

Kilkenny Local Area Plan Habitat Assessments 2010

BALLYHALE



Roman Catholic Church and bell tower, Ballyhale

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 Ballyhale to inform the Local Area Plan.

A Green Infrastructure approach was taken to describe 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 April 2010 to map habitats to Level 3, 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 allow 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.

An annotated aerial photo shows the location of ecological networks in the Ballyhale area (Map 2). The habitat map accompanying the report (Map 1) shows the habitats present within them. 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 the habitat 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 ecological network was identified in Ballyhale associated with the Ballyhale Stream which is a tributary of the Little Arrigle River. Part of this network at the northern end of the village is within the River Nore/River Barrow Special Area of Conservation. Habitats within the northern section of this network are of international and county importance. The network at the southern section of the river is not part of the SAC but is of Local Ecological Value.

Any development within or adjacent to this network which could affect water quality or riparian habitats should be screened for its potential impact on the cSAC

As a Green Infrastructure feature its most important characteristic is that it provides for flood attenuation. It is an important visual amenity which has potential for further development for active recreation and to reduce pollution in the river.

Hedgerow evaluation revealed that the hedgerows surveyed were evenly divided into moderate and high 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. These habitats are of local ecological value. 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, 2009). 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 salmon, otter, 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 assessment 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.

Field survey and report-writing was carried out by Mary Tubridy, Mieke Muyliaert, Betsy Hickey and Michelle O'Neill. Mapping and GIS was carried out by Richard Jennings of Kilkenny Archaeology.

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:

- Ecological Survey of Ballyhale (included in the report on Knocktopher) (CAAS, 2003).
- National Parks & Wildlife Service online data (www.npws.ie)
- Site file for the designated site: Barrow Nore cSAC No.2162 inspected in NPWS, Ely Place, Dublin.
- Environmental Protection Agency data on soils and water quality <http://maps.epa.ie/InternetMapView/MapView.aspx> - Land/Soils; Land/Subsoils; Water Quality/Current River Data
- 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). Vol. 1

- 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 2004 Ballyhale 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 areas within Ballyhale examined by CAAS (op cit) as part of the survey to inform the Ballyhale 2004 LAP, fieldwork was carried out to map habitats and thus verify the status of the areas which were highlighted.

‘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.

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, and 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 hierarchical classification of habitats from Levels 1 to 3. Level 1 provides a gross classification, Level 2 is intermediate, and Level 3 is the most detailed. Habitats in Ballyhale were mapped to Level 3.

At Level 1 in the classification, 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 2 allows for a more detailed classification of the Level 1 types. For example Level 1 Freshwater habitats can be distinguished as either lakes, ponds, watercourses, springs or swamps and so on for all other Level 1 habitats.

Level 3 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 Ballyhale 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 (dry stone walls) and BL1B (stone buildings).
3. Land under development (i.e. a building site) transitional between habitat types was mapped as BL3D.
4. Concrete walls were mapped as BL3W. This is a subtype of BL3 (Artificial surfaces)
5. 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. The majority of gardens were observed from outside. 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 has 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.

Hedgerows that were surveyed and assessed were assigned a number and are mapped accordingly (e.g. H01, H11 etc). Hedgerows which could not be surveyed due to access difficulties but were validated as present are mapped as WL1 and have no individual number.

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 took 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. These principal objectives were met despite the seasonal constraints, by using previous reports particularly CAAS, (2003), targeted consultations, field survey and professional judgement.

3 Results

3.1 Geodiversity

Ballyhale lies on the geological divide between the limestones underlying most of Kilkenny and the sandstones which are associated with the higher ground. Most of the village is underlain by sandstones and mudstones of the Kiltorcan formation, with a small portion at the north end of the village underlain by carboniferous rocks associated with the Portersgate formation. Rocks of the Kiltorcan formation are c. 410 million years old and are yellow and red. In contrast Porters Gate formation rocks are a mixture of sandstones and thin limestone and were laid down during the Lower Carboniferous period (355 million years ago). Bedrock is near the surface west and south of the village and forms the low hill to the west crossed by the railway line.

Associated with the rock is a regionally important aquifer which throughout most of the study area is extremely vulnerable to pollution particularly near rock outcrops.

Soils have developed on top of limestone till and alluvium. Grey-brown podzolics and brown earths are derived from limestone till. Alluvium is found along the river where it indicates the extent of the post glacial floodplain.

The study area is principally drained by a tributary of the Little Arrigle River, the Ballyhale Stream, which flows into the Nore. Water quality is not assessed by the EPA on this tributary.

3.2 Ecological networks

The important ecological network in Ballyhale (BH1) is associated with the Ballyhale Stream. The extent of the network is shown on Map 2 and habitats within it are shown on Map 1. No invasive exotics were recorded in this network or elsewhere in Ballyhale.

The northern section is principally contained within the cSAC. It includes the Ballyhale Stream (FW2) and associated drains (FW2) semi-natural grasslands (GS2 and GS4), scrub (WS1), hedgerows (H05,H06,H07,H08,H09,H11 and H44), a man-made pond (FL8) and planted broadleaved woodland (WS2).

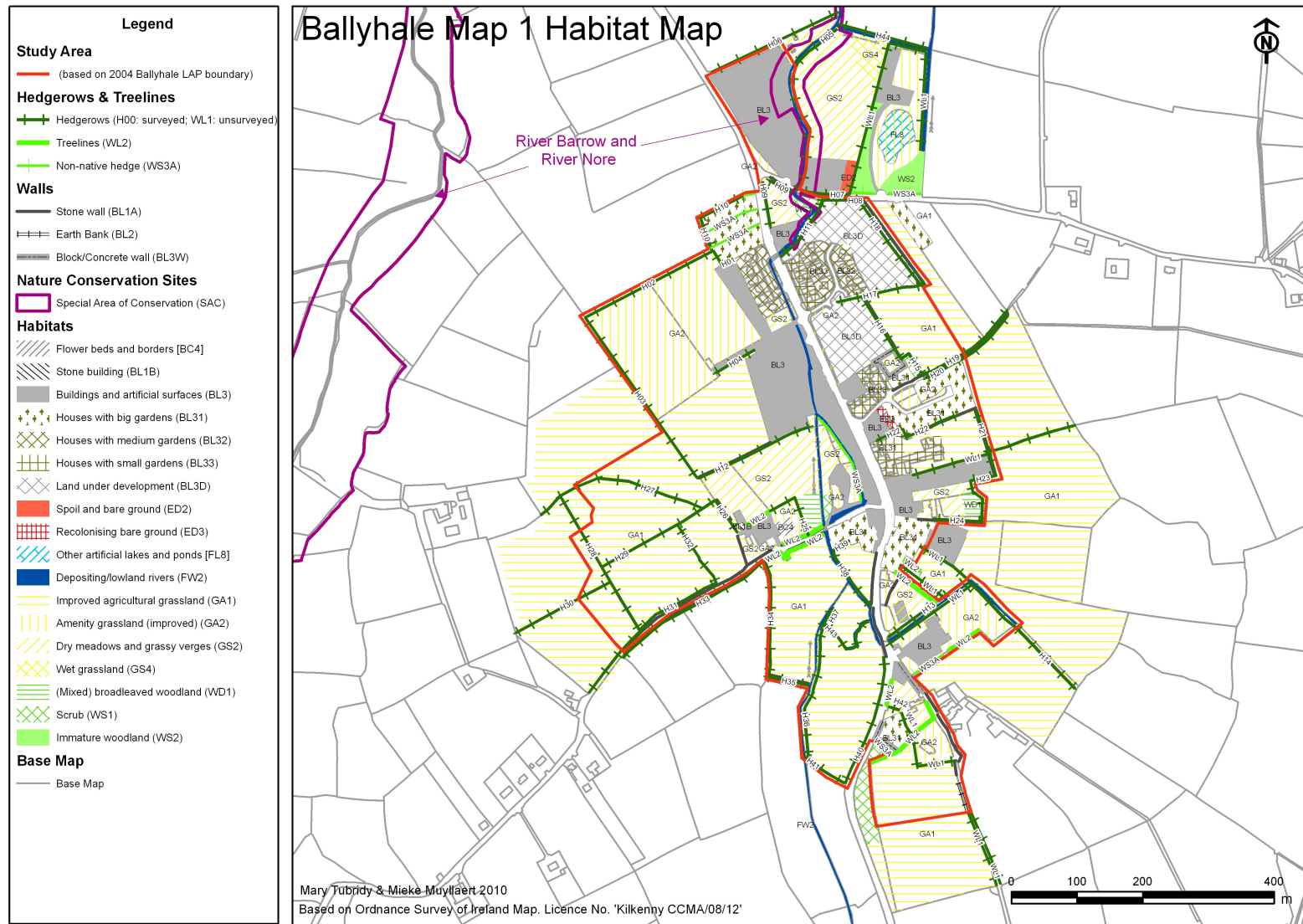
The section of the network outside the SAC features the stream (FW2), hedgerows (H12,H13,H14,H25,H26,H36,H37,H38,H39, H41 and H43), a small area of mixed-broadleaved woodland (WD1) dry meadows and grassy verges

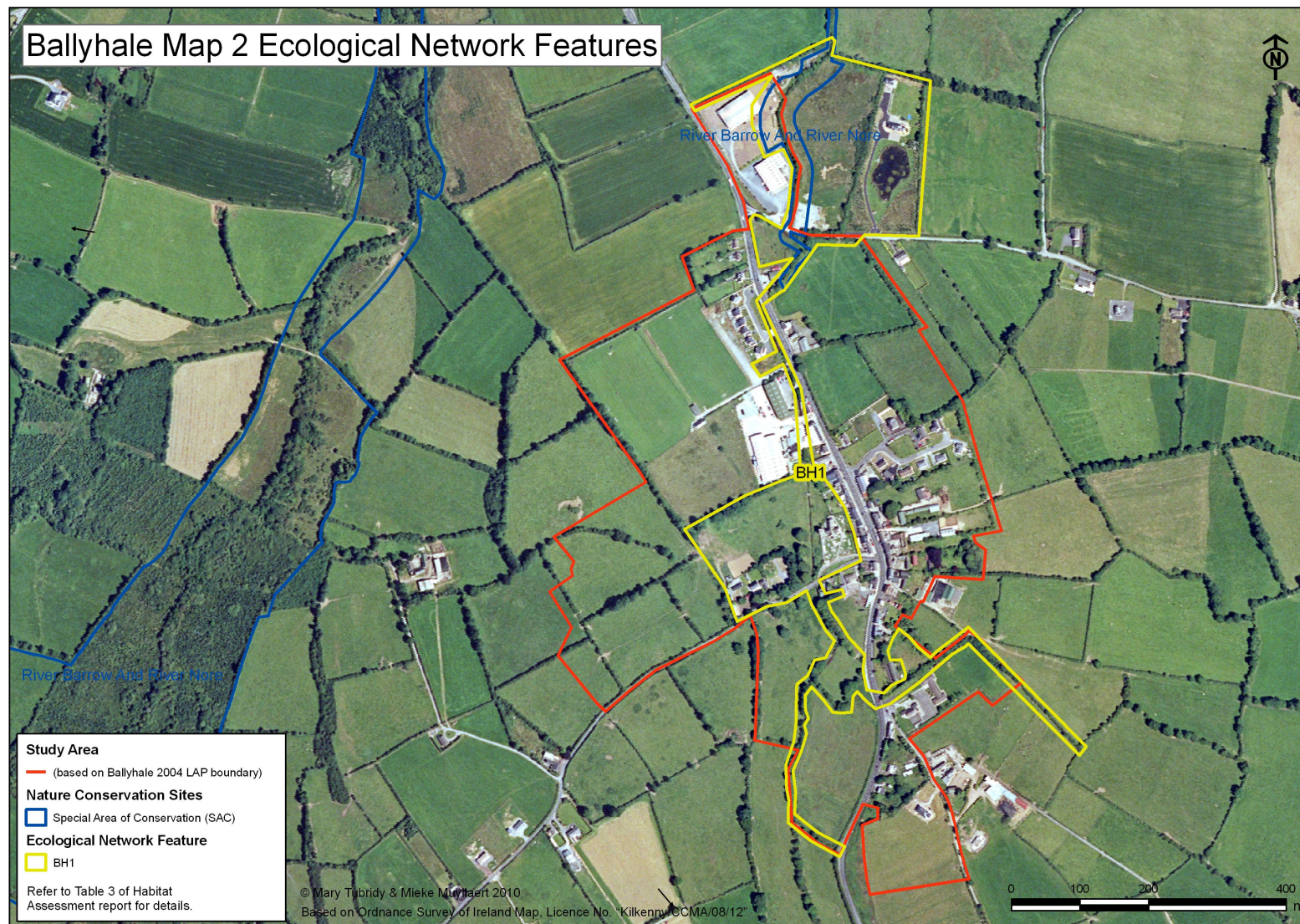
(GS2), scrub (WS1), tree line (WL2), the graveyard and bell tower of the church and the gardens associated with Ballyhale Manor.

The key feature of the network is the river. According to Frank O' Donoghue , (Southern Regional Fisheries Board) the tributaries of the Nore in the vicinity of Ballyhale are important nursery streams for salmonids. Pat Durkan, (BirdWatch) confirmed that they support wetland bird species such as grey wagtail, little egret, grey heron, kingfisher and dipper (which nest under bridges).

Network within and adjacent to the SAC

The stream, which flows in a northerly direction enters the designated site behind the local garage next to hedgerow H11, then twists around a small area of scrub before bordering the local industrial estate. It is clear and flowing freely and contains abundant watercress and water crowfoot (the latter is an indicator of good water quality). Within the estate, a part of the western bank of the river is maintained almost free of plants by spraying. This has exposed the bank to erosion as the ground on this side is now bare (Plate 1). Lesser celandine and cornsalad (*Valerianaella locusta*) were among the species surveyed.





Hedgerow H05 occurs on the eastern bank of the river and is one of the two highest scoring hedgerows.



Plate 1. Hedgerow H05 and exposed bank of the Ballyhale stream within the industrial estate.

On a vacant plot within the industrial estate the ground is covered with shingle base that is now being colonised by opportunistic herbs, gorse and bramble (ED2). Coltsfoot, dandelion, herb robert, nipplewort, bush vetch, clover, red clover, common thistle and rosebay willowherb are present. These herbs are good for insects, butterflies and bees and provide additional winter food for birds.

Teasel (*Dipsacus fullonum*) and wild mignonette (*Reseda lutea*) can be found growing in the north east corner of the site next to the council storage depot. These uncommon species are confined to disturbed ground and are typically found in the east and north of the country. Teasel is a valuable food source for birds in winter particularly goldfinch. Wild mignonette is pollinated by bees and butterflies.

Dumping of grass clippings is occurring near the river. This source of nutrients could lead to further eutrophication of the river.

A large garden associated with a dwelling house (Lakeside View) outside the LAP boundary adds to the biodiversity value of this network as it contains habitats such as a hedgerow (WL1), a man-made pond (~ 5,000 ²m) (FL8)

landscaped using mainly native species, immature native woodland (WS2) (Plate 2) as well as amenity grassland (GA2).

The main species in the pond area include hard rush (*Juncus inflexus*), flag iris (*Iris pseudacorus*) and common alder (*Alnus glutinosa*), which are prominent in the shallower water at fringes of the pond. Mallard ducks are introduced to the pond from time to time and a pair was present along with several native coot. The presence of coot is significant as this is an Amber listed bird species. Its presence confirms that this man made habitat is of significance for native biodiversity. Other plant species included marsh willowherb, duckweed, brooklime, soft rush, nettle, crack willow, pondweed and lilies.



Plate 2. Man made pond (FL8) and immature woodland (WS2) in the garden of Lakeside View.

The boundary to the east and north of the site is composed of a native hedgerow (H44) and a drain which is a tributary of the Ballyhale Stream. A native hedgerow is also present on the western boundary on this garden (mapped as WL1). Common alder, ash, hawthorn, ivy, pedunculate oak, wild cherry, gorse and bramble were the main woody species. Lord's and ladies, herb robert, lesser celandine, common thistle, bush vetch, cleavers, and white clover were among the herbaceous species present.

The field between Lakeview and the Ballyhale Stream, is of ecological interest as it is not managed intensively. While the southern part of it is currently being used as a storage area (BL3) the remainder of the field was classified as GS2 (dry meadows and grassy verges) containing small areas of GS4 (wet grassland) dominated by rushes.

A locally rare plant species, shining crane's-bill (*Geranium lucidum*, Plate 3.), is found growing in this area between the cracks of a small length of dry stone wall at the junction where the Kiltorcan road meets the N10 opposite the industrial estate.



Plate 3. Shining crane's-bill (*Geranium lucidum*), growing on a dry stone wall in Ballyhale.

Network based on Ballyhale Stream outside the SAC

Outside the SAC the most important section of the network is where the Ballyhale Stream is bounded by semi-natural vegetation. The river south of the built up area is clear (Plate 1), has a steady flow and has not been arterially drained. Flooding occurs by the bridge in the lower parts of the broadleaved woodland (WD1) below Ballyhale Manor. In addition to water dropwort (*Oenanthe crocata*); brooklime (*Veronica beccabunga*), water crowfoot (*Ranunculus penicillatus*) and watercress (*Nasturtium officinale*) and moss (*Fontinalis sp*) are found in the river.



Plate 4. River south of the church with hedgerow H36 on the eastern bank and GA1 on the western side.

In this location the Ballyhale Stream is joined by a smaller stream which flows along the north-west boundary of the local primary school, then passes under the road before joining the Ballyhale. Hedgerows occur on both sides of the stream in the vicinity of the school (H13 on the north side, WL1 on the south). Near the road they are partly concealed by lines of *Leylandii*.

Rabbits, foxes, rodents, crows, jackdaws, magpies, pigeons, starlings, blackbirds, thrushes, wrens and robins have been recorded along this corridor this by the pupils and teachers from the school.

The wooded area (WD1) west of the stream near the church is dominated by mature lime trees and a mature sycamore. A shrub layer was virtually absent with the exception of an occasional elder and bramble. The ground flora was poor but cow parsley (*Anthriscus sylvestris*), wood dock (*Rumex sanguineus*) and lesser celandine (*Ranunculus ficaria*), were evident. Ladies smock (*Cardamine pratensis*), was growing in the area prone to flooding.

The network includes the graveyard beside the church. Dry meadow and grassy verge habitat (GS2) occurs next to the church and in the field behind Ballyhale Manor. Near the church it is being invaded by gorse, bramble and ash scrub.

A tree line of mature oak, sycamore and beech (WL2) forms the boundary between Ballyhale Manor and the road, while the garden itself (mapped as GA2 and BC4) contains a diverse range of ornamental species and some small ponds (unmapped) in which frogs were abundant. Buildings in this location and stone

features such as walls have potential as bat roosts. However no bat surveys were undertaken as part of this study.

Green infrastructure assessment – BH1

The ecological network is an important corridor and reservoir of biodiversity.

Part of the network is of international biodiversity importance as it is contained within the cSAC Barrow/Nore. The section outside the SAC is of lesser biodiversity value.

It provides several services to society. The stream and floodplain 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 and catchment.

The network enhances visual amenity values and has recreational potential for fishing or a walking route. Landscaping associated with a new house north of the village has enhanced Green Infrastructure values as owners have developed a large wetland which is important for biodiversity and visual amenity. The environmental education potential of this network could be developed as it is close to a school where pupils are interested in local biodiversity.

The biodiversity adds value to features of cultural importance such as bridges.

Future development should seek to protect and enhance the quality of the semi-natural habitats within the network. Any proposals for development which could impact on EU listed habitats will require to at least be screened for Appropriate Assessment. This particularly includes any impacts on water quality, habitats directly associated with the river inside or outside the cSAC.

Within the village itself care needs to be taken to ensure that the quality of the river is maintained, that it is protected from misuse of chemicals and dumping of spoil or wastes (including organic waste). Encouragement should be given to establishing riparian woodland beside the river but particularly within the village. In the wider countryside there may be more opportunities to restore marginal wetland habitats.

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 four hedgerows were surveyed and evaluated of which 42 are within or on the study area boundary. Some are associated with important ecological networks. On the western side of the village they are associated with active farms and farmhouses.

Inspection of hedgerows and examination of historical mapping (i.e. 1st ed OS maps) suggests that the total number of hedgerows has remained constant. However hedgerow length and quality have been reduced by development around the village.

Hedgerow numbers are shown on Map 1 and results of the evaluation of individual hedgerows are in Appendix 4. Table 2 below summarises the results of the hedgerow evaluation for Ballyhale.

Table 2. Hedgerow Evaluation

Hedgerow Numbers	Rating	Description
-	1 *	Low value – least important
H01, H04, H08, H09, H15, H20, H25, H26, H42	2 **	Moderate value - of moderate importance
H02, ,H03 H05, H06,H07, H10, H11, H12, H13, H14, H16, H17, H18, H19, H21, H22, H23, H24, H27, H28, H29, H30, H31, H32, H33, H34, H35, H36, H37, H38, H39, H40, H41, H43, H44.	3 ***	High value – most important

Forty-one hedgerows are of cultural value as they are shown on the 1st edition OS map (1837-1842); the exceptions were H01, H04 and H06. All of the hedgerows surveyed in Ballyhale were found to be of either of moderate or high biodiversity value.

In contrast to other locations surveyed in 2010 three-quarters are associated with running water, either ditches or streams adding to their value as habitats. Ash is the main species of tree, found in 37 of the 44 hedgerows surveyed. Oak was found in two hedgerows (H27 and H44). Goat willow, alder and wild cherry occur in only one hedgerow each. Interestingly, the wild cherry, alder and one of the oak occurrences were in the same hedgerow (H44), beside a tributary of the River which is outside of the study area. Lime was found in one hedgerow, the

non-native sycamore was found in 15 hedgerows, while horse chestnut, Norway spruce and Lawson cypress occurred occasionally.

Seventeen different shrubs were recorded from the surveyed hedgerows, twelve of which are native. Hawthorn occurred in all hedgerows, while elder and blackthorn were found in the majority of them. Other native shrubs included hazel, holly, honeysuckle, gorse, field rose, dog rose, and bramble.

Thirty five hedgerows were rated as having high value with 2 (H05 and H13), scoring 28 points. Hedgerow H05 is situated to the east of the northern section of the River and forms part of the River Barrow and Nore SAC. In addition to containing hawthorn, ash, bramble and ivy; gorse and goat willow were also present. Herbaceous species included arum lily, buckler fern, hard fern and primrose. This and H32 were the only two hedgerows that had primroses recorded in them. Although there was considerable amount of gaps in H05 (between 25 and 50%), species diversity and structural diversity were high as it is associated with the river and bank. It also received the highest possible score for connectivity, having 4 connections.

Hedgerow H13 can be found on the north-west boundary of the school where it is associated with a tributary of the River. While it had fewer gaps than H05 it received a lower mark for connectivity. Neither hedgerow has been recently managed.

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. Total numbers of woody native species were usually high relative to other hedgerows. The 33 other hedgerows that are of high value can be found in Table 2.

Moderately ranked hedgerows (H01, H04, H08, H09, H15, H20, H25, H26, H42) were generally younger, had poor structural diversity (some had just a shrub layer), more gaps and were more likely to be directly affected by recent development of housing and gardens.

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. Only fifteen out of a total of 44 hedgerows had received any management in the past two years and this tended to be to one side only.

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)

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

They are important features of the cultural landscape.

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

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.

Other features of biodiversity interest

Other features of biodiversity interest include dry stone walls (BL1A). They are particularly associated with Ballyhale Church, Ballyhale Manor, farms on the east side of the village, bridges and roads. 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 stone buildings and walls have potential value as roosting sites particularly if they are linked by hedgerows, lines of trees or blocks of semi-natural vegetation to wetlands. CAAS (2003) also considered that mature trees, the bell tower and river provide valuable habitat for bats.

Mature trees include individual elms and ash in the centre of the village on the east side of the road, along the road in front of Ballyhale Manor and in the field across from this road.

Mature gardens which are associated with older residences in Ballyhale provide nesting, roosting and feeding areas for birds.



Plate 5. Large garden (with GS2) to the rear of house in the village

Amenity grassland (GA2) tends to be species poor but there were two areas in Ballyhale where species diversity was high. These were in front of the school and part of the green in the housing estate that lead to the former mass path. Both are managed as GA2 but both had a dense cover of moss. Sweet vernal grass, meadow foxtail, yarrow, ladies smock, meadow buttercup, red clover and field wood rush were among the species recorded.

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

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 survey work.

The ecological network / green infrastructure associated with these features have 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.

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 Ballyhale

Ecological network/Habitats	Ecological network element	Ecological evaluation
Ballyhale Stream (FW2) inside cSAC, scrub (WS1), wet grassland (GS4) and hedgerows H05 and H11	Core area	Internationally important
Hedgerows H06, H07, H08, H09 and H44.	Corridors	County Importance
Dry grassland (GS2), new wetland (FL8), planted woodland (WS2)	Corridors linked to core area	Local importance (higher value)
Recolonising ground (ED2),		Local importance (higher value)
Ballyhale Stream (FW2) outside the SAC, planted woodland (WD1), hedgerows H12, dry grassland (GS2), hedgerows H13, H14,H25,H26,H36, H37,H38, H39, H41 and H43	Core area and corridors	Local importance (higher value)
Buildings (BL3), flower beds (BC4), treeline (WL2), amenity grassland (GA2), agricultural grassland (GA1) and non-native linear shrubbery (WS3A)	Core and corridor features	Local importance (lower value)
Hedgerows which scored >20 H02, H03, H10, H16, H17, H18, H19, H21, H22, H23, H24, H27, H28, H29, H30, H31, H32, H33, H34, H35, H40,	Corridors	Local importance (higher value)
Hedgerows (WL1) which scored 10 +: H01, H04, H15, H20, H25, H26, H42	Corridors	Local importance (lower value)
Other semi-natural habitats; stone walls (BL1A), stone buildings (BL1B), mature trees (WL2 where mapped)	Small core and 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 catchments 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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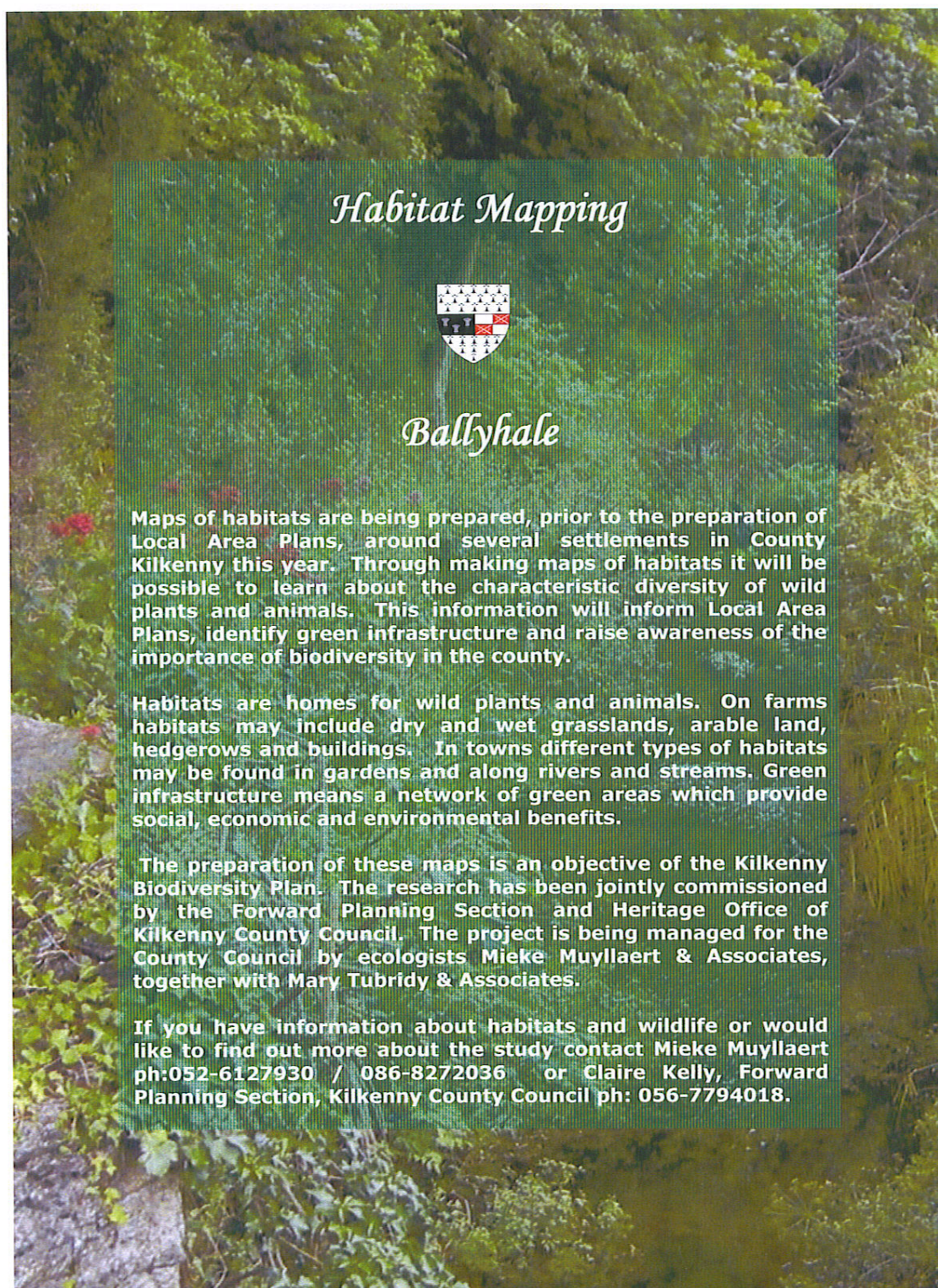
Websites

Environmental Protection Agency www.epa.ie

Geological Survey of Ireland www.gsi.ie

National Parks & Wildlife Service www.npws.ie

Appendix 1 Information Leaflet



Maps of habitats are being prepared, prior to the preparation of Local Area Plans, around several settlements in County Kilkenny this year. Through making maps of habitats it will be possible to learn about the characteristic diversity of wild plants and animals. This information will inform Local Area Plans, identify green infrastructure and raise awareness of the importance of biodiversity in the county.

Habitats are homes for wild plants and animals. On farms habitats may include dry and wet grasslands, arable land, hedgerows and buildings. In towns different types of habitats may be found in gardens and along rivers and streams. Green infrastructure means a network of green areas which provide social, economic and environmental benefits.

The preparation of these maps is an objective of the Kilkenny Biodiversity Plan. The research has been jointly commissioned by the Forward Planning Section and Heritage Office of Kilkenny County Council. The project is being managed for the County Council by ecologists Mieke Muyliaert & Associates, together with Mary Tubridy & Associates.

If you have information about habitats and wildlife or would like to find out more about the study contact Mieke Muyliaert ph:052-6127930 / 086-8272036 or Claire Kelly, Forward Planning Section, Kilkenny County Council ph: 056-7794018.

Appendix 2 Record sheets used in habitat mapping and hedgerow evaluation

Kilkenny LAP habitat survey 2010

Target areas

Settlement:_____ Recorder:_____ Date:_____

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

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

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: BH1

Habitat codes

FW2, WS1,GS2 GS4,WS1, WL1, FL8,
WS2, WD1,WL2.

Scientific name	Common name
<i>Acer pseudoplatanus</i>	Sycamore
<i>Achillea millefolium</i>	Yarrow
<i>Agrostis</i> sp.	Bent grass
<i>Alnus glutinosa</i>	Alder
<i>Angelica sylvestris</i>	Wild angelica
<i>Anthoxanthum odoratum</i>	Sweet vernal grass
<i>Anthriscus sylvestris</i>	Cow parsley
<i>Apium nodiflorum</i>	Fool's watercress
<i>Bellis perennis</i>	Daisy
<i>Blechnum spicant</i>	Hard fern
<i>Bryophytes</i>	Moss
<i>Caltha palustris</i>	Marsh marigold
<i>Cardamine pratensis</i>	Ladies smock
<i>Cardamine pratensis</i>	Ladies smock
<i>Carex panicea</i>	Carnation sedge
<i>Carex pendula</i>	Soft shield fern
<i>Carex sylvatica</i>	Sedges
<i>Centaurea nigra</i>	Knapweed
<i>Cerastium fontanum</i>	Common mouse ear
<i>Chrysosplenium oppositifolium</i>	Opposite leaved golden saxifrage
<i>Cirsium arvense</i>	Creeping thistle
<i>Cirsium vulgare</i>	Common thistle
<i>Cirsium palustre</i>	Marsh thistle
<i>Cirsium vulgare</i>	Common thistle
<i>Crataegus monogyna</i>	Hawthorn
<i>Cynosurus cristatus</i>	Crested dogs tail
<i>Dactylis glomerata</i>	Cocksfoot
<i>Daucus carota</i>	Wild carrot
<i>Elytrigia repens</i>	Scutch grass
<i>Epilobium hirsutum</i>	Great willowherb
<i>Fagus sylvatica</i>	Beech
<i>Festuca rubra</i>	Red Fescue
<i>Filipendula ulmaria</i>	Meadowsweet
<i>Fraxinus excelsior</i>	Ash
<i>Geum urbanum</i>	Wood avens
<i>Glyceria</i> sp.	Flote-grass
<i>Hedera helix</i>	Ivy
<i>Heracleum sphondylium</i>	Hogweed

<i>Holcus lanatus</i>	Yorkshire fog
<i>Hypochoeris</i> sp.	Cats ear
<i>Ilex aquifolium</i>	Holly
<i>Iris pseudacorus</i>	Flag iris
<i>Juncus articulatus</i>	Jointed rush
<i>Juncus bufonius</i>	Toad rush
<i>Juncus effusus</i>	Soft rush
<i>Juncus inflexus</i>	Hard rush
<i>Lemna</i> sp.	Duckweed
<i>Leucanthemum vulgare</i>	Ox-eye daisy
<i>Leycesteria formosa</i>	Himalayan honeysuckle
<i>Ligustrum vulgare</i>	Privet
<i>Lonicera nitida</i>	Box leaf honeysuckle
<i>Lonicera periclymenum</i>	Honeysuckle
<i>Lotus corniculatus</i>	Bird'sfoot trefoil
<i>Nasturtium officinale</i>	Water cress
<i>Odontites verna</i>	Red bartsia
<i>Phalaris arundinacea</i>	Reed canary grass
<i>Phyllitis scolopendrium</i>	Hart's tongue fern
<i>Plantago lanceolata</i>	Narrow leaved plantain
<i>Polypodium vulgare</i>	Common polypody fern
<i>Polystichum setiferum</i>	Soft shield fern
<i>Potentilla reptans</i>	Creeping cinquefoil
<i>Potentilla sterilis</i>	Barren strawberry
<i>Prunella vulgaris</i>	Self heal
<i>Prunus spinosa</i>	Blackthorn
<i>Quercus robur</i>	Pedunculate oak
<i>Ranunculus ficaria</i>	Lesser celandine
<i>Ranunculus repens</i>	Creeping buttercup
<i>Rubus fruticosus</i> agg.	Bramble
<i>Rumex obtusifolius</i>	Broad leaved dock
<i>Salix cinerea</i>	Grey willow
<i>Sambucus nigra</i>	Elder
<i>Senecio jacobaea</i>	Ragwort
<i>Trifolium pratense</i>	Red clover
<i>Trifolium repens</i>	Creeping clover
<i>Typha latifolia</i>	Bulrush
<i>Ulex europaeus</i>	Gorse
<i>Ulmus glabra</i>	Wych elm
<i>Urtica dioica</i>	Nettle
<i>Veronica beccabunga</i>	Brooklime

Appendix 4 Results of hedgerow evaluation

No.	Height	Width	Gaps	Biodiversity value	Structure	Structural diversity	Connectivity	Cultural value	Score	Management
	1 <1.5m 2 1.5-2.5m 3 2.5-4m 4 >4m	1 <1m 2 1.2m 3 2-3m 4 3m+	0 50%+ 1 25-50% 2 10-25% 3 5-10% 4 <5% 5 no gaps	No. of native tree & shrub species 1 One-two 2 Three 4 Four+	1 Shrub layer only 2 Shrub + herbs 3 Tree, shrub + herbs, open base 4 Tree, shrub + herbs, dense base	0 No bank/ditch 1 Bank only 2 Bank + ditch 3 Bank, ditch, stagnant water 4 Bank, ditch, flowing water	0 No direct connections 1 Connection by water (ditch only) 2 1 connection 3 2 connections 4 3 connections 5 4 or more connections	1 Not on 1 st ed map 2 On 1 st ed map (but not tld bdry) 4 Townland boundary		1 Short-term unmgd (5 yrs) 2 Long-term unmgd 3 Box profile 4 Cut one side 5 Cut both sides 6 A-shape
H01	2	1	4	4	2	1	3	1	18	1
H02	2	2	4	4	2	1	3	2	20	2
H03	4	3	3	4	3	1	5	2	25	1
H04	2	2	5	4	2	1	0	1	17	1
H05	4	4	1	4	4	4	5	2	28	1
H06	2	4	4	4	2	1	3	1	21	1
H07	4	3	3	4	3	2	3	2	24	2
H08	4	3	3	1	3	3	3	2	22	1
H09	3	2	1	4	3	1	2	2	18	1
H10	4	3	2	4	3	1	4	2	23	2
H11	4	3	3	4	3	4	3	2	26	2
H12	4	2	3	4	3	1	2	2	21	1
H13	4	4	3	4	3	4	4	2	28	2
H14	4	2	3	4	3	4	4	2	26	2
H15	4	3	1	4	3	1	3	*	19	2
H16	4	3	2	4	3	1	3	*	20	2
H17	4	3	2	4	3	1	3	2	22	2
H18	3	3	3	4	4	1	3	2	23	1
H19	4	2	1	4	3	1	3	2	20	2

Kilkenny LAP Habitat Assessment BALLYHALE

	1 <1.5m 2 1.5-2.5m 3 2.5-4m 4 >4m	1 <1m 2 1.2m 3 2-3m 4 3m+	0 50%+ 1 25-50% 2 10-25% 3 5-10% 4 <5% 5 no gaps	No. of native tree & shrub species 1 One-two 2 Three 4 Four+	1 Shrub layer only 2 Shrub + herbs 3 Tree, shrub + herbs, open base 4 Tree, shrub + herbs, dense base	0 No bank/ ditch 1 Bank only 2 Bank + ditch 3 Bank, ditch, stagnant water 4 Bank, ditch, flowing water	0 No direct connections 1 Connection by water (ditch only) 2 1 connection 3 2 connections 4 3 connections 5 4 or more connections	1 Not on 1 st ed map 2 On 1 st ed map (but not tld bdry) 4 Townland boundary		1 Short-term unmngd (5 yrs) 2 Long-term unmngd 3 Box profile 4 Cut one side 5 Cut both sides 6 A-shape
H20	4	2	0	4	3	0	3	2	18	1
H21	3	3	2	4	4	0	4	2	22	2
H22	4	2	3	4	3	0	2	2	20	2
H23	4	3	3	4	4	0	5	2	25	2
H24	4	2	1	4	3	1	5	2	22	2
H25	4	2	1	4	3	1	2	2	19	2
H26	3	3	1	4	4	0	2	2	19	2
H27	4	2	2	4	3	1	3	2	21	2
H28	3	3	4	4	4	1	5	2	26	2
H29	4	3	2	4	3	1	5	2	24	2
H30	4	3	3	4	2	1	5	2	24	2
H31	3	2	4	4	4	1	4	2	24	1
H32	4	2	2	4	3	1	3	2	21	2
H33	2	2	4	4	4	1	5	2	24	1
H34	4	2	1	4	3	1	4	2	21	2
H35	4	2	2	4	3	4	3	2	24	2
H36	3	2	0	4	3	4	5	2	23	2
H37	4	2	0	4	3	4	4	2	23	2
H38	4	2	0	4	3	4	5	2	24	2
H39	4	1	0	4	3	4	4	2	22	2
H40	1	3	4	4	2	1	5	2	22	1
H41	3	3	5	4	4	1	5	2	27	2
H42	3	1	4	2	2	0	2	2	16	1

Kilkenny LAP Habitat Assessment BALLYHALE

	1 <1.5m 2 1.5-2.5m 3 2.5-4m 4 >4m	1 <1m 2 1.2m 3 2-3m 4 3m+	0 50%+ 1 25-50% 2 10-25% 3 5-10% 4 <5% 5 no gaps	No. of native tree & shrub species 1 One-two 2 Three 4 Four+	1 Shrub layer only 2 Shrub + herbs 3 Tree, shrub + herbs, open base 4 Tree, shrub + herbs, dense base	0 No bank/ ditch 1 Bank only 2 Bank + ditch 3 Bank, ditch, stagnant water 4 Bank, ditch, flowing water	0 No direct connections 1 Connection by water (ditch only) 2 1 connection 3 2 connections 4 3 connections 5 4 or more connections	1 Not on 1 st ed map 2 On 1 st ed map (but not tld bdry) 4 Townland boundary		1 Short-term unmged (5 yrs) 2 Long-term unmged 3 Box profile 4 Cut one side 5 Cut both sides 6 A-shape
H43	4	4	0	4	4	4	5	2	27	2
H44	4	3	2	4	3	4	5	2	27	1

*Impossible to determine whether H15 and H16 were on 1st ed OS or not as they occurred at junction of map.

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.
<i>FL</i>	<i>Lakes and ponds</i>	PB4	Cutover bog
FL1	Dystrophic lakes	PB5	Eroding blanket bog
FL2	Acid oligotrophic lakes	PF	<i>Fens and flushes</i>
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	<i>WN</i>	<i>Semi-natural woodland</i>
FW	<i>Watercourses</i>	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	<i>Springs</i>	WN6	Wet willow-alder-ash woodland
FP1	Calcareous springs	WN7	Bog woodland
FP2	Non-calcareous springs	WD	<i>Highly modified/non-native woodland</i>
FS	<i>Swamps</i>	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
<i>GA</i>	<i>Improved grassland (highly modified)</i>	WS	<i>Scrub/transitional woodland</i>
GA1	Improved agricultural grassland	WS1	Scrub
GA2	Amenity grassland (improved)	WS2	Immature woodland
<i>GS</i>	<i>Semi-natural grassland</i>	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	<i>Linear woodland and scrub</i>
GS4	Wet grassland	WL1	Hedgerows
GM	<i>Freshwater marsh</i>	WL2	Treelines
GM1	Marsh		
H	HEATH AND DENSE BRACKEN	E	EXPOSED ROCK/DISTURBED GROUND
<i>HH</i>	<i>Heath</i>	<i>ER</i>	<i>Exposed rock</i>
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
<i>HD</i>	<i>Dense bracken</i>	EU	<i>Underground rock and caves</i>
HD1	Dense bracken	EU1	Non-marine caves
		EU2	Artificial underground habitats

P	PEATLANDS	ED	<i>Disturbed ground</i>
PB	<i>Bogs</i>	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
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	NON-MARINE		MARINE
B	CULTIVATED AND BUILT LAND	L	LITTORAL (INTERTIDAL)
BC	<i>Cultivated land</i>	LR	<i>Littoral rock</i>
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	<i>Built land</i>	LR5	Sea caves
BL1	Stone walls and other stonework	LS	<i>Littoral sediment</i>
BL2	Earth banks	LS1	Shingle and gravel shores
BL3	Buildings and artificial surfaces	LS2	Sand shores
		LS3	Muddy sand shores
		LS4	Mud shores
		LS5	Mixed sediment shores
C	COASTLAND	S	SUBLITTORAL (SUBTIDAL)
CS	<i>Sea cliffs and islets</i>	SR	<i>Sublittoral rock</i>
CS1	Rocky sea cliffs	SR1	Exposed infralittoral rock
CS2	Sea stacks and islets	SR2	Moderately exposed infralittoral rock
CS3	Sedimentary sea cliffs	SR3	Sheltered infralittoral rock
CW	<i>Brackish waters</i>	SR4	Exposed circalittoral rock
CW1	Lagoons and saline lakes	SR5	Moderately exposed circalittoral rock
CW2	Tidal rivers	SR6	Sheltered circalittoral rock
CM	<i>Salt marshes</i>	SS	<i>Sublittoral sediment</i>
CM1	Lower salt marsh	SS1	Infralittoral gravels and sands
CM2	Upper salt marsh	SS2	Infralittoral muddy sands
CB	<i>Shingle and gravel banks</i>	SS3	Infralittoral muds
CB1	Shingle and gravel banks	SS4	Infralittoral mixed sediments
CD	<i>Sand dune systems</i>	SS5	Circalittoral gravels and sands
CD1	Embryonic dunes	SS6	Circalittoral muddy sands
CD2	Marram dunes	SS7	Circalittoral muds
CD3	Fixed dunes	SS8	Circalittoral mixed sediments
CD4	Dune scrub and woodland		
CD5	Dune slacks		
CD6	Machair		
CC	<i>Coastal constructions</i>	MW	MARINE WATER BODY
CC1	Sea walls, piers and jetties	MW1	Open marine water
CC2	Fish cages and rafts	MW2	Sea inlets and bays
		MW3	Straits and sounds
		MW4	Estuaries

Appendix 6 Ecological evaluation criteria

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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.

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

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*).

<p>Species listed on the relevant Red Data list.</p> <p>Site containing 'viable areas'⁵ of the habitat types listed in Annex I of the Habitats Directive.</p>
<p>County Importance:</p> <p>Area of Special Amenity.⁶</p> <p>Area subject to a Tree Preservation Order.</p> <p>Area of High Amenity, or equivalent, designated under the County Development Plan.</p> <p>Resident or regularly occurring populations (assessed to be important at the County level)⁷ of the following:</p> <ul style="list-style-type: none"> 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. <p>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.</p> <p>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.</p> <p>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.</p> <p>Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.</p>
<p>Local Importance (higher value):</p> <p>Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared;</p> <p>Resident or regularly occurring populations (assessed to be important at the Local level)⁹ of the following:</p> <ul style="list-style-type: none"> 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. <p>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;</p> <p>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.</p>

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

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.

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.