

Kilkenny Local Area Plan Habitat Assessments 2010

Johnstown



Lane with hedgerows on northern edge of Johnstown

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 Johnstown to inform planning.

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. Fieldwork took place in March 2010 to map habitats to Level III, following Heritage Council guidelines. Hedgerows were assessed using a combination of structural and biodiversity criteria. This provided a numerical value for each hedgerow. Using an approach developed by the National Roads Authority, 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 (Map 1) accompanying the report shows habitats present within the study area. Ecological networks are overlain on an aerial photo (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 the habitat map. 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.

Three ecological networks were identified in Johnstown, the principal constituents of which are the hedgerows around the village and small areas with dry meadows/ grassy verge vegetation. They link biodiversity in Johnstown to the biodiversity of the wider countryside. The corridor features of this network are of local importance for biodiversity. The most important hedgerows within them and areas of dry meadow grassland warrant appropriate management and protection/integration into any future development. As Green Infrastructure features hedgerows are important for local biodiversity, provide cultural and visual amenities and support farming by providing shelter for animals and

reservoirs for species which are important for pollination and pest control. Current management is poor for biodiversity and farming. There is potential for improved management to enhance biodiversity and to provide for new uses such as “greenways” walking/cycling routes as an alternative to busy roads. Areas adjacent to these networks such as local graveyards could be managed to improve their biodiversity value.

Other features of biodiversity interest include mature trees and stone walls. They are not rated highly as the features in the ecological networks. 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, probably salmon, otter, 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:

- National Parks & Wildlife Service online data (www.npws.ie)
- Site files for the nearest designated sites: The Loughlans SAC No. 00407 and Spahill and Clomantagh Hill SAC No. 849.
- 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 was defined following consultation with Kilkenny County Council. Some habitats outside the study area boundary were mapped if they were important semi-natural types or were constituents of an ecological network which was present within the study area 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.

Plant species lists 'Target notes' were compiled when ecological networks included particular areas of biodiversity value. 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 Johnstown 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 Johnstown 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. The Fossitt habitat category BL1 (Stone buildings) was subdivided into BL1A (stone walls) and BL1B (stone buildings).
2. Due to the difficulty of describing habitats in gardens three additional habitat types were identified to describe the characteristic biodiversity associated with houses and gardens. These 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). Gardens were almost always mapped by viewing them from outside their boundaries.

These subtypes were identified in the field and digitised for the habitat map.

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 relevant studies located for this project, targeted consultations, field survey and professional judgement.

3 Results

3.1 Geodiversity

In common with the lowlands of Kilkenny, Johnstown is underlain by limestone. These are the limestones of the Ballyadams and Durrow formations. The Durrow type is a deep deposit (average thickness 200m) of shaley fossiliferous and oolitic limestone. The Bellyadams type is of similar thickness. It consists of pale-grey thick-bedded clean fossiliferous limestone intermittently separated by clay wayboards. It is exposed dramatically at the Ballykeefe quarry near Kilmanagh. While this rock is found near the surface in the north-west corner of the village no karst features are visible. Throughout the study area the rock is obscured by carboniferous limestone till from which productive soils have developed. The main soils are Grey Brown Podzolics and Brown Earths (of medium-high base status). Renzina/lithosol overlies rock in the north-west corner.

Most of the village lies on a regionally important karstified (diffuse) aquifer. This is of high to extreme vulnerability, particularly where bedrock is near the surface in the north west of the village.

A public water supply is shared with Urlingford. The source is two springs located 1.5 km east of Urlingford and almost 3 km south of Johnstown. No watercourses or drains are found within the study area. The River Goul flows in a north south direction c. 1.5km west of Johnstown. According to Frank O' Donoghue (Fisheries Board, pers.comm.) the Goul, which is part of the Erkina sub catchment of the Nore basin is important for salmonids.

There are no designated sites within or immediately adjacent to Johnstown. The nearest areas of designated value for biodiversity, the Loughlans SAC and Spahill and Clomantagh SAC are both situated c2km from Johnstown to the south east and east respectively.

3.2 Ecological networks

Introduction

Within and adjacent to Johnstown the most common habitats are associated with intensively managed farmland (managed grassland (GA1) and tilled land (BC1)). No invasive species were found within the study area.

The most important and prominent features of biodiversity value were hedgerows (WL1) and small patches of tall uncut grassland (GS2). Sixty seven hedgerows were surveyed and evaluated. All of these are within or on the study area boundary, while eight of them extend beyond the study boundary. Hedgerows comprise the dominant habitat in ecological networks.

The extent of hedgerows reflects field patterns and history of land management. Of the sixty seven hedgerows surveyed fifty two are present since the early 1800s (shown on 1st Edition O.S. maps 1837-1842) with most remaining intact. None run along townland boundaries.

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 Johnstown.

Table 2. Hedgerow Evaluation

Hedgerow Numbers	Rating	Description
H13, H19, H21, H29, H34, H36, H39, H40	1 *	Low value – least important

H01, H02, H03, H04, H05, H07, H08, H09, H10, H11, H12, H14, H15, H16, H17, H18, H20, H24, H25, H28, H30, H32, H33, H35, H37, H38, H41, H42, H43, H44, H46, H47, H48, H49, H51, H53, H55, H56, H57, H58, H59, H60, H61, H63, H64, H66, H67	2 **	Moderate value - of moderate importance
H06, H22, H23, H26, H27, H31, H45, H50, H52, H54, H62, H65	3 ***	High value - most important

The majority of hedgerows in the study area were found to be of moderate value, twelve were found to be of high value, with just eight of low value.

Within the hedgerows the most frequently-occurring tree species is the native ash. In hedgerows that are regularly managed (box shaped) trees are present but are cut with the hedgerow. Non-native sycamore also occurs in places. Holly is found in H45.

Eight different shrubs were recorded from the surveyed hedgerows. The natives: hawthorn, blackthorn and elder were found throughout. Other native shrub species are ivy and bramble, while the non-native travellers-joy is also present. Lilac was found near H34 and gooseberry was present in H35.

The highest-ranking hedgerow was H06. H06 is generally a good height (over 3 m) and 2 metres wide, with a diverse structure along most of its length, composed of mature trees, shrubs, herbs and a dense base. However, the hedgerow is unmanaged and gaps have developed in places. Birds including bullfinch, blackbird and blue tit, dunnock, chaffinch and robin were recorded moving along this hedgerow.

H23, H27, H45 and H52 also ranked high on evaluation, achieved by a combination of good height, width, structure and structural diversity. They contain native species, predominately hawthorn and elder, with some blackthorn and ash. All have bramble and ivy shrubs present. The connectivity of these

hedgerows improves their value as does the fact that they appear on the 1st edition OS map (1837-1842).

Typical medium ranking hedgerows such as H02, H03, H04, H05, H09 and H10 are also composed primarily of native species; blackthorn, hawthorn and elder, with bramble and ivy abundant in the under story. Trees include native ash and non-native sycamore, but have been cut to hedgerow height, leaving stumps with some new growth occurring. Young ash is also present.

Stone walls are present at the base of some of these medium ranking hedgerows such as H01, H08, H09 and H10. Most of these hedgerows are of good height (2-4m) and consist of shrubs, herbs and open bases. However, they have a large amount of gaps which reduce their value as stock proof boundaries. They appear unmanaged in recent times.

H13, H19, H21, H29, H34, H36, H39 and H40 are low value hedgerows. H13 is a small isolated hedgerow near rubble and scrub associated with a residential property. This hedgerow is less than 1 metre wide and has a large amount of gaps (over 50%), and lacks structural diversity. It is composed predominately of hawthorn with some young ash. H19, H21, H29, H34, H36, H39 and H40 all lacked height, width, structure and structural diversity. Gaps were also prevalent.

Based on the value of these hedgerows as habitats and their value as corridors linking biodiversity in Johnstown and the wider countryside three networks were identified.

JT1 Network of hedgerows and an old house (The Rectory) with stone buildings, mature trees and grassy verge habitat.

This network includes the following hedgerows (H01, H02, H03, H04, H05, H06, H07, H08, H09, H10, H11, H62, H61, H63, H64, and H65), treeline (WL2), scrub (WS1) dry stone walls (BL1A) and grassy verge habitat (GS2).

The core of this network is the network of hedgerows which provides a corridor for biodiversity within the study area and links it with the wider countryside.

The hedgerows (such as that shown in Plate 1) contain mainly native species, such as ivy, hawthorn, blackthorn, ash, elder and bramble. Non-native sycamore and the shrubs travellers' joy and laurel are also present in places. Some of these hedgerows are regularly managed (box shaped) and gaps have developed in most. However; the hedgerows adjacent to The Rectory appear unmanaged in recent years, with a resulting increase in structural diversity. The majority of these hedgerows also appear on the 1st Edition O.S. map (1837-1842) increasing their cultural value. The hedgerows form links with the wider countryside

through additional hedgerows outside the village boundary, which increase their ecological value.

Birds such as bullfinch, house sparrow, chaffinch, wren and dunnock were recording using the hedgerow network. Rabbit burrows were present in places.



Plate 1. Part of network of hedgerows showing good structural diversity with a mix of immature and mature trees and shrubs.



Plate 2. The Rectory with mature trees and stone wall

An old house (Plate 2) which has been unoccupied for some years now and is falling into disrepair is present on the south eastern fringe of the village boundary within this network (site mapped as BL31). The main structure of the house is still intact and provides suitable nesting habitat for some bird species and may be occupied by bats, however no bat survey was undertaken for this study. The out buildings are composed of cut stone (BL1B unmapped). There is a mature garden adjacent to the house with mature trees including Scot's pine and beech and a well developed scrub undergrowth consisting of elder, ivy and bramble. This is connected to the wider countryside by a line of mature beech trees to the south (WL2). A walled garden surrounded by a dry stone wall (BL1A) lies adjacent to the house on the western side. The wall supports abundant ivy. The garden itself has developed into an unmanaged grassy verge habitat (GS2 unmapped), dominated by the tussocky grass, cock's-foot (Plate 3). Docks and nettles are abundant as are thistle species, buttercups and cleavers. There are a few fruit trees scattered across the garden.

Jackdaw, wood pigeon and robin were observed in and around the old house with the mature garden supporting, wren, blue tit, blackbird and chaffinch. Rook was present in the mature trees. Blue tit, chaffinch and woodpigeon were recorded in the grassy verge habitat. White-tailed bumblebees were also present here. This network has connections to residences in the village through a stone wall and residential gardens and extends into the wider countryside through a continued network of hedgerows. Residential gardens, although composed predominately of non-native plants, provide important habitat for birds, small mammals and invertebrate species. The network is principally located within a matrix of agricultural tillage land or intensively managed grassland.



Plate 3. An old walled garden with grassy verge habitat and fruit trees.

JT2 Network of hedgerows and an old overgrown lane

This network contains the following habitats: hedgerows (WL1), (H27, H28, H26, H25, H24, H23, H22, H30, H29, H31, H32, H34, H33, H35, H52, H54, H55, H56, H 57, H58, H59 H60) dry stone walls (BL1A), grassy verges (GS2). The hedgerows contain native species such as hawthorn, blackthorn, ash, ivy and bramble. They are of medium height and width and are regularly maintained by cutting. The level of cutting has resulted in gaps developing, with new growth restricted. The network of hedgerows extends to the village centre where it connects with stone walls (BL1A) and small gardens associated with residential properties. Grassy verge type habitat (GS2) is present in unmanaged areas. This is predominately composed of tussock forming grass such as cock's-foot, and false oat grass. Herbs include creeping buttercup, nettle, docks and bush vetch.



Plate 4. An old, disused lane with trees, shrubs, ground flora and stone walls.

Hedgerow H27 (Plate 4) contains the remnants of an old lane (known locally as Brophy's Lane) that is now overgrown and inaccessible over most of its length. The hedgerow is regularly maintained, along part of its length. In a small area where the hedgerow has been removed (Plate 5) neutral grassland (GS1, Fossitt 2000) habitat is present, with species such as yarrow, violet, meadow vetchling, cats-ear, selfheal, creeping jenny and grasses such as creeping bent and meadow grass. Due to its small size this habitat was not mapped. As the lane extends west it is unmanaged and has developed more structural diversity with a mixture of trees including ash, elder and elm and shrubs including hawthorn, ivy and bramble. The lane itself has developed an understory of herbs, such as nettle, lesser celandine, cleavers and dandelion species. Stone walls are also present which support numerous mosses and lichens. Tree stumps and dead woody species add further diversity to this lane, increasing the ecological value of the habitat, particularly for invertebrate species. The lane disappears where it reaches H25 as one of the boundary hedgerows has been removed.



Plate 5. A small area of neutral grassland where hedgerow H27 has been removed.

Birds including, robin, blackbird, wren, dunnock, great tit, blue tit and chaffinch were recorded using this lane. Starling, jackdaws, rook and wood pigeon were present in adjacent farmland. Rabbit burrows were present in a number of these hedgerows, with rabbits seen feeding in the fields. Invertebrates, including white-tailed bumblebee, large white butterfly and painted lady butterfly were also observed.

This network has connections to residences in the village through residential gardens and extends into the wider countryside through a continued network of hedgerows. The network is principally located within a matrix of agricultural tillage land or intensively managed grassland.

JT3 Network of dry stone walls and hedgerows and grassy verge habitat.

In the south east of the village green infrastructure is composed of stone walls (BL1A), hedgerows (WL1 numbered H12, H19, H20), an area of abandoned land where grassy verge habitat (GS2) has developed, a new plantation (WD4) and a large block of mature gardens (in area mapped as BL31 near the centre of the village).

Stone walls (Plate 6) provide a habitat for mosses and lichens and herbs such as navelwort, wavy bittercress and annual meadow grass. H12 is an isolated hedgerow, forming a boundary with residential property, however; it remains connected to a treeline and new beech hedging.



Plate 6. Stone wall along the road entering Johnstown from the south west.

Hedgerows H19 and H20 surround tilled land and are of low to moderate value, with poor structural diversity and numerous gaps. However, they contribute to the green network by providing a corridor for birds, invertebrates and small mammals. H19 is linked to a patch of grassy verge habitat (GS2) that has developed on an abandoned area of land. The grassy verge habitat consists mainly of grasses such as cock's-foot, creeping bent, meadow rush and herbs including ragwort, nettle, spear thistle, ribwort plantain, soft-fruited willow herb, silverweed, meadow buttercup and dandelions. Elder, goat willow and grey willow are also present. H20 extends into the wider countryside.

H20 is connected by an adjacent treeline, stone wall and conifer plantation to large mature gardens (in area mapped as BL31 near village centre) which increase habitat diversity and connectivity within the village and wider countryside. These gardens consist of a mixture of open lawns, non-native shrubberies, bedding plants, mature trees (horse chestnut and beech) and an old stone wall. The mature beech contains an active rookery. Supplementary feeders are provided, which encourage garden birds with robin, chaffinch, blackbird, great tit, blue tit and starling recorded. The out buildings associated with one of the houses has potential sites for bats, but no bat survey was undertaken as part of this study. Although a breeding bird survey was not undertaken it can be assumed that all hedgerows are important for nesting birds (protected under the Wildlife Acts).

Green infrastructure – networks

The ecological networks associated with Johnstown provide several ecosystem services :

Hedgerows and associated semi-natural habitats provide reservoirs for native biodiversity. They provide commuting and dispersal corridors for native species. They are important for nesting birds (protected under the Wildlife Acts), native plants and trees.

Their invertebrate biodiversity performs an essential supporting function to agriculture as they provide a habitat for pollinating insects and predators of crop pests.

They are important features of the cultural landscape providing evidence of landscape management over previous centuries.

They contribute to landscape values.

Some sections of ecological networks such as old lanes have potential for development as landscaped amenity areas and /or “greenways” . Greenways are non motorised transport routes.

Priorities for development should be the promotion of higher standards of management of hedgerows by owners and greater consideration of Green Infrastructure values by planners if development is proposed adjacent to the ecological networks identified around Johnstown. Guidelines are provided to inform spatial planning around hedgerows.

3.3 Other features of biodiversity interest

The two historic graveyards in the area are of low biodiversity interest as they currently support intensively managed amenity grassland (GA2). The dry stone walls which surround them are also of limited value as habitats. More appropriate management of vegetation could enhance their potential to become habitats of local interest and capitalise on their proximity to existing networks.

3.4 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 Johnstown

Ecological Network/Habitats	Ecological network element	Ecological evaluation
JT1: WS1, WL1: H06, H62, H65	Corridor feature	Local importance (higher value)
JT1: GS2, WL2, BL1A	Small scale core/corridor features	Local importance (lower value)
JT1: WL1: H01, H02, H03, H04, H05, H07, H08, H09, H10, H11, H61, H63, H64	Corridor feature	Local importance (lower value)
JT2: WL1: H22, H23, H26, H27, H31, H52, H54	Corridor feature	Local importance (higher value)
JT2: BL1A, GS2, WS3A and H24 H25, H28, H29, H30, H32, H33, H34, H35, H55, H56, H57, H58, H59 H60	Corridor features	Local importance (lower value)
JT3 WL1, (H12, H19, H20), BL1A, GS2, WL2	Small scale core/corridor features	Local importance (lower value)
WL1: H45, H50, H52	Corridor features	Local importance (higher value)
WL1: H14, H15, H16, H17, H18, H28, H37, H38, H41, H42, H43, H44, H46, H47, H48, H49, H51, H53, H66, H67	Corridors	Local importance (lower value)

3.5 Guidelines for sustainable development of hedgerows

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

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, stonewall) 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.

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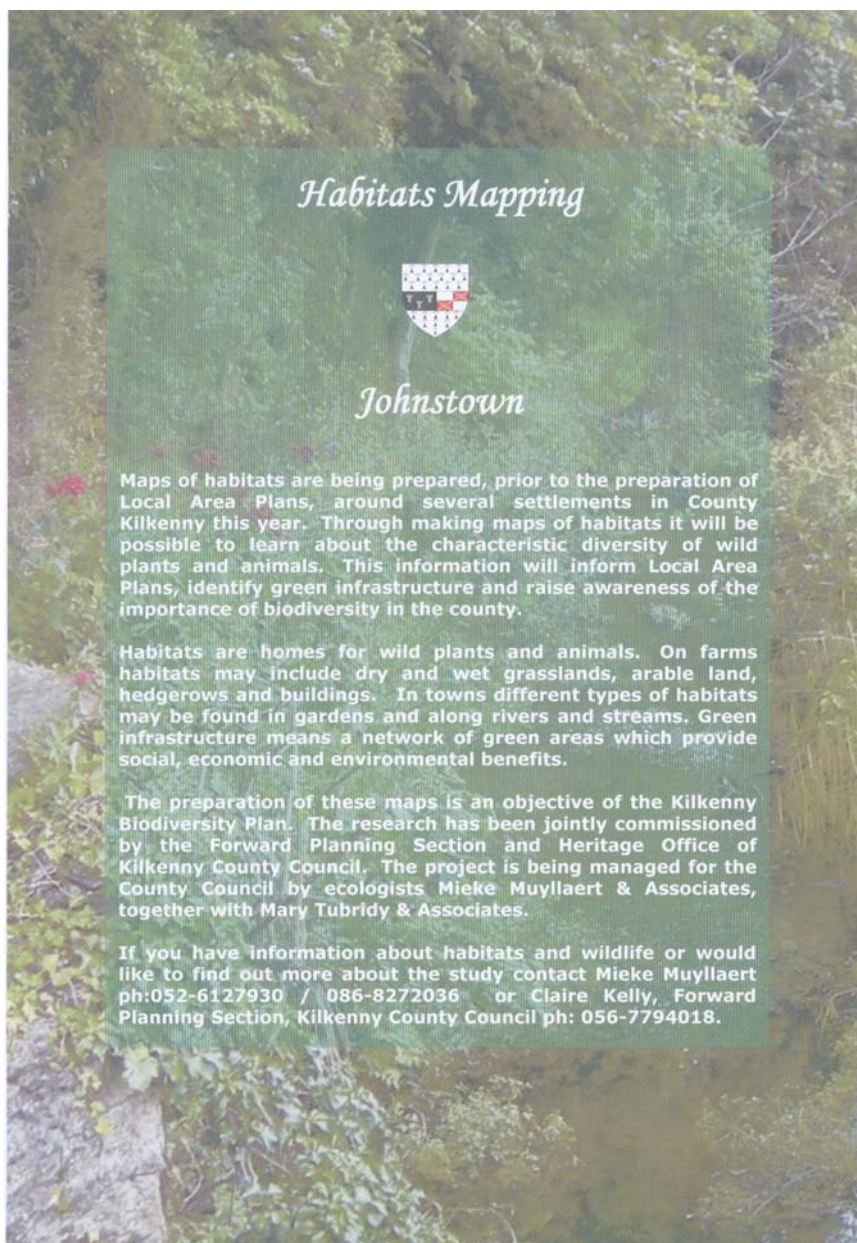
Websites

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

Settlement:	Surveyor:
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No	Height	Width	Gaps	Biodiversity value	Structure	Structural diversity	Bird value	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 Roosting habitat only 2 Roosting, feeding habitat 3 Roosting, feeding, nesting habitat	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: JT1

Habitat codes WL1, BL1A, GS2

Scientific name	Common name
<i>a</i>	Annual meadow grass
<i>Fagus sylvatica</i>	Beech
<i>Prunus spinosa</i>	Blackthorn
<i>Rubus fruticosus</i>	Bramble
<i>Rumex obtusifolius</i>	Broad-leaved dock
<i>Galium aparine</i>	Cleaver
<i>Dactylis glomerata</i>	Cock's-foot
<i>Agrostis stolonifera</i>	Creeping bent
<i>Ranunculus repens</i>	Creeping buttercup
<i>Taraxacum officinale</i> agg.	Dandelions
<i>Sambucus nigra</i>	Elder
<i>Veronica chamaedrys</i>	Germander Speedwell
<i>Ulex europaeus</i>	Gorse
<i>Crataegus monogyna</i>	Hawthorn
<i>Hedera helix</i>	Ivy
<i>(Leylandii) x</i>	Leyland Cypress
<i>Cupressocyparis leylandii</i>	
<i>Lolium perenne</i>	Perennial rye-grass
<i>Senecio jacobae</i>	Ragwort
<i>Pinus sylvestris</i>	Scots pine
<i>Acer pseudoplatanus</i>	Sycamore
<i>Cirsium</i> sp.	Thistle specie
<i>Clematis vitalba</i>	Traveller's-joy
<i>Holcus lanatus</i>	Yorkshire fog

Ecological network feature: JT2

Habitat codes WL1, GS2, GS1, BL1A

Scientific name	Common name
<i>Poa annua</i>	Annual meadow grass
<i>Fagus sylvatica</i>	Beech
<i>Prunus spinosa</i>	Blackthorn
<i>Rubus fruticosus</i>	Bramble
<i>Rumex obtusifolius</i>	Broad-leaved dock
<i>Vicia sepium</i>	Bush vetch
<i>Hypochaeris radicata</i>	Cat's-ear
<i>Galium aparine</i>	Cleaver
<i>Dactylis glomerata</i>	Cock's-foot

<i>Urtica dioica</i>	Common nettle
<i>Agrostis stolonifera</i>	Creeping bent
<i>Ranunculus repens</i>	Creeping buttercup
<i>Taraxacum officinale</i> agg.	Dandelions
<i>Sambucus nigra</i>	Elder
<i>Veronica chamaedrys</i>	Germander Speedwell
<i>Crataegus monogyna</i>	Hawthorn
<i>Hedera helix</i>	Ivy
<i>Lolium perenne</i>	Perennial rye-grass
<i>Senecio jacobae</i>	Ragwort,
<i>Prunella vulgaris</i>	Self-heal
<i>Cirsium</i> sp.	Thistle specie
<i>Achillea millefolium</i>	Yarrow
<i>Holcus lanatus</i>	Yorkshire fog

Ecological network feature: JT3

Habitat codes WL1, BL1A,GS2, WL2,BL31

Scientific name	Common name
<i>Poa annua</i>	Annual meadow grass
<i>Fagus sylvatica</i>	Beech
<i>Prunus spinosa</i>	Blackthorn
<i>Rubus fruticosus</i>	Bramble
<i>Rumex obtusifolius</i>	Broad-leaved dock
<i>Galium aparine,</i>	Cleaver
<i>Dactylis glomerata</i>	Cock's-foot
<i>Agrostis stolonifera</i>	Creeping bent
<i>Ranunculus repens</i>	Creeping buttercup
<i>Taraxacum officinale</i> agg.	Dandelions
<i>Sambucus nigra</i>	Elder
<i>Salix cinerea</i>	Grey willow
<i>Salix caprea</i>	Goat willow
<i>Crataegus monogyna</i>	Hawthorn
<i>Hedera helix</i>	Ivy
<i>(Leylandii) x</i>	Leyland Cypress
<i>Cupressocyparis leylandii</i>	
<i>Juncus inflexus</i>	Meadow rush
<i>Umbilicus rupestris</i>	Navelwort
<i>Senecio jacobae</i>	Ragwort
<i>Plantago lanceolata</i>	Ribwort plaintain
<i>Potentilla anserina</i>	Silverweed
<i>Epilobium obscurum,</i>	Soft-fruited willowherb
<i>Cirsium vulgare</i>	Spear thistle
<i>Cirsium</i> sp.	Thistle specie
<i>Cardamine flexuosa</i>	Wavy bittercress
<i>Holcus lanatus</i>	Yorkshire fog

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	2	1	2	2	0	2	2	13	3
H02	3	2	1	2	2	1	3	2	16	3
H03	2	2	2	4	2	1	4	2	19	1
H04	3	3	1	2	2	1	3	2	17	1
H05	2	2	1	1	4	1	3	2	16	1
H06	3	3	2	4	4	1	5	2	24	1
H07	3	2	2	2	4	1	3	2	19	1
H08	2	2	0	1	2	1	2	2	12	1
H09	2	2	1	1	4	1	4	2	17	2
H10	2	2	3	1	4	0	3	2	17	1
H11	2	2	4	2	4	0	2	2	18	3
H12	4	2	3	2	4	0	2	2	19	5
H13	3	1	1	1	3	0	0	1	10	3
H14	2	1	1	1	2	0	3	1	11	3
H15	1	1	0	1	2	0	4	2	11	5
H16	2	2	1	4	3	1	2	2	17	3

Appendix 4 Results of hedgerow evaluation (contd)

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
H17	3	2	1	2	4	0	3	2	17	3
H18	2	1	0	2	3	0	2	2	12	5
H19	2	1	0	1	3	0	0	1	8	3
H20	2	2	1	1	4	0	3	2	15	2
H21	2	1	1	1	2	0	0	1	8	1
H22	2	3	3	2	4	1	3	2	20	3
H23	2	3	2	4	4	1	4	2	22	3
H24	2	3	2	2	2	1	3	1	16	3
H25	3	3	2	2	2	0	3	2	17	3
H26	2	3	2	2	4	0	5	2	20	3
H27	2	3	2	4	4	0	5	2	22	3
H28	2	2	2	1	4	1	3	2	17	2
H29	1	2	0	1	1	0	2	1	8	3
H30	2	2	1	2	2	0	2	2	13	3
H31	2	3	2	1	4	1	5	2	20	3

H32	2	2	1	1	3	0	4	2	15	3
H33	2	2	3	1	2	1	3	2	16	3
H34	1	1	0	1	1	0	4	2	10	4

Appendix 4 Results of hedgerow evaluation (contd)

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
H35	2	3	2	2	3	0	3	2	17	3
H36	1	1	2	2	2	0	0	2	10	3
H37	2	3	2	1	4	0	2	1	15	1
H38	1	1	0	1	3	0	5	2	13	3
H39	1	2	2	0	1	0	0	1	7	3
H40	1	2	0	1	2	0	2	2	10	3
H41	3	3	0	1	3	1	2	1	14	3
H42	2	2	0	1	2	0	5	2	14	4
H43	2	2	2	1	1	0	2	2	12	3
H44	2	2	3	1	2	0	3	2	15	3
H45	2	3	3	4	4	1	3	2	22	3
H46	2	2	1	2	3	1	4	2	17	1
H47	2	3	2	1	4	0	4	2	18	1

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H48	4	3	4	1	4	0	2	1	19	3
H49	3	3	1	1	4	0	3	2	17	4
H50	4	3	4	1	4	0	3	2	21	3
H51	2	3	2	1	2	0	0	2	12	4
H52	3	3	4	1	4	1	4	2	22	2

Appendix 4 Results of hedgerow evaluation (contd)

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+ 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
H53	3	3	4	1	4	1	2	1	19	4
H54	4	3	4	1	4	0	3	2	21	4
H55	3	2	2	1	4	0	3	2	17	4
H56	2	3	1	1	4	0	5	2	18	2
H57	3	2	2	1	4	0	2	2	16	1
H58	4	3	1	2	4	1	2	2	19	2
H59	4	3	1	2	4	0	2	1	17	5
H60	3	3	3	1	4	0	0	1	15	5
H61	2	4	2	2	2	0	2	2	16	2
H62	2	3	2	2	4	0	5	2	20	3
H63	2	3	2	1	2	1	3	2	16	3
H64	3	2	4	1	4	0	2	2	18	3
H65	2	2	4	2	4	0	4	2	20	4
H66	2	2	1	1	4	0	2	2	14	3
H67	2	2	1	1	2	0	3	2	13	3

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	WN	<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
GA	<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
GS	<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
HH	<i>Heath</i>	ER	<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
HD	<i>Dense bracken</i>	EU	<i>Underground rock and caves</i>
HD1	Dense bracken	EU1	Non-marine caves
		EU2	Artificial underground habitats

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		ED	Disturbed ground
P	PEATLANDS	ED1	Exposed sand, gravel or till
PB	Bogs	ED2	Spoil and bare ground
PB1	Raised bog	ED3	Recolonising bare ground
PB2	Upland blanket bog	ED4	Active quarries and mines
PB3	Lowland blanket bog	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		
CS2	Sea stacks and islets	S	SUBLITTORAL (SUBTIDAL)
CS3	Sedimentary sea cliffs	SR	Sublittoral rock
CW	Brackish waters	SR1	Exposed infralittoral rock
CW1	Lagoons and saline lakes	SR2	Moderately exposed infralittoral rock
CW2	Tidal rivers	SR3	Sheltered infralittoral rock
CM	Salt marshes	SR4	Exposed circalittoral rock
CM1	Lower salt marsh	SR5	Moderately exposed circalittoral rock
CM2	Upper salt marsh	SR6	Sheltered circalittoral rock
CB	Shingle and gravel banks	SS	Sublittoral sediment
CB1	Shingle and gravel banks	SS1	Infralittoral gravels and sands
CD	Sand dune systems	SS2	Infralittoral muddy sands
CD1	Embryonic dunes	SS3	Infralittoral muds
CD2	Marram dunes	SS4	Infralittoral mixed sediments
CD3	Fixed dunes	SS5	Circalittoral gravels and sands
CD4	Dune scrub and woodland	SS6	Circalittoral muddy sands
CD5	Dune slacks	SS7	Circalittoral muds
CD6	Machair	SS8	Circalittoral mixed sediments
CC	Coastal constructions	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

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.

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/orSpecies 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/orSpecies 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.