

Kilkenny Local Area Plan Habitat Assessments 2010

MOONCOIN



Flooded wet grassland near the New Road January 2010

Report prepared for Kilkenny County Council

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Executive Summary

This report contains the results and interpretation of a habitat mapping study which was carried out in Mooncoin to inform the Local Area Plan. It builds on a descriptive account of biodiversity which was prepared for the Local Area Plan in 2003 by CAAS Ltd.

A Green Infrastructure approach was taken to describing biodiversity, based on the identification of habitats and their relationship within ecological networks. Green Infrastructure highlights the provision of ecosystem services by biodiversity. These include food/timber production, mitigation of climate effects (e.g flooding), quality of life and supporting services to agriculture. Fieldwork took place in January 2010 to map habitats to level III, following Heritage Council guidelines. Hedgerows were also assessed using a combination of structural and biodiversity criteria. This provided a numerical value for each hedgerow. Using an approach developed by the NRA, the relative value of habitats was also identified. To inform the account of Green Infrastructure further interpretation of the habitat map was carried out to identify “ecological networks”. Ecological networks are based on the core/corridor/buffer principle and emphasise the importance of linkages between habitats to maintain ecosystem functioning. Cores are areas/features of key biodiversity importance/ecosystem functioning, while corridors are land/watercourses which allows linkages between key areas or their expansion. Buffers comprise land adjacent to the key area whose management influences its quality. These networks were identified to assist the identification of functions provided by Green Infrastructure.

A habitat map accompanying the report (Map 1) shows the habitats present in Mooncoin. An annotated aerial photo shows the location of ecological networks (Map 2). Digital files which have been provided to Kilkenny County Council will allow habitat information to be imported into the council’s Geographic Information System (GIS).

All hedgerows are numbered on this map and their value for biodiversity is summarised in Table 2. This report contains a summary account and evaluation of biodiversity and its value as Green Infrastructure.

One main ecological network (MN1) was identified in Mooncoin. It is centred on low-lying alluvial soil between the main street and New Road, and is of local importance (higher value). It is linked spatially and functionally with the cSAC associated with the Suir, as the drains from this area are piped to the river. It is prone to flooding and supports locally important wetland habitats. Any

development in or adjacent to this ecological network which could affect water quality should be screened for its potential impact on the cSAC. Linking features/corridors associated with this network comprise hedgerows and drainage ditches.

As a Green Infrastructure feature its most important characteristic is that it provides for flood attenuation. It represents the most intact hedgerow network in the village and has potential for further development for open space, recreation and environmental education.

A second small area of interest (MN2) is found where the local bedrock outcrops at the surface, in the south west of the village. This area provides a locally important (lower value) habitat for invertebrates and birds, and development of this area needs to be sensitive to the underlying groundwater aquifer.

Hedgerow evaluation revealed that most of the hedgerows surveyed were evenly divided into moderate and high value types, with two scoring as low value types. As Green Infrastructure features they are important for local biodiversity, provide cultural and visual amenities, support farming by providing reservoirs for species which support pollination of commercial crops and shelter for animals. Current management as stock proof barriers or for biodiversity is poor. There is potential for improved management in the countryside and adjacent to the village. The hedgerows of high value warrant protection from future development.

Other features of biodiversity interest include mature trees, stone buildings and stone walls. They are not rated highly as rare habitats or for rare species. They provide important visual amenities and enhance cultural values.

1 Introduction

1.1 Study brief

Kilkenny County Council is reviewing and preparing local area plans (LAPs) for settlements throughout the county. As part of this process, habitat assessments were undertaken as a source of information on local biodiversity, and to help assess future planning applications.

1.2 Approach

This habitat assessment uses a Green Infrastructure approach to identify the most important ecological features of the area and their functions.

A working definition of Green Infrastructure (GI), developed by a research project currently being undertaken for Comhar Sustainable Development Council, DOEHLG (Compass Informatics et al, 2010, in prep.) states that GI is a “strategically planned and managed network featuring areas with high quality biodiversity (uplands, wetlands, peatlands, rivers and coast), farmed and wooded lands and other green spaces that conserve ecosystem values which provide essential services to society”. Ecosystem services include *provisioning*, such as the production of food and water; *regulating*, such as the control of climate and disease; *supporting*, such as nutrient cycles and crop pollination; and *cultural*, such as spiritual and recreational benefits. Practical examples of services provided by Green Infrastructure include: the provision of food and wood through farming and forestry, water from rivers or aquifers; flood attenuation by rivers and natural wetlands, waste decomposition; transport routes, pollination of crops, interesting green spaces for recreation; air filtering and noise attenuation by vegetation and environmental education opportunities. A Green Infrastructure approach to spatial planning is being promoted by the Biodiversity Unit, DG Environment of the European Commission (2006) to support biodiversity management post 2010 as it allows for greater integration between biodiversity and development. This approach is supported by the numerous guidelines such as the Green City guidelines (Brennan and O’Connor, 2008). The study being undertaken for Comhar SDC explains the concept illustrated by case studies, describes a Green Infrastructure planning process and provides recommendations for its elaboration and promotion by Comhar SDC and DOEHLG.

Habitat mapping is at the core of Green Infrastructure assessment as it provides an account of almost all the features in the landscape which are responsible for ecosystem functioning. Habitat mapping following the Heritage Council’s *Best*

Practice Guidance for Habitat Survey and Mapping (2010) allows for the identification of each example of a habitat type. It also allows for the evaluation of biodiversity outside designated areas using an ecological evaluation technology developed by the National Roads Authority (NRA), based on criteria such as rarity, naturalness and statutory requirements for protection of particular species (NRA, 2008). As ecosystem services are rarely provided by individual examples of habitats but by groups of similar or related habitats, the Green Infrastructure approach requires that habitat mapping is further interpreted to identify “ecological networks”. Ecological networks consist of “cores” (habitats/features of key importance for biodiversity and ecosystem functioning), “buffers or nature rehabilitation areas” (habitats adjacent to the key area whose management influences its quality and require more appropriate management) and “corridors” habitats which allow for the movement of species, particularly those associated with the core habitats. Rivers provide obvious examples of ecological networks where buffer or nature rehabilitation areas comprise their margins which have been drained and no longer function as wetlands. Core areas are surviving good quality habitats and corridors which allow for the movement of key species, such as birds and bats, associated with them. Not all of these features will necessarily be found in any one area.

Ecological networks support the implementation of the EU Habitats Directive, as Article 10 stresses the importance of ecological corridors linking designated sites. It also highlights the maintenance of biodiversity throughout the wider landscape, not just in areas which are protected for nature conservation designations. It highlights linking features such as hedgerows, streams or small examples of semi-natural habitats. Identification of ecological networks allows consideration of the possible impacts of development on important nature conservation areas, which are outside the survey area but are linked to it through ecological networks. In areas where proposals may have an impact on EU designated nature conservation sites the Planning Authority has an obligation to ensure that adequate screening takes place and, if necessary, that an appropriate assessments under Article 6 of the Habitats Directive is carried out. The identification of ecological networks can be of significant assistance in identifying any features in the LAP areas, outside designated areas that might trigger screening and risk pathways that could suggest the need for full appropriate assessment.

Information on hydrology, geology and soils are all important factors underpinning the quality of ecological networks and Green Infrastructure. As well as human management, these are the main features that explain why a particular habitat occurs in an area. Their consideration is important when

examining Green Infrastructure as it allows a more robust analysis of the quality of current ecological networks, threats and opportunities for enhancement.

Habitat identification and assessment is at the core of ecological networks and Green Infrastructure. Greater connectivity increases the value of individual habitats, the value of the network and ecosystem functioning. The more natural and connected a habitat, the more important it is as Green Infrastructure.

2 Methodology

2.1 Introduction

Preparation of this report can be broken down into three main parts: (i) consultations and desk study; (ii) field survey; and (iii) report writing and database compilation.

In practice these phases all overlap to some extent.

2.2 Consultations and desk study

An initial steering meeting was held with Kilkenny County Council Forward Planning and the County Heritage Officer to agree the approach to the assessment and the data sources to be used. Working maps were then produced to facilitate the desk study. An outline map was prepared using a combination of vector maps, aerial photographs, historic first edition Ordnance Survey maps, and a review of existing information.

Consultations were held with the local National Parks & Wildlife Service conservation ranger, the Southern Regional Fisheries Board, the county botanical recorder, and Kilkenny branch of BirdWatch Ireland, as well as local authority staff. Desk sources consulted included:

- Mooncoin Local Area Plan 2003
- Ecological Survey of Mooncoin to inform the local area plan (CAAS, 2003).
- National Parks & Wildlife Service online data (www.npws.ie)
- Site file for the nearest designated site: Lower River Suir cSAC No.2137 inspected in NPWS, Ely Place, Dublin.
- Environmental Protection Agency data on soils and water quality <http://maps.epa.ie/InternetMapView/mapviewer.aspx> - Land/Soils; Land/Subsoils; Water Quality/Current River Data; Water Quality/Coastal and Estuarine Waters

- Geological Survey of Ireland geological data on geology, subsoils and hydrology. http://spatial.dcenr.gov.ie/imf/imf.jsp?site=GSI_Simple – Bedrock datasets/Bedrock 100k Solid Geology; Bedrock datasets/Faults 500k; Groundwater/Karst features; Groundwater/ National Draft Bedrock Aquifer Map; Groundwater/National Draft Gravel Aquifer Map; Groundwater/Irish Interim Vulnerability.
- County Kilkenny Groundwater Assessment (Kilkenny County Council and Geological Survey 2002)
- Kilkenny County Development Plan 2008-2014 (www.kilkennycoco.ie/cdp/index.html)
- Draft County Kilkenny Biodiversity Action Plan 2008

An information leaflet was produced explaining the project (Appendix 1). This was sent out to interested individuals and local groups e.g. Tidy Towns groups, in advance of fieldwork. It was also used in conjunction with a letter of introduction provided by Kilkenny County Council when approaching landowners to seek access.

2.3 Fieldwork

Following Heritage Council guidelines all habitats within the study area were mapped, the boundary of which is based on the development boundary of the 2003 Mooncoin Local Area Plan. Some areas outside the study area boundary were mapped where they supported important semi-natural habitats or were constituents of an ecological network whose core lay within the study area LAP boundary.

Standardised field survey and hedgerow recording cards (Appendix 2) were used to gather information on habitats and hedgerows. Wherever possible land was surveyed by direct inspection of the habitats. No land was entered without prior permission of the landowner. Where access was not possible, habitats were viewed from the nearest public road or other public land, and mapped and described using results of desk research.

In the case of habitats previously surveyed in detail for ecological reports for the 2003 LAP, it was sufficient in most cases to ground-truth the habitats to ensure that the new mapping is accurate, and draw on the previous work to complete the habitat descriptions. Previous reports were particularly useful to describe sites with difficult access.

‘Target notes’ were compiled for ecological networks of particular value. These are notes entered into record cards during the field survey and consisted of lists

of species and notes on habitat features (Appendix 3). These were used to inform descriptions contained in this report. Photographs were taken of habitats within these areas.

2.4 Habitat mapping

The methodology followed the latest guidance produced by the Heritage Council (2010). Habitats were mapped according to Fossitt (2000).

Habitats are areas defined particularly by their flora. They may also have particular environmental characteristics, fauna, vegetation structure or management history. For example a hedgerow is a habitat which must have native shrubs growing in a linear pattern. It may or may not have a dry bank or wet ditch.

Habitats vary in value for biodiversity depending on factors such as naturalness and habitat and species rarity. Habitats of high value are usually less modified by man. They may be associated with land, freshwaters or marine environments

The Fossitt classification system (summarised in Appendix 5) provides a hierarchal classification of habitats from Levels One to Three. Level one provides a gross classification, Level Two is intermediate, and Level Three is the most detailed. Habitats in Mooncoin were mapped to Level Three.

At Level One eleven habitats are differentiated. These are Freshwater, Grassland and Marsh, Heath and Dense Bracken, Peatlands, Woodland and Scrub, Exposed Rock and Disturbed Ground, Cultivated and Built Land, Coastland, Littoral, Sub littoral and Marine Water Body.

Level Two allows for a more detailed classification of the Level One types. For example Level One Freshwater habitats can be distinguished as either lakes, ponds, watercourses, springs or swamps and so on for all other Level One habitats.

Level Three allows for further differentiation of these types. For example there are eight different lake habitats; four types of watercourses, two types of springs and two different kinds of swamps.

In Mooncoin habitat classification followed Fossitt conventions with the following modifications which have been developed through experience of habitat mapping studies elsewhere (Dublin, Laois and Kildare):

1. Hedgerows consisting of non-native shrubs, usually surrounding housing were identified as WS3A. This is a sub type of WS3 (Ornamental /non native shrubs) according to Fossitt 2000).

2. The Fossitt habitat category BL1 (Stone buildings) was subdivided into BL1A (stone walls) and BL1B (stone buildings).
3. Land under development (i.e. a building site) transitional between habitat types, was mapped as BL3D.
4. Due to the difficulty of describing habitats in gardens three additional habitat types were identified in semi-urban areas to describe the characteristic biodiversity associated with houses and gardens. Gardens were observed from outside except where permission was obtained to enter them. These habitat types were developed from experience of fieldwork in Dublin where the recommended habitat type BC4 (Flower beds and borders) did not usefully describe habitat diversity. These new habitats were subsets of the habitat category BL3 (Buildings and built surfaces) and were BL3 1; BL3 2 and BL3 3. The three types are distinguished by size of garden; areas mapped as BL3 1 have houses and gardens occupying an area > 500 m². BL3 2 have gardens between 250 and 500 m² usually associated with semi-detached houses. The third category BL3 3 describes areas dominated by small gardens < 250 m². Experience elsewhere suggests that the largest gardens support a diversity of habitats often featuring mature trees. Medium size gardens usually have areas with ornamental non native shrubbery and smaller gardens have a smaller number of habitats dominated by amenity grassland (GA2).

2.5 Hedgerow survey

A hedgerow survey methodology was devised for this project which enabled a ranking of hedgerows tailored to the rural/peri-urban focus of this study. The methodology is based on hedgerow assessments by Lyons & Tubridy (2006), Murray & Foulkes (2005) and Clements and Tofts (1992).

Hedgerows were inspected along their entire length where possible. Data was collected on their average height and width, gappiness, biodiversity value (number of native tree and shrub species), number of layers (herb, shrub, trees), structural features (bank, ditch, water), connections to other hedgerows, age) whether the hedgerow existed in the 1840s and whether it was a townland boundary), management and other features of biodiversity interest (rare plants, badger sett etc).

The data was used to score the surveyed hedgerows so that the most important ones could be identified. Details of the scoring system for each characteristic are

shown on the Hedgerow Record Card (Appendix 2). Scores under each characteristic were added to give an overall score for each hedgerow.

Under this system, the minimum possible score for any one hedgerow is 5; the maximum is 30. Following careful examination of the results from several settlements, each hedgerow was then allocated to one of the categories shown on Table 1.

Table 1. Hedgerow rating system

Score	Rating	Description
5-10	1 *	Low value – least important
11-19	2 **	Moderate value - of moderate importance
20-30	3 ***	High value – most important

2.6 Map digitisation and database compilation

Clean hard copy maps were marked up clearly with habitat polygons and line features and handed over to the GIS specialist for digitisation. Each feature was marked as being surveyed (S) where it was directly inspected in the field; validated (V) where it was checked from a distance if access was not possible, or assigned a habitat code based on the desk study (D), where no visual confirmation was possible. This information is contained in the GIS database.

Information relating to each habitat area and hedgerow is stored in a separate Microsoft Access Database, allowing this information to be linked to Kilkenny County Council's GIS system. This allows the maps to be queried for information.

A standard hatching and map layout was agreed for final presentation. A hardcopy habitat map and ecological features map accompany this report. Ecological networks described in the report are given a unique identifier number on the map so that readers can easily find the feature in question.

2.7 Reporting and data presentation

This written report, a set of photographs, along with the maps and GIS database, gather together the information collected during the survey, desk study and consultations. The main body of this report contains descriptive accounts of habitats and ecological networks. This is based on species lists compiled for

principal habitats within these networks (Appendix 3 , Target Notes). The assessment of the habitat networks is based on that developed by the NRA.

2.8 Study constraints

The timeframe for carrying out the assessment required that fieldwork takes place over a short time outside the optimum period for fieldwork which is late spring/summer. Accordingly, the list of plant species recorded from the habitats is incomplete. Seasonality did not affect the principal objectives of the study: to map, assess the significance of the habitats present, identify ecological networks and comment on their significance as Green Infrastructure. The principle objective was met despite the seasonal constraints, by using previous reports particularly CAAS (2003), studies located for this project, targeted consultations, field survey and professional judgement.

3 Results

3.1 Geodiversity

In common with the lowlands of Kilkenny and the Golden Vale, the Mooncoin study area is underlain by limestone rock. It comprises mainly Waulsortian limestone with rocks of the Ballysteen Formation found in the south and east of the village. Waulsortian limestone is a pale grey fine-grained clean unbedded fossiliferous limestone which is widely dolomitised, particularly at the top and along faults. In the north west at Galmoy the dolomitisation is associated with lead and zinc ore deposition. In the Mooncoin study area there are two north-south faults running through these two rock types. The bedrock is at the surface in the south west of the village, near the site of an old quarry which is shown in the centre-south of the village on 1st edition maps.

Within the Waulsortian limestone is found a regionally important karstified aquifer. The aquifer associated with the Ballysteen Formation is locally important as it is only moderately productive in local zones. Generally these aquifers are moderately vulnerable, except in the south west where outcrop bedrock is found. Here the aquifer is vulnerable.

Ice movement during the last glaciation, has resulted in a blanket of till of Devonian Sandstone origin covering most of the study area. Alluvium is found along New Road on the northern study area boundary in an area which is regularly flooded. The OPW flood hazard maps (www.floodmaps.ie) indicate that a number of areas around Mooncoin are prone to flooding.

Soil types derived from Devonian till are mainly acid brown earths/grey brown podzolics with fair amount of acidic gleys in areas subject to waterlogging. Rendzinas are found on outcrops and alluvium is still accumulating in the flooded hollow.

3.2 Ecological networks

MN1 Grasslands and hedgerows north of Mooncoin

The principal and most important ecological network in Mooncoin is associated with an area of alluvial soil north of the village centre between the main street and New Road. This area is of high local importance. The extent of the area of

ecological interest is outlined on Map 2 and habitats within it are shown on the Habitat Map. Wet grassland (GS4) prone to intermittent flooding is the core habitat within this network. It links Mooncoin with the River Suir which is a designated site of international biodiversity importance (cSAC no. 2137) and Coolfin marshes (pNHA, no. 399) a site of national importance, approximately 2km to the south, via the large drains on New Road. While no river is present within the study area there are deep extensive drains in this area which are constantly wet. They are significant wetland habitats and are linked to the River Suir.

Habitats within the ecological network in the study area (shown on the Habitat Map), include the wet grassland (GS4), a pond (FL8), hedgerows (WL1), dry meadows and grassy verges (GS2), and drainage ditches (FW4). A small field with improved grassland (GA1) is also a constituent of this network as it lies within the flood-prone area.

Some of the habitats within this network were described by CAAS (2003), and confirmed by fieldwork in 2010.

Survey work by CAAS (2003) provided an account of wet grassland habitat north of this area, outside the study area boundary.



Fig. 1 Pond between Main Street and New Road

The core of this area centres on the wetter habitats – wet grassland, pond (Fig. 1) and drains. At the time of surveying, much of the wet grassland was flooded. It also appeared not to have been grazed or cut for at least one year. The main grasses found were creeping bent, Yorkshire fog and perennial rye-grass. Herbaceous species indicative of damp conditions were found, including meadowsweet, soft rush, jointed rush, and lady's smock. Creeping buttercup was abundant. This wet grassland grades into a drier type which has been classified here as dry meadows and grassy verges (GS2) as it had not been grazed or cut in

the preceding year and had some of the species typical of this habitat, including cock's-foot grass and common hogweed. Other species found here included ribwort plantain, red clover and meadow buttercup. These two grassland types can be considered as semi-improved, having been in agricultural production until relatively recently, but now supporting a moderate range of species typical of more natural grassland.

The fields are divided by a network of hedgerows, most of which have drains on one side. These all flow to the main drain on New Road. Some of them may hold water all year, though it was not possible to tell due to flooded conditions at the time of surveying. The large roadside drains flow on a very shallow gradient towards the Filbuckstown junction, where the water is piped under the road and south towards Doornane. According to local landowners, this resurfaces as a drain further south along the Doornane road. It subsequently flows into the Suir.

As well as the drains, there is a small pond in the north-west corner of this area. It could not be accessed during this study and was viewed from the boundary wall of the adjacent graveyard using binoculars. Its context was reviewed on aerial photography back to 1995 and local soil classification. It may be either a small example of a Mesotrophic Lake (FL4) a semi-natural feature, or a man made lake (habitat FL8, Other Artificial Lakes and Ponds) associated with a former quarry. While currently considered FL8 and thus given a low rating this particular area wetland merits further study if development is being considered in this area.

The other main feature of MN1 is the network of mature hedgerows, all of which scored "high value" in the hedgerow evaluation and an area of planted woodland at the end of a private garden (WD1). Within hedgerow H16 and WD1 mature trees include beech, alder and oak. The main trees in the private garden were highlighted by CAAS (2003) as they had a small rookery (20 nests) and the ground vegetation contained shade loving species such as celandine *Ranunculus ficaria* and ivy *Hedera helix*. Hedgerows in this network are described in more detail in the hedgerow section of this report.



Fig. 2 Hedgerow 16 and wet ditch in MN1 core area

Green infrastructure assessment – MN1

The habitat complex of wet grassland (GS4), hedgerows with drainage ditches (WL1, FW4), and pond (FL8) is of local importance (higher value) because it is linked by drainage, over a relatively short distance, to the Lower River Suir cSAC. As the drain linking this area to the Suir is culverted along part of its length the drainage ditch /link is of lesser value as its habitat value has been reduced. However this does not affect the overall value of the network and its wetland habitats.

The remaining hedgerows (WL1), small patch of planted woodland (WD1) and dry grassland (GS2) are also of local importance (higher value) because they are important habitats for native (non wetland species). They also provide corridors for biodiversity into the village centre, and provide a buffer between the wet habitats and the built-up part of the village.

The ecological network provides several services to society. It is an important reservoir of biodiversity, linked to an internationally important cSAC; the Lower River Suir. The wet grassland and drains perform a regulatory function as they absorb floodwaters and may have the potential to remove pollutants. They act as a natural attenuation area reducing the risk of flooding elsewhere in the village.

Any proposals for development which could impact on EU listed habitats or species found in the River Suir cSAC downstream will require to at least be screened for Appropriate Assessment. This particularly includes any impacts on water quality, habitats within the river or wetland habitats along the river margin.

Future development should as a priority seek to retain or increase the flood attenuation capacity of this area by at least retaining the wetland habitats. The

highest value hedgerows here, particularly those linking through to the village centre, should also be retained as far as possible.

Hedgerows

Hedgerows form a particular type of ecological network important for trees, plants associated with woodlands, songbirds, small mammals and invertebrates including bees and butterflies.

Forty-one hedgerows were surveyed and evaluated within or on the study area boundary.

The extent of hedgerows reflects field patterns and history of land management. Much of the historical hedgerow network shown on the 1st edition Ordnance Survey maps has gradually been removed due to the expansion of Mooncoin. The most extensive intact network is hedgerows H06 to H18 found around MN1 (described above).

Hedgerow numbers are shown on the habitat map and results of the evaluation of individual hedgerows are in Appendix 4. Table 2 below summarises the results of the hedgerow evaluation for Mooncoin.

Table 2. Hedgerow Evaluation

Hedgerow Numbers	Rating	Description
40, 41	1 *	Low value – least important
H01, H02, H03, H04 , H05, H21, H22, H24, H25, H28, H29, H30, H31, H32, H33, H34, H35, H36, H37, H38, H39	2 **	Moderate value - of moderate importance
H06, H07, H08, H09, H10, H11, H12, H13, H14, H15, H16, H17, H18, H19, H20, H23, H26, H27	3 ***	High value – most important

All but two of the hedgerows surveyed in Mooncoin were found to be of either of moderate or high biodiversity value.

The majority of hedgerows are of cultural value as they are shown on the 1st edition OS map (1837-1842). Seven of these, H02, H06, H19, H20, H23, H26, and H30, lie along townland boundaries, suggesting greater antiquity.

Almost all are associated with significant banks, raised linear mounds of earth on which plants were originally established. The earthen banks and their associated drains are exceptionally large around New Road due to their important function in land drainage.

Two-thirds of the hedgerows have trees. Ash is the main native species of tree, with grey willow found in wetter areas. Yew was found in one, H09. Non-native sycamore is found in many of the hedgerows, as well as some beech and English elm.

Ten different shrubs were recorded from the surveyed hedgerows. Hawthorn occurred in all of them. Elder and blackthorn were found in the majority of hedgerows. Other native shrubs included hazel, holly, dog rose, honeysuckle and bramble. Privet and snowberry were also found. Snowberry is listed as an invasive species (Amber List) by the National Biodiversity Data Centre.

The highest ranking hedgerow is H06 and it scored 28. It is found north of the main street and is part of the ecological network associated with the alluvial soils. It scored highly on structural and connectivity characteristics as well as being a townland boundary. High scoring hedgerows (>20) were more likely to contain banks or ditches, have a better structure (with tree, shrub and herb layers) and fewer gaps.



Fig. 3 Hedgerow 14 and Hedgerow 06, associated with MN1 core area

Moderately ranked hedgerows were generally younger, had poor structural diversity (some had just a shrub layer) and more gaps as they were more likely to be fragmented as a result of recent building development.

With few exceptions management of hedgerows as stock-proof barriers and for biodiversity is poor. This is typical of the situation throughout the country. Few hedgerows showed signs of appropriate management within the last five years.

Green infrastructure – hedgerows

Hedgerows in the study area primarily function as ecological corridors. They comprise semi-natural habitats and are important for nesting birds (protected under the Wildlife Acts).

The hedgerows are ranked in Table 2 above according to their value relative to each other, based on the hedgerow survey methodology. Their value as part of local green infrastructure (Table 3) is evaluated based on the ecological evaluation criteria (Appendix 6), which finds that some the hedgerows in Mooncoin are of local importance (higher value) due their importance in maintaining links and ecological corridors. This type of green infrastructure has the following values:

It supports habitats of high local value.

Certain hedgerows are important constituents of other ecological networks (i.e.) providing corridors or additional habitat.

They have potential for development as landscaped amenity areas and more effective stockproof barriers.

They are important features of the cultural landscape.

They provide habitat for pollinating insects and predators of crop pests for commercial crops.

Ditches beside hedgerows particularly near the New Road function as important flood attenuation areas.

Priorities for development should be the promotion of higher standards of management by owners and greater consideration of hedgerow values by planners if development is proposed adjacent to them. Guidelines are provided to inform planning around hedgerows.

MN2 Recolonising bare ground (ED3) south of Mooncoin

Natural bedrock (Ballysteen Limestone) which was unmapped as its extent is too small can be seen in a large field located in the south-west of the village. Aerial photography confirms continuous intensive management of the field for tillage or grass. As the south west corner of this field has recently been disturbed (area MN2 on Map 2), its biodiversity value has increased. It now comprises the habitats recolonising bare ground (ED3) and scrub (WS1) on shallow soil and bedrock (unmapped). Species such as common cat's-ear, ragwort, common centaury and willowherbs are colonising the ground. The presence of foxglove indicates the slightly more acidic nature of the soil. Willow and gorse scrub is

spreading into the area. This type of habitat is important as its vegetation is now dominated by a diverse range of native species which are important for insects and birds. If left undisturbed the area is likely to maintain its high habitat quality native plant species flourish in shallow soils and bedrock.

Green infrastructure assessment – MN2

This small area is included as a green infrastructure feature of local importance (lower value) because it contains a habitat that is relatively uncommon in the local area (exposed bedrock) and the recolonising scrub and plant species provide habitat for invertebrates and birds.

This exposed bedrock is the centre of the vulnerable part of the aquifer underlying the village.

The priority of any development in this area should be to protect the underlying groundwater source, which is vulnerable to pollution due to the shallow soils.

The corner of this field would be very suitable for enhancement as a wildlife area, either by allowing it to continue to naturally recolonise, or by planting in some small-growing native trees such as hazel and mountain ash.

Other features of biodiversity interest

Other features of biodiversity interest include the habitats dry stone walls, stone buildings and stone features which are mapped on the habitat map as either BL1A and BL1B. The habitat category Stone Wall (BL1A) comprise a mixture of dry stone walls, dry stone walls with earthen banks and mortared stone walls. Survey work showed that they provide a habitat for native plants and feeding area for birds. While no bat surveys were carried out, the ecology of bats suggests that they have potential value as roosting sites particularly if they are linked by hedgerows, lines of trees or blocks of semi-natural vegetation to wetlands.

Mature trees (WL2) are valuable as potential roosting sites for bats, habitat for insects and food and nesting sites for birds. Mature trees are associated with the habitat Treeline (WL2) near the church and convent, hedgerows H12 and H15 and private garden (WD1). The trees near the church include horse chestnut, beech and sycamore planted near the church and convent and the Lawson's cypress that run from here behind the adjacent school. CAAS (2003) highlighted the importance of groups of mature trees as a habitat for birds particularly rooks, mistle thrush, great tit, jackdaw, chiffchaff - species that do not take to hedges.

All mature trees with rough bark are of potential importance to bats as they provide suitable cavities for roosting. CAAS (2003) drew attention to old laneways leading from the village into the countryside. These are a distinctive feature of the landscape. They act as corridors for wildlife and have potential as no- motorized transport routes of particular amenity value

Scrub (WS1) also provides habitat for birds. Mature gardens which are associated with older residences provide nesting, roosting and feeding areas for birds.

Intensively managed grassland (GA1) comprises most of the agricultural land around Mooncoin. Of limited biodiversity value for flora and fauna, it provides feeding for common birds.



Fig. 4 Scrub beside the church on the Ballytarsney road ; and stone wall along the main N24.

Green infrastructure value of other features (listed above)

These habitats are of lower local ecological value. Mature trees should be considered as being of potentially high local value as they may contain roosting sites for rare species such as bats. This would need to be confirmed by specialised bat survey work.

The ecological network /green infrastructure associated with these features has the following values:

They provide habitats principally of low local value of importance to common bird species and invertebrates within the built-up urban area.

They have potential as roosting sites for rare species.

Mature trees and publicly accessible green spaces improve the appearance of the streetscape and provide a passive amenity for the community.

Farmland has an important provisioning function in terms of food supply.

3.3 Summary of biodiversity assessment/evaluation

Supported by criteria contained in guidelines produced by the NRA (www.nra.ie, Appendix 6) the relative significance of the principal habitats and ecological networks within the study area was assessed. These results are summarised in Table 3, which should be used in conjunction with Maps 1 and 2.

Table 3. Summary of biodiversity assessment/evaluation in Mooncoin

Ecological network/Habitats	Ecological network element	Ecological evaluation
MN1: GS4, GS2, WL1, H06-H18, WD1,FW4	Core area	Local importance (higher value)
MN1: FL8,GA1	Core	Local importance (lower value)
MN2: ED3, WS1	Small core area	Local importance (lower value)
H06, H07, H08, H09, H10, H11, H12, H13, H14, H15, H16, H17, H18, H19, H20, H23, H26, H27	Corridors	Local importance (higher value)
H01, H02, H03, H04, H05,H29,H30, H21, H22, H24, H25,H31, H32, H33, H34, H35, H36,H37,H38,H39, H40, H41,	Corridors in need of rehabilitation	Local importance (lower value)
Dry stone walls (BL1A), stone buildings (BL1B), mature trees (WL2 where mapped), H05, H36, H40, H41, H21, H22, H24, H25, H28, H29, H36, H37, H38	Small corridor features	Local importance (lower value)

4. Guidelines for Sustainable Development of Hedgerows and Drainage Ditches

The Green City Guidelines (Brennan and O'Connor 2008) contain many other suggestions for integrating biodiversity and development.

Hedgerows

Spatial planning should protect best quality hedgerows (those which score between 20 and 30). If a dense network of such hedgerows is present within fields proposed for development, those with highest values and which function as connecting features/wildlife corridors should be retained. The objective should be to retain a connected network, which links to other types of semi-natural areas, provides a wildlife or green corridor, particularly from countryside into the town centre and has a sustainable use within the new development.

No development should be allowed within 5m of retained hedgerows.

Developers and local groups should be reminded of their obligations under the Wildlife Act i.e. not to remove or interfere with hedgerows between March 1st and 31st August.

Boundary hedgerows should be retained unless there is an imperative reason of public safety. Prospective developers should be reminded that hedgerows require little management, look more appropriate in rural locations than garden hedges and are a ready made green feature of particular value to birds.

If a new boundary has to be established encouragement should be given to replace the original semi-natural feature (hedgerow, dry stone wall) with another type of semi-natural boundary. It is preferable to use native species, particularly the locally occurring ones mentioned in the hedgerow section of this report. This will provide alternative habitat for displaced species, be more compatible with local landscape values and maintain connectivity for species which relied on such features for commuting or feeding.

Spatial planning for large scale developments should integrate retained hedgerows into the design of roads, pedestrian/cycleways routes or open spaces. A grass margin should be retained around all retained hedgerows. By cutting grass regularly within this margin the hedgerow will appear to be managed.

Landscaping plans should retain hedgerows by incorporating them within new shrubberies or woodlands. Hedgerows (or individual mature trees contained within them) could become a nucleus for a new woodland developed by planting native trees/shrubs. Instead of retaining a straight line, gaps (for roads,

paths, views) could be created and resulting smaller lengths could become the focii of woodlands/shrubberies of more varied shapes. Depending on the potential risks of anti-social activity or requirements for a more garden look the margins of these new hedgerows/cum woodlands/shrubberies could be planted with spiny shrubs or species of horticultural value.

Drainage Ditches

Drainage ditches provide a habitat for aquatic species, allow for connectivity and provide for flood attenuation. Drainage ditches which form part of the catchment of salmonid rivers and are adjacent to hedgerows are most valuable.

Drainage ditches should be retained, unless there is an imperative reason of public safety, by ensuring that their hydrology is protected, culverting does not occur and new development does not drastically alter the physical environment within 5m.

Spatial planning should attempt to integrate drainage ditches into new designs.

Drainage ditches could become amenity type wetland features through reprofiling and landscaping. Landscaping should involve native species, particularly those occurring locally to maximise biodiversity and amenity values.

In large scale developments drainage ditches could be enlarged to become the nuclei of Sustainable Urban Drainage Systems. If used as receiving waters for surface water drainage, or SUDS, monitoring should occur to ensure no deterioration occurs.

If a barrier is required around a drainage ditch, spiny shrubs (hawthorn, blackthorn) rather than a fence, should be planted. If a fence is erected a type should be chosen which would allow for the movement of small mammals.

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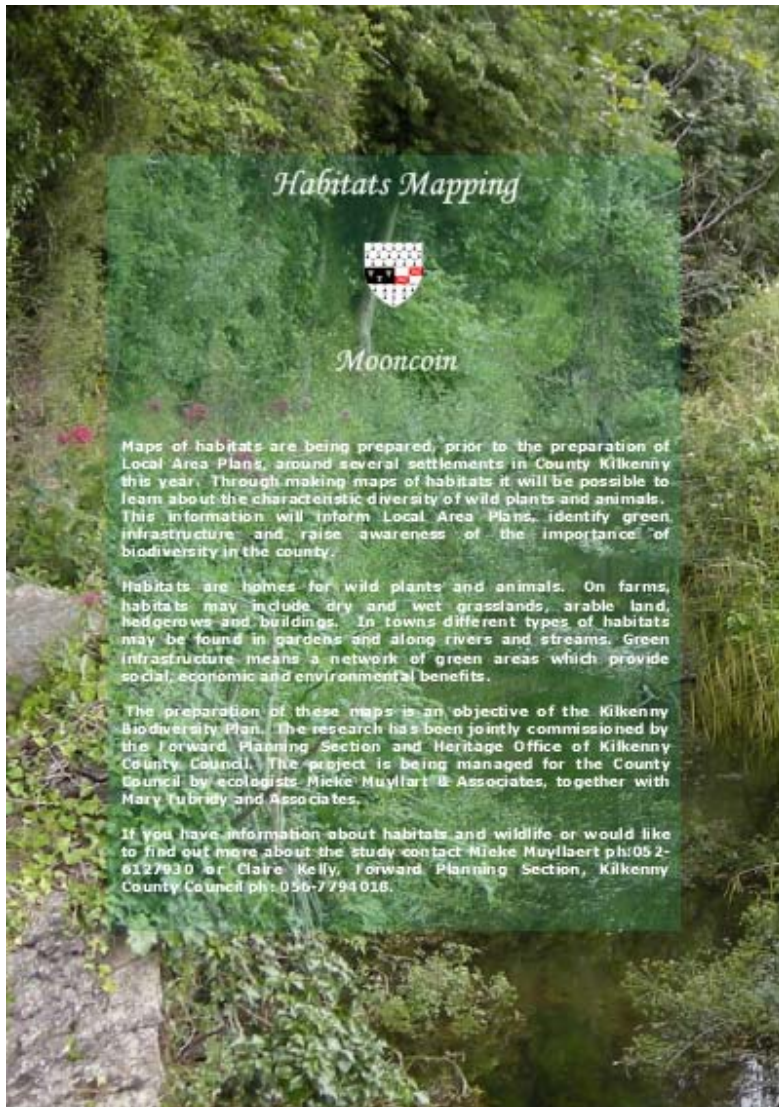
Websites

Environmental Protection Agency www.epa.ie

Geological Survey of Ireland www.gsi.ie

National Parks & Wildlife Service www.npws.ie

Appendix 1 Information Leaflet



Appendix 2 Record sheets used in habitat mapping and hedgerow evaluation

Kilkenny LAP habitat survey 2010

Target areas

Settlement: _____ Recorder: _____ Date: _____

Target note **List species, describe features, management, invasives**
ID no.

Settlement:	Surveyor:
--------------------	------------------

No.	Height	Width	Gaps	Biodiversity value	Structure	Structural diversity	Management	Notes
1	<1.5m	1 <1m	0 50%+	List tree and shrub species	1 Shrub layer only	0 No bank/ditch	1 Short-term unmgd (5 yrs)	Include notable spp., signs of fauna
2	1.5-2.5m	2 1.2m	1 25-50%		2 Shrub + herbs	1 Bank only	2 Long-term unmgd	
3	2.5-4m	3 2-3m	2 10-25%		3 Tree, shrub + herbs, open base	2 Bank + ditch	3 Box profile	
4	>4m	4 3m+	3 5-10%		4 Tree, shrub + herbs, dense base	3 Bank, ditch, stagnant water	4 Cut one side	
			4 <5%				5 Cut both sides	
			5 no gaps				6 A-shape	

NB Connectivity and Cultural value are entered directly to spreadsheet afterwards using field map and 1st ed. map.

Appendix 3 Target notes

Ecological network feature: MN1

Habitat codes

GS2, GS4

Scientific name	Common name
-----------------	-------------

<i>Ranunculus acris</i>	Meadow buttercup
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<i>Rumex acetosa</i>	Sorrel
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<i>Juncus articulatus</i>	Jointed rush
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<i>Juncus inflexus</i>	Hard rush
------------------------	-----------

<i>Juncus effusus</i>	Soft rush
-----------------------	-----------

<i>Cardamine pratensis</i>	Ladies' smock
----------------------------	---------------

<i>Agrostis stolonifera</i>	Creeping bent-grass
-----------------------------	---------------------

<i>Lolium perenne</i>	Perennial rye-grass
-----------------------	---------------------

<i>Holcus lanatus</i>	Yorkshire fog
-----------------------	---------------

<i>Filipendula ulmaria</i>	Meadowsweet
----------------------------	-------------

<i>Lemna trisulca</i>	Ivy-leaved duckweed
-----------------------	---------------------

<i>Ranunculus repens</i>	Creeping buttercup
--------------------------	--------------------

<i>Scrophularia sp.</i>	Figwort sp.
-------------------------	-------------

<i>Dactylis glomerata</i>	Cock's-foot
---------------------------	-------------

<i>Plantago lanceolata</i>	Narrow-leaved plantain
----------------------------	------------------------

<i>Trifolium pratense</i>	Red clover
---------------------------	------------

Ecological network feature: MN2

Habitat codes

ED3

Scientific name	Common name
-----------------	-------------

<i>Ulex europaeus</i>	Gorse
-----------------------	-------

<i>Salix sp.</i>	Willow
------------------	--------

<i>Digitalis purpurea</i>	Foxglove
---------------------------	----------

<i>Hypochaeris radicata</i>	Common cat's-ear
-----------------------------	------------------

<i>Senecio jacobaea</i>	Ragwort
-------------------------	---------

<i>Epilobium sp.</i>	Willowherb
----------------------	------------

<i>Centaureum sp.</i>	Centauray sp.
-----------------------	---------------

Appendix 4 Results of hedgerow evaluation

No.	Height	Width	Gaps	Biodiversity value	Structure	Structural diversity	Connectivity	Cultural value	Score	Management
	1 <1.5m	1 <1m	0 50%+	No. of native tree & shrub species 1 One-two 2 Three 4 Four+	1 Shrub layer only	0 No bank/ditch	0 No direct connections	1 Not on 1 st ed map		1 Short-term unmgd (5 yrs)
	2 1.5-2.5m	2 1.2m	1 25-50%		2 Shrub + herbs	1 Bank only	1 Connection by water (ditch only)	2 On 1 st ed map (but not tld bdry)		2 Long-term unmgd
	3 2.5-4m	3 2-3m	2 10-25%		3 Tree, shrub + herbs, open base	2 Bank + ditch	2 1 connection	4 Townland boundary		3 Box profile
	4 >4m	4 3m+	3 5-10%		4 Tree, shrub + herbs, dense base	3 Bank, ditch, stagnant water	3 2 connections			4 Cut one side
			4 <5%			4 Bank, ditch, flowing water	4 3 connections			5 Cut both sides
			5 no gaps			5 4 or more connections			6 A-shape	
1	2	2	1	4	4	2	2	2	19	2
2	2	1	0	4	2	1	3	4	17	1
3	3	1	0	2	3	1	1	2	13	2
4	3	1	0	2	3	1	2	2	14	2
5	4	2	4	1	3	1	0	2	17	2
6	3	2	3	4	3	4	5	4	28	1
7	2	3	4	4	4	2	3	2	24	1,3

Kilkenny LAP Habitat Assessment MOONCOIN

No.	Height	Width	Gaps	Biodiversity value	Structure	Structural diversity	Connectivity	Cultural value	Score	Management
1	<1.5m	<1m	0 50%+	No. of native tree & shrub species 1 One-two 2 Three 4 Four+	1 Shrub layer only	0 No bank/ditch	0 No direct connections	1 Not on 1 st ed map	24	1 Short-term unmgd (5 yrs)
2	1.5-2.5m	1.2m	1 25-50%		2 Shrub + herbs	1 Bank only	1 Connection by water (ditch only)	2 On 1 st ed map (but not tld bdry)		2 Long-term unmgd
3	2.5-4m	2-3m	2 10-25%		3 Tree, shrub + herbs, open base	2 Bank + ditch	2 1 connection	4 Townland boundary		3 Box profile
4	>4m	3m+	3 5-10%		4 Tree, shrub + herbs, dense base	3 Bank, ditch, stagnant water	3 2 connections			4 Cut one side
			4 <5%			4 Bank, ditch, flowing water	4 3 connections			5 Cut both sides
			5 no gaps			5 4 or more connections		6 A-shape		
8	2	3	4	3	4	2	4	2	24	1,3
9	3	3	5	4	4	3	3	2	27	1,5
10	3	3	4	4	4	3	2	2	25	1
11	3	3	3	4	3	3	4	2	25	1
12	4	2	5	4	3	3	3	2	26	2
13	3	3	5	4	3	3	3	2	26	1,3
14	4	2	5	4	3	3	4	2	27	2
15	4	2	5	1	3	3	3	2	23	2

Kilkenny LAP Habitat Assessment MOONCOIN

No.	Height	Width	Gaps	Biodiversity value	Structure	Structural diversity	Connectivity	Cultural value	Score	Management
1	<1.5m	<1m	0 50%+	No. of native tree & shrub species 1 One-two 2 Three 4 Four+	1 Shrub layer only	0 No bank/ditch	0 No direct connections	1 Not on 1 st ed map	25	1 Short-term unmgd (5 yrs)
2	1.5-2.5m	1.2m	1 25-50%		2 Shrub + herbs	1 Bank only	1 Connection by water (ditch only)	2 On 1 st ed map (but not tld bdry)		2 Long-term unmgd
3	2.5-4m	2-3m	2 10-25%		3 Tree, shrub + herbs, open base	2 Bank + ditch	2 1 connection	4 Townland boundary		3 Box profile
4	>4m	3m+	3 5-10%		4 Tree, shrub + herbs, dense base	3 Bank, ditch, stagnant water	3 2 connections			4 Cut one side
			4 <5%			4 Bank, ditch, flowing water	4 3 connections			5 Cut both sides
			5 no gaps			5 4 or more connections		6 A-shape		
16	4	2	4	4	3	3	3	2	25	2
17	4	4	1	4	3	3	2	2	23	2
18	2	4	5	1	2	2	3	2	21	2
19	2	2	3	2	3	1	4	4	21	4
20	2	2	3	4	2	1	3	4	21	2
21	4	3	3	2	4	1	0	2	19	1,4
22	1	2	1	2	3	1	3	2	15	1,3
23	2	3	2	4	4	1	4	4	24	1,3

Kilkenny LAP Habitat Assessment MOONCOIN

No.	Height	Width	Gaps	Biodiversity value	Structure	Structural diversity	Connectivity	Cultural value	Score	Management
1	<1.5m	<1m	0 50%+	No. of native tree & shrub species 1 One-two 2 Three 4 Four+	1 Shrub layer only	0 No bank/ditch	0 No direct connections	1 Not on 1 st ed map	15	1 Short-term unmgd (5 yrs)
2	1.5-2.5m	1.2m	1 25-50%		2 Shrub + herbs	1 Bank only	1 Connection by water (ditch only)	2 On 1 st ed map (but not tld bdry)		2 Long-term unmgd
3	2.5-4m	2-3m	2 10-25%		3 Tree, shrub + herbs, open base	2 Bank + ditch	2 1 connection	4 Townland boundary		3 Box profile
4	>4m	3m+	3 5-10%		4 Tree, shrub + herbs, dense base	3 Bank, ditch, stagnant water	3 2 connections			4 Cut one side
			4 <5%			4 Bank, ditch, flowing water	4 3 connections			5 Cut both sides
			5 no gaps				5 4 or more connections			6 A-shape
24	1	2	1	4	2	1	2	2	19	1,3
25	2	3	1	4	4	1	2	2	23	1,3
26	3	3	2	3	4	1	3	4	20	1
27	4	3	1	1	4	1	4	2	14	1,5
28	2	2	1	4	2	1	0	2	13	1,3
29	1	2	1	2	4	1	0	2	17	1,3
30	2	2	2	1	2	1	3	4	15	1,3
31	2	2	1	2	2	1	3	2		

Kilkenny LAP Habitat Assessment MOONCOIN

No.	Height	Width	Gaps	Biodiversity value	Structure	Structural diversity	Connectivity	Cultural value	Score	Management
1	<1.5m	<1m	0 50%+	No. of native tree & shrub species 1 One-two 2 Three 4 Four+	1 Shrub layer only	0 No bank/ditch	0 No direct connections	1 Not on 1 st ed map	15 18 15 19 16 16 14 11	1 Short-term unmgd (5 yrs)
2	1.5-2.5m	1.2m	1 25-50%		2 Shrub + herbs	1 Bank only	1 Connection by water (ditch only)	2 On 1 st ed map (but not tld bdry)		2 Long-term unmgd
3	2.5-4m	2-3m	2 10-25%		3 Tree, shrub + herbs, open base	2 Bank + ditch	2 1 connection	4 Townland boundary		3 Box profile
4	>4m	3m+	3 5-10%		4 Tree, shrub + herbs, dense base	3 Bank, ditch, stagnant water	3 2 connections			4 Cut one side
			4 <5%			4 Bank, ditch, flowing water	4 3 connections			5 Cut both sides
			5 no gaps			5 4 or more connections		6 A-shape		
32	2	2	1	1	4	1	3	1	15	1,3
33	2	2	0	4	4	1	3	2	18	1,3
34	2	2	1	2	2	1	3	2	15	1,3
35	2	2	1	4	4	1	3	2	19	1,3
36	3	3	3	1	4	1	0	1	16	1
37	1	2	3	1	4	1	2	2	16	1
38	1	2	2	1	4	0	2	2	14	2
39	1	1	0	2	2	1	2	2	11	1

Kilkenny LAP Habitat Assessment MOONCOIN

No.	Height	Width	Gaps	Biodiversity value	Structure	Structural diversity	Connectivity	Cultural value	Score	Management
	1 <1.5m	1 <1m	0 50%+	No. of native tree & shrub species 1 One-two 2 Three 4 Four+	1 Shrub layer only	0 No bank/ditch	0 No direct connections	1 Not on 1 st ed map	9	1 Short-term unmgd (5 yrs)
	2 1.5-2.5m	2 1.2m	1 25-50%		2 Shrub + herbs	1 Bank only	1 Connection by water (ditch only)	2 On 1 st ed map (but not tld bdry)		2 Long-term unmgd
	3 2.5-4m	3 2-3m	2 10-25%		3 Tree, shrub + herbs, open base	2 Bank + ditch	2 1 connection	4 Townland boundary		3 Box profile
	4 >4m	4 3m+	3 5-10%		4 Tree, shrub + herbs, dense base	3 Bank, ditch, stagnant water	3 2 connections			4 Cut one side
			4 <5%			4 Bank, ditch, flowing water	4 3 connections			5 Cut both sides
			5 no gaps			5 4 or more connections		6 A-shape		
40	1	1	2	1	2	0	0	2	9	1,3
41	1	1	0	1	2	0	2	2	9	1

Appendix 5 Summary of Fossitt habitat classification

Summary of the habitat classification scheme in *A Guide to Habitats in Ireland* (Fossitt, 2000) with standard alphanumeric habitat codes.

NON-MARINE		NON-MARINE	
F	FRESHWATER		Peatlands contd.
FL	Lakes and ponds	PB4	Cutover bog
FL1	Dystrophic lakes	PB5	Eroding blanket bog
FL2	Acid oligotrophic lakes	PF	Fens and flushes
FL3	Limestone/marl lakes	PF1	Rich fen and flush
FL4	Mesotrophic lakes	PF2	Poor fen and flush
FL5	Eutrophic lakes	PF3	Transition mire and quaking bog
FL6	Turloughs		
FL7	Reservoirs	W	WOODLAND AND SCRUB
FL8	Other artificial lakes and ponds	WN	Semi-natural woodland
FW	Watercourses	WN1	Oak-birch-holly woodland
FW1	Eroding/upland rivers	WN2	Oak-ash-hazel woodland
FW2	Depositing/lowland rivers	WN3	Yew woodland
FW3	Canals	WN4	Wet pedunculate oak-ash woodland
FW4	Drainage ditches	WN5	Riparian woodland
FP	Springs	WN6	Wet willow-alder-ash woodland
FP1	Calcareous springs	WN7	Bog woodland
FP2	Non-calcareous springs	WD	Highly modified/non-native woodland
FS	Swamps	WD1	(Mixed) broadleaved woodland
FS1	Reed and large sedge swamps	WD2	Mixed broadleaved/conifer woodland
FS2	Tall-herb swamps	WD3	(Mixed) conifer woodland
		WD4	Conifer plantation
G	GRASSLAND AND MARSH	WD5	Scattered trees and parkland
GA	Improved grassland (highly modified)	WS	Scrub/transitional woodland
GA1	Improved agricultural grassland	WS1	Scrub
GA2	Amenity grassland (improved)	WS2	Immature woodland
GS	Semi-natural grassland	WS3	Ornamental/non-native shrub
GS1	Dry calcareous and neutral grassland	WS4	Short rotation coppice
GS2	Dry meadows and grassy verges	WS5	Recently-felled woodland
GS3	Dry-humid acid grassland	WL	Linear woodland and scrub
GS4	Wet grassland	WL1	Hedgerows
GM	Freshwater marsh	WL2	Treelines
GM1	Marsh		
H	HEATH AND DENSE BRACKEN	E	EXPOSED ROCK/DISTURBED GROUND
HH	Heath	ER	Exposed rock
HH1	Dry siliceous heath	ER1	Exposed siliceous rock
HH2	Dry calcareous heath	ER2	Exposed calcareous rock
HH3	Wet heath	ER3	Siliceous scree and loose rock
HH4	Montane heath	ER4	Calcareous scree and loose rock
HD	Dense bracken	EU	Underground rock and caves
HD1	Dense bracken	EU1	Non-marine caves
		EU2	Artificial underground habitats

P	PEATLANDS	ED	Disturbed ground
PB	Bogs	ED1	Exposed sand, gravel or till
PB1	Raised bog	ED2	Spoil and bare ground
PB2	Upland blanket bog	ED3	Recolonising bare ground
PB3	Lowland blanket bog	ED4	Active quarries and mines
		ED5	Refuse and other waste
NON-MARINE		MARINE	
B	CULTIVATED AND BUILT LAND	L	LITTORAL (INTERTIDAL)
BC	Cultivated land	LR	Littoral rock
BC1	Arable crops	LR1	Exposed rocky shores
BC2	Horticultural land	LR2	Moderately exposed rocky shores
BC3	Tilled land	LR3	Sheltered rocky shores
BC4	Flower beds and borders	LR4	Mixed substrata shores
BL	Built land	LR5	Sea caves
BL1	Stone walls and other stonework	LS	Littoral sediment
BL2	Earth banks	LS1	Shingle and gravel shores
BL3	Buildings and artificial surfaces	LS2	Sand shores
		LS3	Muddy sand shores
C	COASTLAND	LS4	Mud shores
CS	Sea cliffs and islets	LS5	Mixed sediment shores
CS1	Rocky sea cliffs	S	SUBLITTORAL (SUBTIDAL)
CS2	Sea stacks and islets	SR	Sublittoral rock
CS3	Sedimentary sea cliffs	SR1	Exposed infralittoral rock
CW	Brackish waters	SR2	Moderately exposed infralittoral rock
CW1	Lagoons and saline lakes	SR3	Sheltered infralittoral rock
CW2	Tidal rivers	SR4	Exposed circalittoral rock
CM	Salt marshes	SR5	Moderately exposed circalittoral rock
CM1	Lower salt marsh	SR6	Sheltered circalittoral rock
CM2	Upper salt marsh	SS	Sublittoral sediment
CB	Shingle and gravel banks	SS1	Infralittoral gravels and sands
CB1	Shingle and gravel banks	SS2	Infralittoral muddy sands
CD	Sand dune systems	SS3	Infralittoral muds
CD1	Embryonic dunes	SS4	Infralittoral mixed sediments
CD2	Marram dunes	SS5	Circalittoral gravels and sands
CD3	Fixed dunes	SS6	Circalittoral muddy sands
CD4	Dune scrub and woodland	SS7	Circalittoral muds
CD5	Dune slacks	SS8	Circalittoral mixed sediments
CD6	Machair	MW	MARINE WATER BODY
CC	Coastal constructions	MW1	Open marine water
CC1	Sea walls, piers and jetties	MW2	Sea inlets and bays
CC2	Fish cages and rafts	MW3	Straits and sounds
		MW4	Estuaries

Appendix 6 Ecological evaluation criteria

Taken from NRA (2009)

International Importance:

‘European Site’ including Special Area of Conservation (SAC), Site of Community Importance

(SCI), Special Protection Area (SPA) or proposed Special Area of Conservation.

Proposed Special Protection Area (pSPA).

Site that fulfills the criteria for designation as a ‘European Site’ (see Annex III of the Habitats Directive, as amended).

Features essential to maintaining the coherence of the Natura 2000 Network¹.

Site containing ‘best examples’ of the habitat types listed in Annex I of the Habitats Directive.

Resident or regularly occurring populations (assessed to be important at the national level)² of the following:

Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and/or

Species of animal and plants listed in Annex II and/or IV of the Habitats Directive.

Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971).

World Heritage Site (Convention for the Protection of World Cultural & Natural Heritage, 1972).

Biosphere Reserve (UNESCO Man & The Biosphere Programme).

Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979).

Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979).

Biogenetic Reserve under the Council of Europe.

European Diploma Site under the Council of Europe.

Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988)³.

National Importance:

Site designated or proposed as a Natural Heritage Area (NHA).

Statutory Nature Reserve.

Refuge for Fauna and Flora protected under the Wildlife Acts.

National Park.

Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA);

Statutory Nature Reserve; Refuge for Fauna and Flora protected under the Wildlife Act; and/or a National Park.

¹ See Articles 3 and 10 of the Habitats Directive.

² It is suggested that, in general, 1% of the national population of such species qualifies as an internationally important population. However, a smaller population may qualify as internationally important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

³ Note that such waters are designated based on these waters’ capabilities of supporting salmon (*Salmo salar*), trout (*Salmo trutta*), char (*Salvelinus*) and whitefish (*Coregonus*).

Resident or regularly occurring populations (assessed to be important at the national level)⁴ of the following:

Species protected under the Wildlife Acts; and/or

Species listed on the relevant Red Data list.

Site containing ‘viable areas’⁵ of the habitat types listed in Annex I of the Habitats Directive.

County Importance:

Area of Special Amenity.⁶

Area subject to a Tree Preservation Order.

Area of High Amenity, or equivalent, designated under the County Development Plan.

Resident or regularly occurring populations (assessed to be important at the County level)⁷ of the following:

Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;

Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;

Species protected under the Wildlife Acts; and/or

Species listed on the relevant Red Data list.

Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance.

County important populations of species, or viable areas of semi-natural habitats or natural heritage features identified in the National or Local BAP⁸, if this has been prepared.

Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county.

Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.

Local Importance (higher value):

Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared;

Resident or regularly occurring populations (assessed to be important at the Local level)⁹ of the following:

Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;

Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;

⁴ It is suggested that, in general, 1% of the national population of such species qualifies as a nationally important population. However, a smaller population may qualify as nationally important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

⁵ A ‘viable area’ is defined as an area of a habitat that, given the particular characteristics of that habitat, was of a sufficient size and shape, such that its integrity (in terms of species composition, and ecological processes and function) would be maintained in the face of stochastic change (for example, as a result of climatic variation).

⁶ It should be noted that whilst areas such as Areas of Special Amenity, areas subject to a Tree Preservation Order and Areas of High Amenity are often designated on the basis of their ecological value, they may also be designated for other reasons, such as their amenity or recreational value. Therefore, it should not be automatically assumed that such sites are of County importance from an ecological perspective.

⁷ It is suggested that, in general, 1% of the County population of such species qualifies as a County important population. However, a smaller population may qualify as County important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

⁸ BAP: Biodiversity Action Plan

⁹ It is suggested that, in general, 1% of the local population of such species qualifies as a locally important population. However, a smaller population may qualify as locally important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

Species protected under the Wildlife Acts; and/or

Species listed on the relevant Red Data list.

Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality;

Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.

Local Importance (lower value):

Sites containing small areas of semi-natural habitat that are of some local importance for wildlife;

Sites or features containing non-native species that are of some importance in maintaining habitat links.