

Kilkenny Local Area Plan Habitat Assessments 2010

FIDDOWN



Wet woodland along the bank of the River Suir in Fiddown

Report prepared for Kilkenny County Council

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May 2010

CONTENTS

Acknowledgements.....	1
Executive Summary	2
1.1 Study brief.....	4
1.2 Approach.....	4
2 Methodology	6
2.1 Introduction.....	6
2.2 Consultations and desk study.....	6
2.3 Fieldwork	7
2.4 Habitat mapping.....	8
2.5 Hedgerow survey	9
2.6 Map digitisation and database compilation.....	10
2.7 Reporting and data presentation.....	11
2.8 Study constraints	11
3 Results.....	12
3.1 Geodiversity	12
3.2 Ecological networks.....	13
3.3 Summary of biodiversity assessment/evaluation	26
4. Guidelines for Sustainable Development of Hedgerows and Drainage Ditches	27
Hedgerows	27
Drainage Ditches.....	28
Bibliography	29
Appendix 1 Information Leaflet	31
Appendix 2 Record sheets used in habitat mapping and hedgerow evaluation.....	32
Appendix 3 Target notes	26
Appendix 4 Results of hedgerow evaluation	27
Appendix 5 Summary of Fossitt habitat classification	28
Appendix 6 Ecological evaluation criteria.....	30

Acknowledgements

The study team are grateful to the following individuals and organisations who provided information, practical assistance and support:

Landowners and residents who allowed their land and to be surveyed.

Frank O'Donoghue, Southern Regional Fisheries Board who provided comments on the value of Fiddown river as a habitat for salmonids.

Pat Durkan of Kilkenny branch, BirdWatch Ireland who identified important bird areas in and around Fiddown.

Jimi Conroy, National Parks and Wildlife Service (NPWS) conservation ranger.

Roger Goodwillie and Paul Green, Kilkenny and Waterford county recorders for the Botanical Society of the British Isles.

Dearbhala Ledwidge, Heritage Officer, and Claire Kelly, Executive Planner and staff of Kilkenny County Council, who commented on an early draft.

Executive Summary

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

A Green Infrastructure approach was taken to describing biodiversity, based on the identification of habitats and their relationship within ecological networks. Green Infrastructure highlights the provision of ecosystem services by biodiversity. These include food/timber production, mitigation of climate effects (e.g flooding), quality of life and supporting services to agriculture. Fieldwork took place in January 2010 to map habitats to Level 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 Fiddown 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 this map and their value for biodiversity is summarised in Table 2. This report contains a summary account and evaluation of biodiversity and its value as Green Infrastructure.

Three principal ecological networks were identified in Fiddown. The most important one, which is considered of international ecological value, is based around the river and adjacent wet woodland, most of which is outside the LAP boundary but lies within the internationally protected Lower River Suir Special Area of Conservation. It contains rare wetland habitats, and supports salmon which have statutory protection. The habitats within it warrant special

management and protection from future development. Also, any development adjacent to this ecological network which could affect water quality or riparian habitats should be screened for appropriate assessment for any potential impact on the cSAC. Linking features/corridors associated with this network comprise hedgerows.

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

In the south east of the village, the old church yard and adjacent scrub habitats provide small core and corridor features linking the east side of the village to the river corridor.

The ecological network north of the railway line is centred on hedgerows with associated small habitat areas of scrub, mixed woodland, dry meadow grassland and recolonising ground. These do not support rare habitats or rare species. Some of the hedgerows are high local ecological value and function principally as a link between the village centre and the river corridor. The other small habitat areas are of lower local importance. Development in this area should seek to ensure the maintenance of hedgerows and other habitats by integrating them into future developments, where feasible.

Close to this hedgerow network is a small quarry with scrub habitat that is of low local value. Its value could be enhanced by planting of native hedgerow or treeline to link it to the railway hedgerow.

Hedgerow evaluation revealed that over half the hedgerows surveyed are of moderate value, while the remainder are of high value. 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, and provide connectivity between habitats. 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.

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 Muyllaert, 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:

- Fiddown Local Area Plan 2003
- Ecological Survey of Fiddown to inform the local area plan (CAAS, 2003).
- National Parks & Wildlife Service online data (www.npws.ie)
- Site file for the nearest designated site: Lower River Suir cSAC No. 2137 inspected in NPWS, Ely Place, Dublin.

- National Survey of Native Woodlands (Perrin et al , 2008) which includes a report on the woodland beside the river (Site no. 22).
- Environmental Protection Agency data on soils and water quality <http://maps.epa.ie/InternetMapView/mapviewer.aspx> - Land/Soils; Land/Subsoils; Water Quality/Current River Data; Water Quality/Coastal and Estuarine Waters
- Geological Survey of Ireland geological data on geology, subsoils and hydrology. http://spatial.dcenr.gov.ie/imf/imf.jsp?site=GSI_Simple – Bedrock datasets/Bedrock 100k Solid Geology; Bedrock datasets/Faults 500k; Groundwater/Karst features; Groundwater/ National Draft Bedrock Aquifer Map; Groundwater/National Draft Gravel Aquifer Map; Groundwater/Irish Interim Vulnerability.
- County Kilkenny Groundwater Assessment (Kilkenny County Council and Geological Survey 2002)
- Kilkenny County Development Plan 2008-2014 (www.kilkennycoco.ie/cdp/index.html)
- Draft County Kilkenny Biodiversity Action Plan 2008

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

2.3 Fieldwork

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

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

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

'Target notes' were compiled for ecological networks of particular value. These are notes entered into record cards during the field survey and consisted of lists of species and notes on habitat features (Appendix 3). These were used to inform descriptions contained in this report. Photographs were taken of habitats within these areas.

2.4 Habitat mapping

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

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

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

The Fossitt classification system (summaried in Appendix 5) provides a hierarchal 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 Fiddown 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 Fiddown habitat classification followed Fossitt conventions with the following modifications which have been developed through experience of habitat mapping studies elsewhere (Dublin, Laois and Kildare):

1. Hedgerows consisting of non-native shrubs, usually surrounding housing were identified as WS3A. This is a sub type of WS3 (Ornamental /non native shrubs) according to Fossitt 2000).
2. The Fossitt habitat category BL1 (Stone buildings) was subdivided into BL1A (stone walls) and BL1B (stone buildings).
3. Land under development (i.e. a building site) transitional between habitat types, was mapped as BL3D.
4. Due to the difficulty of describing habitats in gardens three additional habitat types were identified in semi-urban areas to describe the characteristic biodiversity associated with houses and gardens. Gardens were observed from outside, except where permission was given to enter them. These habitat types were developed from experience of fieldwork in Dublin where the recommended habitat type BC4 (Flower beds and borders) did not usefully describe habitat diversity. These new habitats were subsets of the habitat category BL3 (Buildings and built surfaces) and were BL3 1; BL3 2 and BL3 3. The three types are distinguished by size of garden; areas mapped as BL3 1 have houses and gardens occupying an area > 500 m². BL3 2 have gardens between 250 and 500 m² usually associated with semi-detached houses. The third category BL3 3 describes areas dominated by small gardens < 250 m². Experience elsewhere suggests that the largest gardens support a diversity of habitats often featuring mature trees. Medium size gardens usually have areas with ornamental non native shrubbery and smaller gardens have a smaller number of habitats dominated by amenity grassland (GA2).

2.5 Hedgerow survey

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

Hedgerows were inspected along their entire length where possible. Data was collected on their average height and width, gappiness, biodiversity value (number of native tree and shrub species), number of layers (herb, shrub, trees), structural features (bank, ditch, water), connections to other hedgerows, age

(whether the hedgerow existed in the 1840s and whether it was a townland boundary), management, and other features of biodiversity interest (rare plants, badger sett etc).

The data was used to score the surveyed hedgerows so that the most important ones could be identified. Details of the scoring system for each characteristic are shown on the Hedgerow Record Card (Appendix 2). Scores under each characteristic were added to give an overall score for each hedgerow.

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

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

3 Results

3.1 Geodiversity

The Fiddown area is underlain by the two principal rock types found in Kilkenny; limestones and sandstones. The principal underlying rock type is a dark muddy limestone/shale (Ballysteen formation), with oolitic limestones, locally dolomitised (Bullockpark Bay Member) coming in as a wedge along a fault line underlying the western half of the village. Interbedded limestones and dark grey calcareous shales (Ballymartin Limestone) adjoin to south of study area. Sandstones, shales and limestones of the Porters Gate and Ballymartin formations, and yellow and red sandstone and green mudstone of the Kiltorcan formation are found under Fiddown island and river bank adjacent to the village. Rock is exposed at two locations, to the west at the site of the old quarry, and at the level crossing.

The aquifer within the limestone is moderately productive. This contrasts with the status of the aquifer associated with the Porters Gate sandstones which is considered regionally important. All aquifers in the immediate environs of the village are considered to be mostly high to extremely vulnerable. To the east and north the aquifer in the hinterland is moderately vulnerable (Kilkenny County Council and GSI, 2002).

Soils are derived from sandstone till and include productive acid brown earths/brown podzolics with some acidic gleys prone to waterlogging. Shallow rendzinas/lithosols are associated with the areas of outcropping bedrock. As the floodplain of the river is narrow on the north side of the river within the study area, alluvial soils occupy a narrow band.

The study area is drained by the River Suir. Inspection of the EPA web site (Water Quality/Current River Data; Water Quality/Coastal and Estuarine Waters) shows that river water quality is assessed 1.5km upstream of Carrick on Suir, where freshwater conditions occur. The most recent data, based on measurements taken in 2008 shows this section having a Q value of 3 (poor status). From Fiddown Bridge downstream the river is considered part of the Suir estuary and is assessed under a separate system whereby the EPA monitors coastal and transitional waters. The Suir estuary below Fiddown bridge is assessed (2001-2005) as being potentially eutrophic. Overall this implies that the most recently available data shows generally poor to moderate water quality in the Suir in the vicinity of Fiddown.

3.2 Ecological networks

FD1 River Suir corridor

The principal and most important ecological network in Fiddown is associated with the River Suir. Its extent is outlined on Map 2 and the habitats found within it are shown on the Habitat Map (Map 1).

This area lies within the Lower River Suir SAC (Special Area of Conservation, Site code 2137), a designated site of international biodiversity importance. It is also part of Fiddown Island Nature Reserve. The main habitats within this area are the tidal river (CW2) and riparian woodland (WN5). Also found within this area are dry meadow and grassy verge grassland (GS2), spoil and bare ground (ED2) and some roads/laneways. The invasive non-native species, Japanese knotweed, was found in the riparian woodland.

The Southern Regional Fisheries Board have confirmed (F. O'Donoghue, *pers. comm.*) that the River Suir in this area is likely to be significant for resident smelt and "slob" or estuarine trout. It also supports migrating Atlantic salmon and Twaite shad which may very well be resident in the area and migrate upstream to spawn in the Carrick-on-Suir area. These latter two species are internationally protected. Riparian habitat appears to be well established on the southern bank of the river and on Fiddown Island. There are no other salmonid streams in the vicinity of the village.

The principal characteristics of this network were described by CAAS (2003) and confirmed by fieldwork in 2010. Perrin *et al* (2008) provide an additional account of the riparian woodland associated with Fiddown Island.

As well as the tidal river, the riparian woodland is of particular significance for biodiversity. This type of wet woodland along rivers is rare in Ireland and the example found at Fiddown is one of the best in the country. It corresponds with the EU Annex I priority habitat 91E0 alluvial forests with alder *Alnus glutinosa* and ash *Fraxinus excelsior*. This type of woodland is declining across Europe as a result of drainage and reclamation, and one of the best examples on the Suir is found here at Fiddown Island and along the river bank.

Within the LAP area, riparian (riverside) woodland forms a narrow band along the banks of the River Suir where water levels fluctuate with tidal movements and within the floodplain. This band is fragmented in part by an oil storage terminal and the bridge which forms the main river crossing in the area. The woodland is dominated by willow tree species, most notably non-native white willow and crack willow, and the native rusty/sally willow.



Figure 1. A narrow band of riparian woodland along the bank of the River Suir, which forms part of the Lower River Suir SAC.

As a result of frequent flooding there is an accumulation of water-borne household rubbish and plant debris, which is abundant in places. The ground is very wet and muddy and ground flora is sparse but includes species such as water figwort, wild angelica and common nettle. Additional species found by CAAS (2003) include marsh ragwort, marsh marigold, hemlock water-dropwort, and summer snowflake. This latter species has a very limited distribution in Ireland and is considered to have been introduced in most places. Additional species recorded from Fiddown Island as part of the native woodland survey include goat, almond and osier willows, guelder rose, hazel, greater pond-sedge, and meadowsweet (Perrin et al , 2008).

The Lower River Suir SAC is also important for protected species such as the otter, Daubenton's bat and common frog (Lower River Suir cSAC site synopsis).

Birds known to use the riparian habitats are reed bunting, sedge warbler, mute swan, willow warbler, whitethroat, chiffchaff, grey wagtail, rail, moorhen, coot, little grebe, heron and little egret. Greylag geese are known to use land further downstream on the Waterford side of the river. Golden plover and lapwing are found in the area in winter. Many of these bird species are on the list of Birds of Conservation Concern in Ireland (Lynas *et al* 2007).

Part of the Suir just south of Fiddown is used by the public for recreational purposes, including boating and kayaking, and the lane running west along by the river is used by walkers/fishermen. This open area contains a mixture of disturbed ground, grassy verges and built areas, which is connected to the

village by a public road. Two hedgerows (H11, H13) add to the habitat diversity here.

Green infrastructure – FD1

The core green infrastructure feature in Fiddown is the corridor of the River Suir, which includes the tidal river (CW2) and riparian woodland (WN5). As well as being the core feature of the village, it clearly has a corridor function, allowing for movement of protected species such as salmon thus linking the biodiversity of Fiddown with many other places, upstream and downstream along the Suir and estuary.

The dry meadow grassland (GS2), amenity area comprising spoil and bare ground habitats (ED2), hedgerows (H11, H13) and car park (BL3) are included in this area because they are within the SAC and immediately adjacent to the river. They can be considered as “nature rehabilitation areas” because ecologically they are currently of low to moderate value, but they have the potential to be managed more favourably for nature and for amenity.

The green infrastructure of the River Suir corridor provides several services to society. It is an important reservoir of biodiversity and part of an internationally important cSAC. It contains an excellent example of a habitat of international significance, wet woodland, listed in the Habitats Directive. This provides an important regulatory function as it absorbs floodwaters and potentially acts to remove pollutants. The wet woodland is a carbon sink, mitigating for climate change. The river is navigable in this area. The state-owned Fiddown Island Nature Reserve, whose boundary includes the river bank beside the village, is a key local green infrastructure asset. It was previously used for growing osiers for basket-making. It now provides a visual amenity and biodiversity resource. It has the potential to be developed for environmental education. The Nature Reserve should be highlighted as part of e.g. Tidy Towns applications, for example with an interpretive sign at the amenity area (the local NPWS conservation ranger and Kilkenny BirdWatch can provide information for this). In addition, the site of Fiddown Castle adds to the cultural importance of the river corridor.

Protection of the river corridor should be the priority of any local development. Future development should seek to improve the quality of “buffer” areas by restoring riparian habitats in the vicinity of the river. This could involve the establishment of riparian woodland or wetlands. Protection of water quality must be ensured. Advice should be sought from the County Council about the

treatment/removal of the Japanese knotweed, and any other invasive species, as inappropriate management of this could lead to further problems downstream.

The amenity area at the Strand is well located to make use of the key river corridor feature. As the river and island are within a Special Area of Conservation, any proposals for development must be discussed with local NPWS staff who will advise on options for sensitive development. Any future integrated tourism facilities could include the revival of osier cultivation on Fiddown Island and the associated tradition of basket-making.

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

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.

Thirteen hedgerows were surveyed and evaluated. All of these are within or on the study area boundary, while two of them extend beyond the study boundary.

The extent of hedgerows reflects the field patterns and history of land management. The total number of hedgerows has declined since the early 1800s, with the most intact network being found in the improved grassland fields outside the LAP boundary immediately south of the railway. The building of the railway in the mid-1800s created a new double hedgerow between these fields and the rest of the village. Development of the village north of the railway in the following years has resulted in the loss of much of the hedgerow network.

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 Fiddown.

Table 2. Hedgerow Evaluation

Hedgerow Numbers	Rating	Description
-	1 *	Low value – least important
H02, H03, H04, H05, H07, H08, H09, H13	2 **	Moderate value - of moderate importance

Kilkenny LAP Habitat Assessment FIDDOWN

H01, H06, H10, H11, H12	3 ***	High value – most important
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Over half of the hedgerows are of cultural value as they are shown on the 1st edition OS map (1837-1842); none of these are townland boundaries. All of the hedgerows in the study area were found to be of relatively moderate or high value.

Almost all are associated with banks, raised linear mounds of earth on which plants were originally established. All had at least some trees present. The most frequently-occurring tree species is ash. Non-native horse chestnut and sycamore also occur. Holly is found in H10.

Seven different shrubs were recorded from the surveyed hedgerows: hawthorn, blackthorn and elder were found throughout. Other native shrub species are ivy and bramble, while the non-native travellers-joy and butterfly bush are occasional.

The highest-ranking hedgerows are H01 and H11. The Limerick/Waterford rail line runs through Fiddown village and the hedgerows present on both sides of this line act as a corridor through the village. (H01a and H01b on the LAP boundary on the north side of the railway were surveyed.) Birds including song thrush, goldcrest, bullfinch, blackbird and blue tit were recorded moving along this hedgerow. H01 adjacent to the village is generally a good height (over 3 m) and 2 metres wide, with a diverse structure along most of its length, composed of trees, shrubs, herbs and a dense base. However, the hedgerow is unmanaged and gaps have developed in places. Close to the railway crossing trees and shrubs have been removed, with just a grassy bank remaining. This hedgerow also becomes fragmented at the railway crossing and associated railway buildings. The hedgerow along the northern side of the railway borders residential properties along part of its length and has concrete walls and ornamental hedging separating it from these residential properties. The hedgerow on the southern side primarily borders agricultural land and is also fragmented at the railway crossing.

Hedgerows H05, H06, H07 and H08 (Map 1) form a connection with the railway hedgerow just northwest of the railway crossing, near a public right of way, towards the centre of the village. Hedgerow H05 has developed into ivy, bramble and elder scrub (WS1) where it meets two derelict buildings. H05, H06, H07 and H08 are composed primarily of native species; blackthorn, hawthorn and elder, with bramble and ivy abundant in the under story. Mature trees including native ash and non-native horse chestnut and sycamore are also present. Most of these

hedgerows are of good height (3-4m) and consist of trees, shrubs, herbs and dense bases. However, hedgerow H07, partially dividing a field, has lost this structural diversity with large gaps at its base, allowing the livestock to move freely through it.



Figure 2. The railway line hedgerow (H01); Hedgerow H06, which forms an important network with the railway hedgerow.

The railway line hedgerows (H01a/b and hedgerow on south side of railway line form a green link to the south western half of the village through their connection with hedgerows H10 and H12, which surround an agricultural field here. Bird species, including; long-tailed tit, great tit, blue tit, chaffinch, house sparrow and linnets were recorded in this area. Rabbits were present in the field. H10 and H12 are over 2m in height and 2-3 m wide with good structural diversity, including; a tree, shrub, herb and base layer. Species include native holly, ash, hawthorn. Ivy and bramble and the non-native sycamore are present. Gaps have developed in places along their length and they appear unmanaged. These hedgerows are all of historical interest as they are shown on 1st edition maps of Fiddown.

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 based on the hedgerow survey methodology. Their value as part of local green infrastructure (Table 3) is evaluated based on the ecological evaluation criteria (Appendix 6), which finds that almost half the hedgerows in Fiddown are of local importance (higher value) due their importance in maintaining links and ecological corridors. This type of green infrastructure has the following values:

It supports habitats of high local value.

Certain hedgerows are important constituents of other ecological networks (i.e. H11, H13) providing corridors or additional habitat.

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

They are important features of the cultural landscape.

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

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.

FD2 Old graveyard with dry meadows and grassy verge habitat and associated areas of scrub and old stone walls

The core feature of this network is an area of dry meadow and grassy verge habitat (GS2) in an old graveyard, situated on the south eastern fringe of Fiddown. This habitat has developed as a result of low intensity management (infrequent cutting) and is dominated by the coarse, tussock-forming grass, cock's-foot. Other common grasses include Yorkshire fog, creeping bent and annual meadow grass. The herb component is well developed and includes species such as bush vetch, ragwort, herb robert, spear thistle, cleavers, creeping tormentil, ribwort plantain and creeping buttercup. Old yew trees and butterfly bushes are also present and together with bramble and ivy increase this area's potential for facilitating birds, small mammals and invertebrates, particular butterflies and bees, through the provision of food and shelter. The old church building appears regularly maintained and its presence may encourage bat species.



Figure 4. Old graveyard with dry meadow and grassy verge habitat.

The dry meadow and grassy verge habitat of the graveyard is connected to a linear patch of scrub which runs uninterrupted as far as the railway line hedgerow, near the railway crossing in the village. This scrub habitat is approximately 3 metres wide and contains shrubby species such as bramble and ivy, with some trees including holly, sycamore and ash. Where it reaches the railway line hedgerow, it opens into a wider patch of young and semi-mature ash that surround a hollow area of ground which is covered in ivy. It is fenced off from the adjacent field. This area is connected to railway hedgerow. In the line of scrub there is holly and sycamore. A group of long-tailed tits were observed following this corridor. Other birds recorded in this area include robin, blackbird, chaffinch, dunnock and great tit. In addition, the line of scrub is bordered on one side by an old stone wall that forms a continuous boundary from the junction in the village as far as an old house on the outskirts, encompassing the old church and graveyard. This wall supports plants, including ivy and navelwort.

The old graveyard is bordered to the south east by another patch of scrub, which contains a small pond and has a mature treeline running along its edge. The scrub area is dominated by elder, ivy and bramble and the mature trees consist of non-natives horse chestnut, beech and sycamore. Immature ash are scattered throughout this area.



Figure 5. An area of scrub, with a mature treeline, which lies adjacent to the old graveyard.

A pair of mistle thrush were observed moving between the treeline (WL2) and the adjacent agricultural land. Robin, blackbird and wren were observed in the scrub. This area of habitat together with the old graveyard may provide habitat for bats. A dedicated bat survey would be needed to confirm this – none was undertaken for this study.

Green infrastructure – FD2

The graveyard and adjacent scrub habitat form a small core feature, which links into the village and the wider countryside to the east along the stone wall/scrub corridor bordering the road and leading to the railway, while the treeline to the south provides the closest link to the River Suir corridor.

The ecological network/green infrastructure functions associated with this area are:

It supports habitats of local importance (higher value) and it links the village to the River Suir corridor, an area of international importance.

The stone wall and old church is locally important in a historical and ecological context.

Development in this area should seek to retain the roadside stone wall and at least some of the linear scrub. The graveyard and church should be maintained in an ecologically-friendly way i.e no herbicides should be used. This ecologically friendly approach can be highlighted on any interpretive material produced for this site or on Tidy Towns applications.

FD3 Area of old quarry

A small old quarry is situated to the east of Fiddown, close to the N24 road. This was not surveyed in detail but remains in a similar condition since the previous survey (CAAS, 2003). It is dominated by scrub with patches of grassy verge habitat and includes species such as hawthorn, blackthorn and gorse. It is surrounded by ornamental *Leylandii* hedging. The land adjacent is composed of intensive agricultural land and an area of amenity grassland, associated with a new commercial business. A hedgerow connecting this quarry to the railway has been removed.

Green infrastructure – FD3

The old quarry is a small core feature of local importance (lower value). Its value has been reduced as it has become isolated from other semi-natural habitats.

Its main green infrastructure function is as a reservoir of local biodiversity of native scrub and as a nesting area for birds.

Its value could be improved by planting a native hedgerow from the railway to the old quarry. The *Leylandii* around the quarry could be removed – this species is of extremely limited value for biodiversity and is not in keeping with the rural character of the village edge. Planting of native trees would be more appropriate.

Other features of biodiversity interest.

A number of smaller areas of biodiversity interest are scattered throughout the village. Almost all of these are linked to the hedgerow network.

An old track/lane with public right of way, running between H05 and H08, provides access from the village as far as the road leading to the banks of the River Suir. Before crossing the rail line, the track is muddy and unmanaged. Stiles provide access across the rail line, linking the lane on either side. South of the rail line this lane is wider and has been resurfaced in places where it provides access to residential houses.

There is a small, old farm building in the field beside H10, which may increase nesting and roosting potential for birds and mammals; and a narrow band of

mature conifer plantation (WD4), beside the railway line adding further habitat diversity to this area.

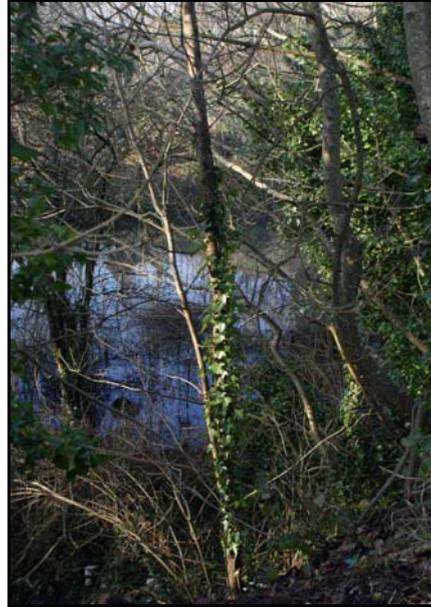


Figure 3. Hedgerow H12, which forms part of the network of hedgerows; and small area of mixed woodland with pond, found beside the level crossing.

A small patch of mixed woodland (WD2), present on an area of land beside the railway crossing, forms an additional green link with the railway hedgerow. Ash and pine are the dominant mature tree species with the ground flora including ivy, bramble and elder shrubs. This woodland surrounds an area of stagnant water. This area of woodland is small, but its structural diversity, with an understorey of ivy, medium sized shrubs and mature trees, plus the area of water, may be attractive for feeding and as shelter for different invertebrates, birds and mammals. Residential gardens with amenity grassland and some non-native shrubs, associated with a row of houses, border this area to the south, adding additional green space to the area. Two of these gardens have unmanaged areas that have developed into grassy verge habitat, dominated by tall tussock forming grasses, such as, cock's-foot. The woodland's connection with the railway line to the north enhances its value as part of the green infrastructure of the village.

Towards the western outskirts of the village there is an area of scrub and recolonising bare ground on disused land behind local business premises. This area of scrub is adjacent to the railway hedgerow. A dense stand of gorse is present here, which is impenetrable in places. Bramble is also present but to a much lesser extent. Beside this dense scrub the habitat is more open and has been

influenced by more recent disturbance. It now consists primarily of recolonising bare ground. Grasses including creeping bent, Yorkshire fog and cock's-foot are frequent. Herbs such as daisy, square-stalked St. John's-wort, oxeye daisy, short-fruited willowherb and ragwort are also present. The non-native butterfly bush is present along the boundary with the railway hedgerow. The butterfly bush is now a common shrub of towns and villages in Ireland and although a non-native, its nectar makes it an important food source for butterflies. This small patch of scrub also supports birds such as dunnock, wren, starling and blackbird. There are reports of rabbits and a family of foxes using this area, but no sighting of burrows or dens were recorded during this survey. Through its connection with the railway hedgerow this area of scrub adds additional size and diversity to the green infrastructure of the village and is deemed locally important for wildlife.

Other birds which have been previously recorded in the area are stonechat, yellowhammer, redpoll, goldcrest, collared dove and wood pigeon. Native hedgerow berries are important food for resident species and visiting winter species such as fieldfare and redwing.

The combination of scrub and hedgerow along H05 provides good habitat for bird species with goldfinch, bullfinch, robin, song thrush, blackbird, starling and fieldfare observed using this area. The old buildings here provide additional shelter and nesting potential, while the open field facilitates feeding for the starling and wintering fieldfare population. Mature trees and derelict buildings may provide roosting potential for bat species, however no bat survey was undertaken during this study.

Just north of H07 is an old apple orchard (WD5). This part of Kilkenny was once renowned for its orchards. Older orchards such as this may contain heritage varieties of apple trees local to the area. This can be ascertained by sending samples to Irish Seed Savers (www.irishseedsavers.ie).

Green infrastructure value of other features (listed above)

The features of biodiversity interest described above are small core and buffer green infrastructure elements. They are of local importance (lower value) as they are of local importance for wildlife and help maintain links between other habitats.

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

Kilkenny LAP Habitat Assessment FIDDOWN

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.

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

They have potential as roosting sites for rare species.

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

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

It supports areas that are of international importance as they provide a range of habitat types, especially of use for birds, and link the village to the internationally-important River Suir corridor.

It provides pedestrian access from the village centre to the banks of the Suir, along H05, H08 and H09.

The old orchard is both of cultural significance and has a potential food provisioning function.

It links the garden habitats of the village with the more semi-natural habitats of the River Suir corridor.

Development in this area should seek to ensure the maintenance of hedgerows. Enhancement of the local green infrastructure could be achieved by rehabilitating the hedgerows along the access route from the village centre to the banks of the River Suir.

3.3 Summary of biodiversity assessment/evaluation

Using criteria contained in guidelines produced by the NRA (www.nra.ie, Appendix 6) the relative significance of the principal habitats 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 Fiddown

Ecological network: Habitats within it	Ecological network element	Relative evaluation
FD1: CW2, WN5	Core area, part of larger corridor feature	Internationally important
FD1: H11, H13	Corridor adjacent to internationally important area	Local importance (higher value)
FD1: GS2, ED2, BL3	Buffer/rehabilitation area adjacent to internationally important habitats	Local importance (higher value)
H01a, H01b, H06, H10, H12	Corridors which link small core areas in village and internationally important river corridor	Local importance (higher value)
FD2: GS2, WS1, BL1A, FL8, WL2, WS1	Small core area immediately adjacent to internationally important river corridor, linking to village centre	Local importance (higher value)
H02, H03, H04, H05, H07, H08, H09	Small corridor features	Local importance (lower value)
FD3: WS1, WS3A	Small core area	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 foci of woodlands/shrubberies of more varied shapes. Depending on the potential risks of anti-social activity or requirements for a more garden look the margins of these new hedgerows/cum woodlands/shrubberies could be planted with spiny shrubs or species of horticultural value.

Drainage Ditches

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

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

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

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

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

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

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Websites

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National Parks & Wildlife Service www.npws.ie

Legend

Study Area

— (based on Fiddown 2003 LAP boundary)

Hedgerows & Treelines

— Hedgerows (H00, surveyed; WL1, unsurveyed)

— Treelines (WL2)

— Non-native hedge (WS3A)

Stone Walls

— Stone wall (BL1A)

— Earth banks (BL2)

Habitats

— Stone building (BL1B)

— Buildings and artificial surfaces (BL3)

— Houses with medium gardens (BL32)

— Houses with small gardens (BL33)

— Land under development (BL3D)

— Tidal rivers (CW2)

— Spoil and spare ground (ED2)

— Recolonising bare ground (ED3)

— Other artificial lakes and ponds (FL8)

— Improved agricultural grassland (GA1)

— Amenity grassland (improved) (GA2)

— Dry meadows and grassy verges (GS2)

— Mixed broadleaved/conifer woodland (WD2)

— Conifer plantation (WD4)

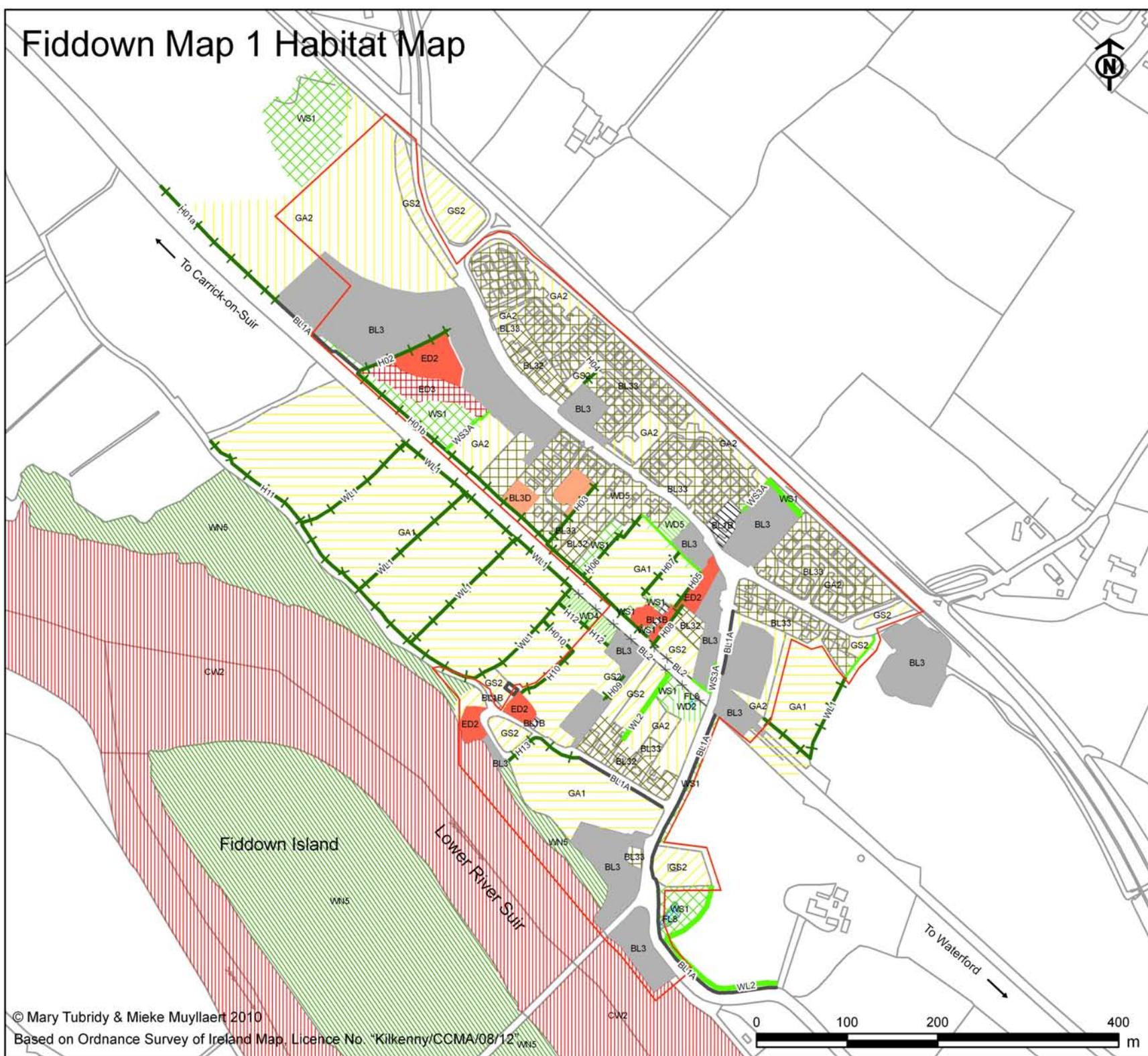
— Scattered trees and parkland (WD5)

— Riparian woodland (WN5)

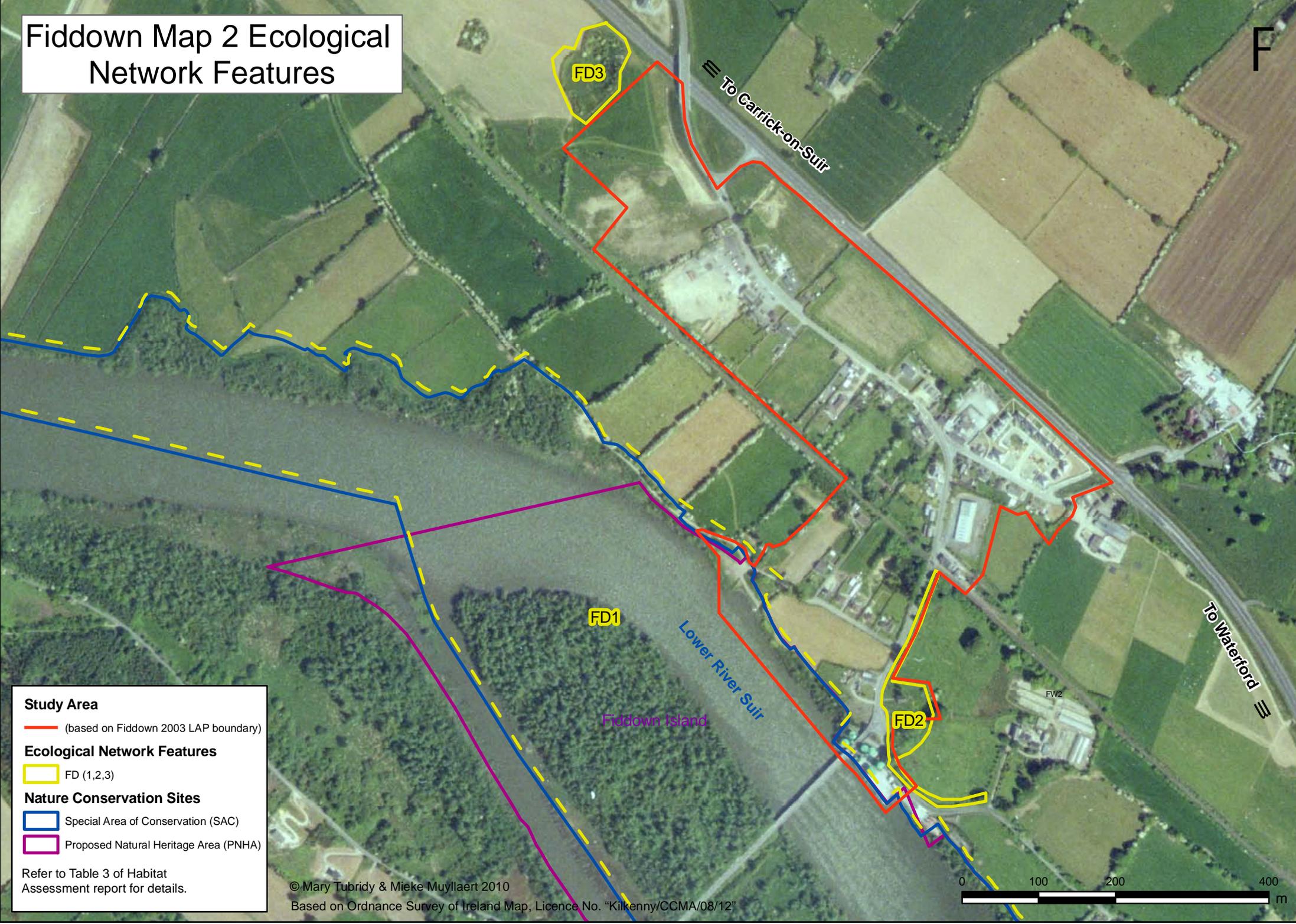
— Scrub (WS1)

Base Map

Fiddown Map 1 Habitat Map



Fiddown Map 2 Ecological Network Features

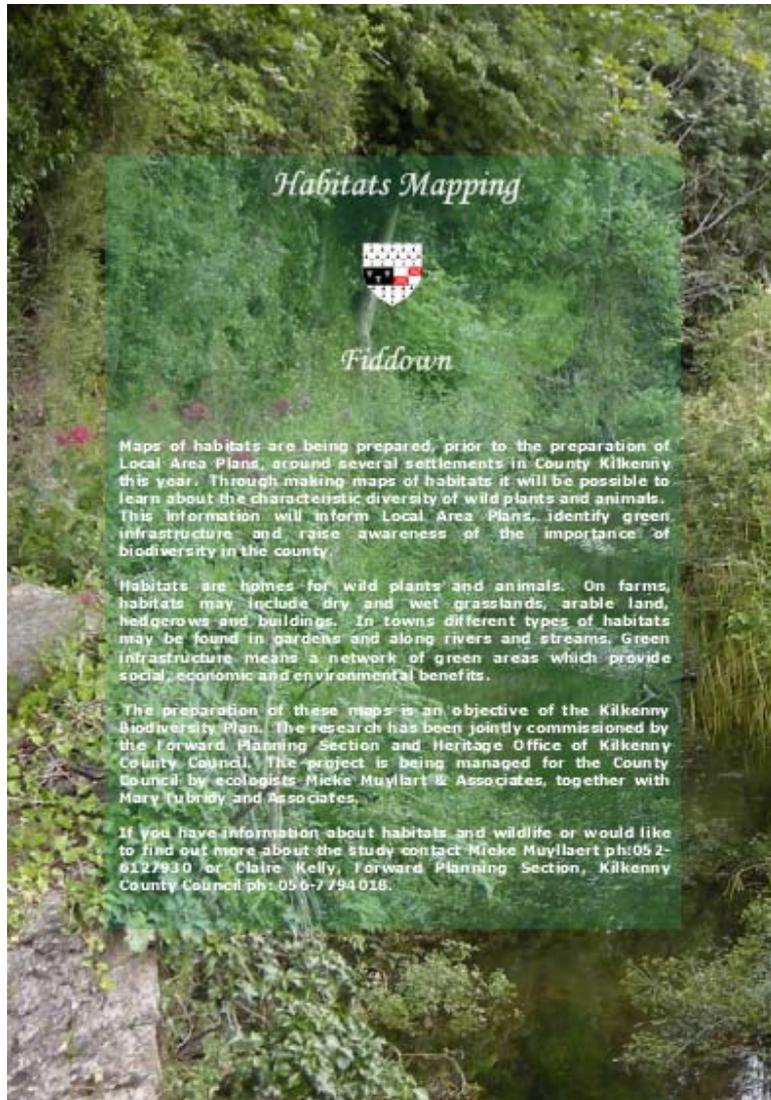


- Study Area**
 - (based on Fiddown 2003 LAP boundary)
- Ecological Network Features**
 - FD (1,2,3)
- Nature Conservation Sites**
 - Special Area of Conservation (SAC)
 - Proposed Natural Heritage Area (PNHA)

Refer to Table 3 of Habitat Assessment report for details.



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	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: FD1

Habitat codes

WN5, ED3, GS2

Scientific name

Salix fragilis
Urtica dioica
Salix cinerea
Scrophularia auriculata
Salix alba
Angelica sylvestris

Common name

Crack willow
Common nettle
Rusty/Sally willow
Water figwort
White willow
Wild Angelica

Ecological network feature: FD2

Habitat codes

GS2, B11A, WS1, WL2, FL8

Scientific name

Fraxinus excelsior
Fagus sylvatica
Rubus fruticosus
Buddleia davidii
Vicia sepium
Galium aparine
Dactylis glomerata
Agrostis stolonifera
Ranunculus repens
Potentilla reptans
Sambucus nigra
Crataegus monogyna
Geranium robertianum
Aesculus hippocastanum
Hedera helix
Senecio jacobae
Plantago lanceolata
Cirsium vulgare
Acer pseudoplatanus
Taxus baccata
Holcus lanatus

Common name

Ash
Beech
Bramble
butterfly bush
Bush vetch
Cleaver's
Cock's-foot
Creeping bent
Creeping buttercup
Creeping Cingufoil
Elder
Hawthorn
Herb robert
Horse chestnut
Ivy
Ragwort
Ribwort plantain
Spear thistle
Sycamore
Yew
Yorkshire fog

Ecological network feature: FD3

Habitat codes

WS1, GS2

Scientific name

Prunus spinosa
Dactylis glomerata

Common name

Blackthorn
Cock's-foot

Agrostis capillaris
Ulex europaeus
Crataegus monogyna
Urtica dioica

Common bent
Gorse
Hawthorn
Nettle

Ecological network feature: FD2

Habitat codes

WL1, WS1, WD4, WD2, GS2, GA2, FL8

Scientific name

Fraxinus excelsior
Poa annua
Prunus spinosa
Rubus fruticosus
Buddleia davidii
Rumex obtusifolius
Hypochaeris radicata
Dactylis glomerata
Agrostis stolonifera
Ranunculus repens
Cardamine pratensis
Taraxacum officinale agg.
Bellis perennis
Sambucus nigra
Veronica chamaedrys
Ulex europaeus
Juncus inflexus
Crataegus monogyna
Ilex aquifolium
Aesculus hippocastanum
Hedera helix
(Leylandii) x Cupressocyparis leylandii
Luicanthemum vulgare
Lolium perenne
Matricaria discoidea
Senecio jacobae
Ribwort plantain
Epilobium obscurum
Hypericum tetrapterum

Picea sp.
Acer pseudoplatanus
Cirsium sp.
Clematis vitalba
Salix sp.
Holcus lanatus

Common name

Ash
Annual meadow grass
Blackthorn
Bramble
Butterfly bush
Broad-leaved dock
Cat's-ear
Cock's-foot
Creeping bent
Creeping buttercup
Cuckoo-flower
Dandelions
Daisy
Elder
Germander Speedwell
Gorse
Hard rush
Hawthorn
Holly
Horse chestnut
Ivy
Leyland Cypress
Ox-eye daisy
Perennial rye-grass
Pineapple weed
Ragwort
Ribwort plantain
Short-fruited Willowherb
Square-stalked St. John's-wort
Sitka sp.
Sycamore
Thistle specie
Traveller's-joy
Willow species
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	3	3	2	4	4	1	5	1	23	2
H02	1	2	0	1	3	1	2	2	12	2
H03	3	2	2	1	3	1	2	1	15	1
H04	3	3	1	4	3	0	0	1	15	1
H05	3	3	1	2	4	1	3	2	19	2
H06	3	3	2	4	4	1	2	2	21	2
H07	3	2	1	2	3	0	2	1	14	2
H08	2	3	2	1	2	1	2	2	15	2
H09	3	3	5	1	4	1	0	2	19	1
H10	3	3	1	4	4	1	3	2	21	2
H11	4	3	2	2	4	1	5	2	23	2
H12	3	3	4	4	4	1	2	1	22	1
H13	2	2	1	1	3	1	2	2	14	1

Appendix 5 Summary of Fossitt habitat classification

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

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

Kilkenny LAP Habitat Assessment FIDDOWN

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