including biosecurity measures and post-control monitoring.



Plate 7-1 Conduct regular maintenance to prevent overgrowth



Plate 7-2 Hedgerow along a busy pedestrian pathway



Plate 7-3 Verge Management: Collect the cuttings after mowing- this will help increase the wildflower diversity of the grassy verge.

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FURTHER RESOURCES

GE-ENV-01104 The Management of Invasive Alien Plant Species on National Roads – Standard (TII, December 2020) • GE-ENV-01105 The Management of Invasive Alien Plant Species on National Roads – Technical Guidance (TII, December 2020)

GE-ENV-01105 The Management of Invasive Alien Plant Species on National Roads – Technical Guidance (TII, December 2020)

For more information on enhancing hedgerows for biodiversity see: Councils: actions to help pollinators. All-Ireland Pollinator Plan, Guidelines 4. National Biodiversity Data Centre Series No.12, Waterford. November, 2016.

For more information on how to plant a hedge see here:

<https://www.teagasc.ie/news--events/daily-archive/environment-archive/how-to-plant-a-hedge.php>

For more information on hedgerow management see:

<https://www.teagasc.ie/news--events/daily/environment/best-practice-hedge-cutting-for-our-two-hedge-types.php>

For more information on hedgerow management and rejuvenation see:

<https://www.teagasc.ie/media/website/environment/biodiversity-countryside/Hedgerow-Management.pdf>

For more information on managing roadside verges for biodiversity see: Don't Mow Let it Grow

<http://dontmowletitgrow.com>

APPENDIX A: GROUND FLORA PLANT SPECIES LIST

Table 1: Shrub layer species recorded

Botanical Name *Non-native species	Common Name
<i>Acer pseudoplatanus</i> *	Sycamore
<i>Alnus glutinosa</i>	Alder
<i>Aucuba japonica</i> *	Spotted Laurel
<i>Betula</i> sp.	Birch
<i>Corylus avellana</i>	Hazel
<i>Crataegus monogyna</i>	Hawthorn
<i>Escallonia</i> spp. *	Escallonia
<i>Euonymus europaeus</i>	Spindle
<i>Fagus sylvatica</i> *	Beech
<i>Fraxinus excelsior</i>	Ash
<i>Griselinia littoralis</i> *	Griselinia
<i>Ilex aquifolium</i>	Holly
<i>Malus domestica</i> *	Apple
<i>Prunus avium</i>	Wild Cherry
<i>Prunus laurocerasus</i> *	Cherry Laurel
<i>Prunus spinosa</i>	Blackthorn
<i>Quercus petraea</i>	Sessile Oak
<i>Quercus</i> spp.	Oak Spp.
<i>Rhododendron ponticum</i> *	Rhododendron
<i>Salix aurita</i>	Eared Willow
<i>Salix cinerea</i>	Grey Willow
<i>Salix</i> spp.	Willow spp.
<i>Sambucus nigra</i>	Elder
<i>Sorbus aucuparia</i>	Rowan
<i>Taxus baccata</i>	Yew
<i>Tilia</i> spp. *	Lime
<i>Ulex europaeus</i>	Gorse

Table 2: Tree layer species recorded

Botanical Name *Non-native species	Common Name
<i>Acer pseudoplatanus</i> *	Sycamore
<i>Aesculus hippocastanum</i> *	Horse chestnut
<i>Alnus glutinosa</i>	Alder
<i>Betula</i> spp.	Birch
<i>Corylus avellana</i>	Hazel
<i>Crataegus monogyna</i>	Hawthorn
<i>Cupressus</i> × <i>leylandii</i> *	Leyland cypress

Botanical Name *Non-native species	Common Name
<i>Euonymus europaeus</i>	Spindle
<i>Fagus sylvatica</i> *	Beech
<i>Fraxinus excelsior</i>	Ash
<i>Griselinia littoralis</i> *	Griselinia
<i>Ilex aquifolium</i>	Holly
<i>Malus domestica</i> *	Apple
<i>Pinus sylvestris</i>	Scots pine
<i>Populus tremula</i>	Aspen
<i>Prunus avium</i>	Wild Cherry
<i>Prunus spinosa</i>	Blackthorn
<i>Quercus sp.</i>	Oak
<i>Salix cinerea</i>	Grey Willow
<i>Salix spp.</i>	Willow
<i>Sorbus aucuparia</i>	Rowan
<i>Taxus baccata</i>	Yew
<i>Tilia x europaea</i>	Common lime

Table 3: Woody climber species recorded

Botanical Name *Non-native species	Common Name
<i>Buddleia davidii</i> *	Butterfly bush
<i>Rubus fruticosus</i> spp	Bramble
<i>Hedera helix</i>	Ivy
<i>Rosa arvensis</i>	Field Rose
<i>Rosa canina</i> agg.	Dog rose
<i>Lonicera periclymenum</i>	Honeysuckle
<i>Solanum dulcamara</i>	Bittersweet
<i>Calystegia sepium</i>	Hedge bindweed
<i>Delairea odorata</i> *	German ivy

Table 4: Ground Flora species recorded

Botanical Name *Non-native species	Common Name
<i>Achillea millefolium</i>	Yarrow
<i>Anthriscus sylvestris</i>	Cow parsley
<i>Arum maculatum</i>	Lords and Ladies
<i>Centaurea nigra</i>	Common knapweed
<i>Conopodium majus</i>	Pignut
<i>Conyza canadensis</i> *	Canadian fleabane
<i>Digitalis purpurea</i>	Foxglove

Botanical Name *Non-native species	Common Name
<i>Chamerion angustifolium</i>	Rosebay willowherb
<i>Geranium robertianum</i>	Herb robert
<i>Geum urbanum</i>	Wood avens
<i>Hypericum androsaemum</i>	Tutsan
<i>Hypochaeris radicata</i>	Cat's ear
<i>Lamium purpureum</i>	Dead nettle
<i>Lapsana communis</i>	Nipplewort
<i>Lesser stitchwort</i>	Lesser stitchwort
<i>Lotus corniculatus</i>	Bird's Foot trefoil
<i>Medicago lupulina</i>	Black medick
<i>Crocasmia x crocosmiiflora</i>	Montbretia
<i>Petasites pyrenaicus</i> *	Winter heliotrope
<i>Plantago lanceolata</i>	Ribwort plantain
<i>Potentilla reptans</i>	Creeping cinquefoil
<i>Potentilla sterilis</i>	Barren strawberry
<i>Ranunculus repens</i>	Creeping buttercup
<i>Smyrnium olusatrum</i>	Alexanders
<i>Sonchus oleraceus</i>	Smooth sow thistle
<i>Stellaria holostea</i>	Greater stitchwort
<i>Torilis japonica</i>	Hedge parsley
<i>Veronica spp.</i>	Speedwell
<i>Vicia sepium</i>	Bush vetch
<i>Viola spp.</i>	Dog violet species
<i>Taraxacum officinale</i>	Dandelion
<i>Arrhenatherum elatius</i>	False oat grass
<i>Trifolium pratense</i>	Red clover
<i>Trifolium repens</i>	White clover
<i>Carex remota</i>	Remote sedge
<i>Festuca rubra</i>	Red fescue
<i>Agrostis stolonifera</i>	Creeping bent grass
<i>Dactylis glomerata</i>	Cock's foot
<i>Brachypodium sylvaticum</i>	False Brome grass
<i>Rumex acetosa</i>	Common sorrel
<i>Heracleum sphondylium</i>	Comon Hogweed
<i>Tussilago farfara</i>	Colt's foot
<i>Common daisy</i>	Bellis perennis

Table 5: Ferns and Allies species recorded

Botanical Name **Invasive tendency	Common Name
<i>Polystichum setiferum</i>	Soft shield fern
<i>Equisetum arvense</i> **	Common Horsetail
<i>Asplenium scolopendrium</i>	Hart's tongue fern

Botanical Name **Invasive tendency	Common Name
<i>Dryopteris dilatata</i>	Buckler fern
<i>Equisetum telmateia</i>	Great Horsetail
<i>Athyrium filix-femina</i>	Lady Fern
<i>Blechnum spicant</i>	Hard Fern
<i>Polypodium spp.</i>	Polypody fern
<i>Pteridium spp.</i>	Bracken

APPENDIX B: TARGETED RECOMMENDATIONS FOR HEDGEROWS SURVEYED

Please see accompanying maps in Appendix C which colour code the management for hedgerows

Hedgerow Number	Description & Targeted Recommendations
Hedgerow 1	Historical Hedgerow: Features as a treeline on first-edition OS Mapping (no longer present).
	Significance: Located within an Area of Outstanding Natural Beauty (AONB).
	Invasive Species: Winter heliotrope present.
	Verge (2-4m) Good opportunity of verge management to maintain and increase diversity.
	Recommendation: - Eradicate or control the growth of invasive plant species through appropriate management practices. Use manual control methods and only use herbicides as a last resort when other methods fail. - Implement a reduced mowing regime (5 cuts per year) and collect cuttings.
Hedgerow 2	Historical Hedgerow: Townland boundary
	Natural Regeneration: Blackthorn regeneration but would benefit from additional infill planting.
	Invasive Species Removal: Includes winter heliotrope (8x1m), rhododendron, Montbretia, and non-native species German ivy.
	Recommendation: - Supplemental planting with native species such as hawthorn (<i>Crataegus monogyna</i>), blackthorn (<i>Prunus spinosa</i>), holly (<i>Ilex aquifolium</i>), dog rose (<i>Rosa canina</i>) and elder (<i>Sambucus nigra</i>). - Aim for 6 plants per m mainly hawthorn but plant another hedge species instead every 2 m. Plant in a double staggered row with 12 inches (330mm) between rows and the same between the rows - Eradicate or control the growth of invasive plant species through appropriate management practices. Use manual control methods and only use herbicides as a last resort when other methods fail.
Hedgerow 3	Historical Hedgerow: Townland boundary
	Verge: Small (<1m) adjacent to a footpath. Features a dry bank with evidence of herbicide treatment.
	Recommendation: - Avoid herbicide use. Lightly scarify to reduce compacted bare earth and allow vegetation to regenerate. Monitor and trim vegetation as necessary.
Hedgerow 4	Native Hedgerow: Includes hawthorn, blackthorn, and field rose .
	Condition: Grassy verge flora present to north (parkland) but not recently mown.
	Recommendations: - Good opportunity for verge management to maintain and increase diversity. Minimise mowing or reduce the frequency to that necessary for health and safety. Collect the cuttings after mowing

Hedgerow Number	Description & Targeted Recommendations
Hedgerow 5	Non-native Species: Spotted laurel recorded within hedge- may become invasive in some areas. Spotted Laurel is toxic to pets and humans if ingested. It is recommended to keep the plant out of reach of children and pets, and to wear gloves when handling it.
	Verge: Less than 1m wide.
	Recommendations: - Monitor the spread of spotted laurel. If it becomes invasive: - Eradicate or control the growth of species through appropriate management practices. Use manual control methods and only use herbicides as a last resort when other methods fail.
Hedgerow 6	Habitat Connectivity: Hedgerow connects to coastal habitats.
	Verge: Less than 1m wide.
	Management: Tightly side trimmed.
	Recommendations: Schedule hedgerow cutting aiming for every 3 years to allow hedgerow to flower (hawthorn flowers on the second years growth) taking road safety constraints into account.
Hedgerow 7	Verge management: Minimise mowing or reduce the frequency to that necessary for health and safety. Collect the cuttings after mowing- this will help increase the wildflower diversity of the grassy verge.
	Recommendation: - Implement a reduced mowing regime (5 cuts per year) and collect cuttings.
Hedgerow 8	Verge: Less than 1m wide. No recommendations
Hedgerow 9	Issues: A broken fence laden with ivy is structurally compromising the hedgerow.
	Verge: Less than 1m wide.
	Recommendations: - Supplemental planting with native species such as hawthorn (<i>Crataegus monogyna</i>), blackthorn (<i>Prunus spinosa</i>), holly (<i>Ilex aquifolium</i>), dog rose (<i>Rosa canina</i>) and elder (<i>Sambucus nigra</i>). - Aim for 6 plants per m mainly hawthorn but plant another hedge species instead every 2 m. Plant in a double staggered row with 2 inches (330mm) between rows and the same between the rows. - Opportunity for verge management to maintain and increase diversity. Minimise mowing or reduce the frequency to that necessary for health and safety. Collect the cuttings after mowing - Remove one side of the fence to allow light and improve hedgerow health. Opportunity for infill planting.
Hedgerow 10	Historical Hedgerow: Townland boundary, also features as a treeline on first-edition OS maps.

Hedgerow Number	Description & Targeted Recommendations
	Verge: Less than 1m due to road widening and footpath. Recommendation: - Common horsetail (<i>Equisetum arvensis</i>) in the understory, with invasive tendencies. Monitor and control if necessary
Hedgerow 11	Relict Hedgerow: Connectivity to adjacent hedgerow cut off by construction site fencing and wall. No recommendations.
Hedgerow 12	Coastal Hedgerow: Includes rowan and hazel planted adjacent on the roadside. Implement best practice management Recommendations: Schedule hedgerow cutting aiming for every 2 – 3 years to allow hedgerow to flower (hawthorn flowers on the second years growth) taking road safety constraints into account. Good opportunity for verge management to maintain and increase diversity. Minimise mowing or reduce the frequency to that necessary for health and safety. Collect the cuttings after mowing.
Hedgerow 13	Habitat Connectivity Hedgerow: Plays a key role in linking habitats. Invasive Species: Butterfly-bush (<i>Buddleja davidii</i>) in the roadside verge. Recommendation: - Supplemental planting with native species such as hawthorn (<i>Crataegus monogyna</i>), blackthorn (<i>Prunus spinosa</i>), holly (<i>Ilex aquifolium</i>), and elder (<i>Sambucus nigra</i>). - Aim for 6 plants per m mainly hawthorn but plant another hedge species instead every 2 m. Plant in a double staggered row with 12 inches (330mm) between rows and the same between the rows - Eradicate or control the growth of invasive plant species through appropriate management practices. Use manual control methods and only use herbicides as a last resort when other methods fail.
Hedgerow 14	Condition: Heavily managed and over-strimmed, resulting in poor structural health and species composition. Recommendations: - Ensure mechanical trimming of hedgerow is conducted sensitively, avoiding flails on thick stems to prevent structural damage and disease vulnerability. - Schedule hedgerow cutting aiming for every years to allow hedgerows to flower (hawthorn flowers on the second years growth)
Hedgerow 15	Historical & Landscape Hedgerow Located on AAP lands Recommendation: - Schedule hedgerow cutting aiming for every 3 years to allow hedgerows to flower (hawthorn flowers on the second years growth).
Hedgerow 16	Historical & Landscape Hedgerow Located on AAP lands Recommendation: - Schedule hedgerow cutting aiming for every 3 years to allow hedgerows to flower (hawthorn flowers on the second years growth). - Ensure mechanical trimming of hedgerows is conducted sensitively, avoiding flails on thick stems to prevent structural damage and disease vulnerability.

Hedgerow Number	Description & Targeted Recommendations
	- Conduct regular maintenance (every 3 years) to prevent overgrowth and ensure hedgerows function effectively as boundaries and wildlife corridors - Common horsetail (<i>Equisetum arvensis</i>) in the understory, with invasive tendencies. Monitor and control if necessary
Hedgerow 17	Located on AAP lands Recommendation: supplemental planting with native species such as hawthorn (<i>Crataegus monogyna</i>), blackthorn (<i>Prunus spinosa</i>), holly (<i>Ilex aquifolium</i>), and elder (<i>Sambucus nigra</i>).
Hedgerow 18	Located on AAP lands Recommendation: - Supplemental planting with native species such as hawthorn (<i>Crataegus monogyna</i>), blackthorn (<i>Prunus spinosa</i>), holly (<i>Ilex aquifolium</i>), dog rose (<i>Rosa canina</i>) and elder (<i>Sambucus nigra</i>). - Aim for 6 plants per m mainly hawthorn but plant another hedge species instead every 2 m. Plant in a double staggered row with 12 inches (330mm) between rows and the same between the rows

Hedgerow planting (Method can be adjusted for infill planting)

- Only purchase hedging plants of local provenance i.e. Plants grown in Ireland from native Irish stock. Do not plant hedging that has been imported from other European countries.
- Select hedge species that are already growing in the local area.
- When ordering, check the scientific (Latin) names to ensure you are purchasing the native species rather than a cultivated non-native garden variety.
- Bare root whips can be planted November to March inclusive.
- Buy 2-year-old bare rooted whips, plant 6 plants per metre, mainly whitethorn (*Crataegus monogyna*), but once every 2m replace one with another hedging species that tolerates trimming such as Blackthorn (*Prunus spinosa*), Holly (*Ilex aquifolium*), dog rose (*Rosa canina*) and Honeysuckle /Woodbine (*Lonicera periclyclamen*). In areas of neutral or more alkaline or lime rich soils the following species are also appropriate Hazel (*Corylus avellana*), Spindle (*Euonymus europaeus*) and Guelder Rose (*Viburnum opulus*).
- For every 100m of new hedge - buy 550 whitethorn and 50 of the other species.
- Protect roots from drying out during planting by keeping plants in the bag until needed.
- Plant in a double staggered row – with 330mm (just over a foot) between the rows and the same between the plants within the rows
- Plant the whips to the same depth as was previously planted (i.e. to the root collar ensuring the roots are not exposed). Firm in.
- Identify a few whitethorn (maybe 5 in every 100 m) to be retained as individual trees and protect with tree guards and /or plant native trees such as sessile (*Quercus petraea*), pedunculate oak (*Quercus robur*), grey willow (*Salix cinerea*), goat willow (*Salix caprea*) rowan (*Sorbus aucuparia*), crab apple (*Malus sylvestris*), wild cherry (*Prunus avium*). Protect with a tree guard.
- On roadside hedgerows ensure sufficient spacing of the “trees” to allow hedge trimming between the trees when mature.

- Prune all hedge plants **except holly** down to 4 inches (10 cm) or so above ground level with a sloping cut to leave a sharp point (to encourage branched growth from the base).
- If necessary, apply an organic mulch (, sheep's wool, wet newspaper, plant-based compostable film, well-rotted leaf mould or bark chips) to the ground to prevent vegetation overgrowth in the first few years of establishment or strim long grass growth to allow light to the base of the young hedge.
- **Avoid herbicide use**

APPENDIX C: MAPS





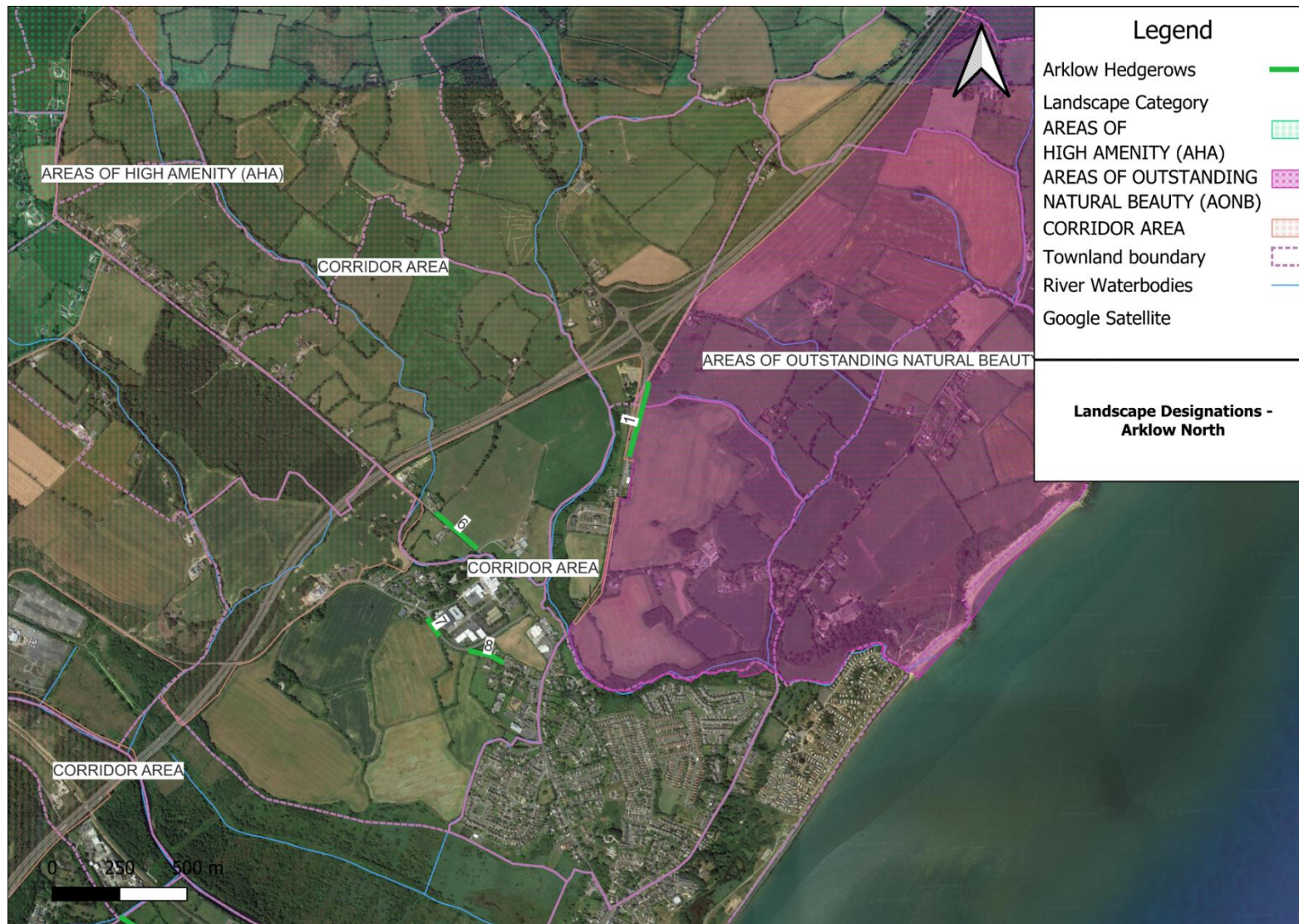




















W I C K L O W

ENDLESS OPPORTUNITIES