

APPENDIX 2 – HABITATS ASSESSMENT

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**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 Gowran 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 and information contained in an ecological assessment of part of the lands by Goodwillie (2005).

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

A habitat map (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.

Two ecological networks were identified in Gowran. The most important one, which is considered of national ecological value, is based around the river and adjacent wet woodland. It contains rare wetland habitats, and supports salmon and bats which have statutory protection. The core features of this network are of national importance for biodiversity. It is linked spatially and functionally with the cSAC associated with the Barrow. 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 its potential impact on the cSAC. Linking features/corridors associated with this network comprise hedgerows and a drainage ditch.

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

The network north of the village is centred on semi-natural uncut grasslands and associated hedgerows. This does not support rare habitats or rare species. It is of high local ecological value and functions principally as an amenity area. Development in this area should seek to ensure the maintenance of hedgerows by integrating them into future developments, where feasible.

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

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

1 Introduction

1.1 Study brief

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

1.2 Approach

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

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

Habitat mapping is at the core of Green Infrastructure assessment as it provides an account of almost all the features in the landscape which are responsible for ecosystem functioning. Habitat mapping following the Heritage Council’s *Best Practice Guidance for Habitat Survey and Mapping* (2010) allows for the identification of each example of a habitat type. It also allows for the evaluation of biodiversity outside designated areas using an ecological evaluation technology developed by the National Roads Authority (NRA), based on criteria such as rarity, naturalness and statutory requirements for protection of particular species (NRA, 2008). As ecosystem services are rarely provided by individual examples of habitats but by groups of similar or related habitats, the

Green Infrastructure approach requires that habitat mapping is further interpreted to identify “ecological networks”. Ecological networks consist of “cores” (habitats/features of key importance for biodiversity and ecosystem functioning), “buffers or nature rehabilitation areas” (habitats adjacent to the key area whose management influences its quality and require more appropriate management) and “corridors” habitats which allow for the movement of species, particularly those associated with the core habitats. Rivers provide obvious examples of ecological networks where buffer or nature rehabilitation areas comprise their margins which have been drained and no longer function as wetlands. Core areas are surviving good quality habitats and corridors which allow for the movement of key species, 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:

Gowran Local Area Plan 2003

Ecological Survey of Gowran to inform the local area plan (CAAS, 2003).

National Parks & Wildlife Service online data (www.npws.ie)

Site file for the nearest designated site: Barrow Nore cSAC No.2162 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. 114).

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

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)

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 Gowran Local Area Plan. Some areas outside the study area boundary were mapped where they supported important semi-natural habitats or were constituents of an ecological network whose core lay within the study area LAP boundary.

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

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

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

2.4 Habitat mapping

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

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

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

The Fossitt classification system (summarised in Appendix 5) provides a hierarchal classification of habitats from Levels One to Three. Level one provides a gross classification, Level Two is intermediate, and Level Three is the most detailed. Habitats in Gowran 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 Gowran 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. The majority of gardens were observed from outside. One garden was inspected directly with the kind permission of the owner. 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).

These four 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). The system required direct inspection of hedgerows. Each hedgerow was inspected along its entire length. Data was collected on height, 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.

All surveyed hedgerows were numbered and this number is shown on the habitat map. Unnumbered hedgerows indicate that these were not surveyed due to access difficulties.

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 the system 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. These principal objective was met despite the seasonal constraints, by using previous reports particularly CAAS, (2003) and Goodwillie (2005), studies located for this project, targeted consultations, field survey and professional judgement.

3 Results

3.1 Geodiversity

In common with the central lowlands of County Kilkenny, the Gowran study area is underlain by limestone rock. This is mainly dolomitised argillaceous limestones (known as Kilkenny marble). To the north there is a band of crinoidal wackestone/packstone limestone and to the south, dolomitised dark-grey muddy limestone. With the exception of the covered over landfill site (which was originally a quarry, area GR2 on Ecological network map) and the south-east corner of study area just north of river and stone pedestrian bridge, the limestone bedrock is covered with a deep layer of till and soil.

Associated with the rock is a karstified regionally important aquifer which throughout most of the study area is extremely vulnerable to pollution particularly near rock outcrops and springs. Groundwater reaches the surface at a spring just outside the study

area boundary, at the site known as a Holy Well (Bastionfort well, mapped as “spring” in Habitat Map). Basic gleys (surface/ground water) have developed from glacial till and are the commonest soil type. In most locations they require drainage to maximise their agricultural potential. Basic grey-brown podzolics/brown earths are present at the south of the study area. Rendzinas/lithosols are associated with rock outcrops. Alluvium showing the extent of the post-glacial floodplain is found beside the river.

The study area is principally drained by the Gowran river. This is a tributary of the River Barrow into which it flows approximately 6km downstream of the village. Inspection of the EPA web site (Water Quality/Current River Data) shows that water quality is assessed upstream at the N9 bridge and from the first bridge downstream of Goat's Bridge. The most recent data, based on measurements taken in 2009 shows the N9 bridge as having a Q value of 3-4 (moderate status), while the downstream samples taken in 2006, have a Q value of 4 (good status).

Ecological networks

GR1 Gowran river valley

The principal and most important ecological network in Gowran is associated with the Gowran River. This habitat is of national ecological interest. The extent of the area of ecological interest is outlined on Map 2 and habitats within it are shown on the Habitat Map. The Gowran River is the core habitat within this network. It links Gowran with the River Barrow which is a designated site of international biodiversity importance (cSAC no. 2162) approximately 6km downstream. The Fisheries Board have confirmed (F. O'Donoghue, Southern Regional Fisheries Board, *pers. comm.*) that the Gowran river is significant in terms of salmonid habitat. It thus shares an important species, listed in the Habitats Directive, with the designated site. No invasive plant species were found within this network or elsewhere in Gowran. Habitats within the ecological network in the study area (shown on the Habitat Map), include the river (FW2), wet woodland (WN6), a small pocket of marsh (GM1) wet grassland (GS4) and artificial ponds (FL8). A drainage ditch (FW4) outside the LAP is also a constituent of this network. All of these habitats principally support aquatic species associated with the key site.

Non-aquatic habitats which complement the interest of these core features and are identified in the habitat map are hedgerows (H01, H06, H13), stone buildings/bridges (BL1B), and locally important semi-natural grassland (GS1). These habitats are of high local importance as they provide commuting routes, feeding or roosting sites for rare and protected species (under the Wildlife Act and Habitats Directive) associated with the core area, such as bats.

The principal characteristics of many of the habitats within this network were described by CAAS (2003) and confirmed by fieldwork in 2010.

Water quality in the river at this location is of moderate quality and allows for the movement and feeding of salmonids (F. O'Donoghue, Southern Regional Fisheries Board, *pers. comm.*). Of particular significance to biodiversity is the presence of wet woodland. Associated wet woodlands around rivers are rare in Ireland. Other more common types of riparian habitats are patchy or non-existent upstream and downstream of Gowran. Wet woodland (Plate 1) is among the rarer types of wetland in the country and corresponds to a priority type (alluvial forests with *Alnus glutinosa* (alder) and ash, *Fraxinus excelsior* (91E0)) listed in the Habitats Directive.

Survey work by CAAS (2003), Goodwillie (2005), and Perrin *et al* (2008) has provided several accounts of wet woodland at this location.



Plate 1 Wet woodland within Gowran LAP area

Throughout the wetter parts of the woodland, alder and ash are the main tree species, however willows are also present. The trees, in particular the ash, tend to be tall and spindly. Pedunculate oak, sycamore and beech grow in drier areas mainly on the slopes, along with hawthorn, elder, honeysuckle, bramble and privet. The woodland has a poorly developed shrub layer including occasional brambles, ivy, hawthorn and elder, usually on drier and more elevated places.

Other species found in the wet willow-alder-ash woodland (WN6) include:

Common polypody fern	Meadowsweet
Cow parsley	Lesser celandine
Fool's watercress	Nettle
Hard fern	Opposite leaved golden saxifrage
Hard rush	Reed canary grass
Hart's tongue fern	Sedges
Hawthorn	Soft shield fern

Himalayan honeysuckle	Water cress
Holly	Wild angelica
Honeysuckle	Wood avens
Holly, on drier sloping ground	

Distant sedge, lady fern, male fern and hairy bittercress were recorded by Goodwillie and Associates (2005) and by CAAS (2003). The report compiled for the Native Woodland Survey (Perrin et al, 2008) commented that the area to the west of the Mill road had a well-developed field layer with abundant nettle, meadowsweet, and valerian. In contrast the area to the east of the road was heavily trampled by cattle and was almost devoid of a field layer.

Throughout the woodland there are open areas dominated by wetland herbs. A small area of marsh (GM1) is found in the corner of the field next to the woodland and bridge. Plant species include, reed canary grass, flag iris, brooklime, lady's smock and marsh thistle. Several more species were recorded from the marsh in 2005 by Goodwillie, including lesser pond sedge, brown sedge, marsh horsetail and ragged robin. Another wetland habitat, wet grassland (GS4) is found in a narrow band outside the woodland in the field below the castle. The main species in the wet grassland included hard rush, soft rush, sedges, creeping buttercup, marsh thistle and lady's' smock.

The network features a drainage ditch (FW4) below the school and two man-made ponds (FL8) at its eastern end. The upper one is covered in duckweed, the lower one was half covered in duckweed and had bulrushes, iris, some sweet grass and rushes.

Important fauna species generally associated with these wetland habitats include salmon and bats. The presence of salmonids was confirmed by the Fisheries Board in 2010. While specific bat surveys were not undertaken as part of this survey the ecological assessment carried out by Goodwillie (2006) revealed the presence of four bat species (soprano pipistrelle, common pipistrelle, Leisler's bat and Daubenton's bat) feeding in the vicinity of the river. While no detailed bird surveys have been undertaken, casual records compiled by ecologists and comments from BirdWatch Ireland suggest that the woodlands support a high density of terrestrial birds and their predators, particularly east of the bridge. The abundance of passerines account for the presence of sparrowhawk, buzzard and kestrel in the area. According to BirdWatch Ireland the river corridor supports aquatic species such as warblers, grey wagtail, moorhen and dipper; the latter is an indicator of good water quality.

Certain habitats within the network are associated with terrestrial (dry land) conditions. They provide a habitat for native species some of which are shared with the key area. Stone bridges (Plate 2) and old stone buildings (BL1B), particularly those covered in ivy, provide potential safe roosting sites for bats which are principally associated with wetlands and woodlands.

Above the wet grassland to the east is found a small band of good quality un-improved species rich dry grassland (GS1) on a steep slope. While the grassland in this field is also

GS1, the entire field is not a component of the network as most of the grassland has been managed intensively. An ecological assessment carried out in 2005 (Goodwillie, 2005) identified it as GA1. The type of GS1 on the steeper slope nearer the river is included (boundary on Map 2) as excessive drainage in this area has resulted in the survival of more native plant species. Species-rich semi-natural grasslands (GS2, good GS1,) and areas dominated by native plants (in the habitats ED3, FL8) are important feeding areas for species of birds, bats and invertebrates which are shared with the core habitat.

Three hedgerows are included in this ecological network. H01 provides an additional area of habitat similar to the woodland and H06 and H13 act as commuting corridors for species associated with important habitats in the core area. "Buffer" areas or "nature rehabilitation" areas were not defined spatially but would include adjacent lands covered principally in intensively managed grassland (intensively managed GS1, or GA1) which drain into the river and are regularly flooded. Priority for management in the buffer area is the restoration of riparian habitats, through the establishment of marginal woodlands and wetlands to enhance the quality of the core feature of biodiversity interest, the river.



Plate 2 Ivy clad stone footbridge (BL1/A) over the Gowran River at the eastern edge of the wet-willow-alder-ash woodland (WN6)

Green infrastructure assessment – GR1

The habitat complex of the Gowran River (FW2), wet woodland (WN6), wet grassland and marsh in Gowran river valley is of national ecological value, as it contains an example of an EU Annex I habitat type (alluvial woodland). The Fisheries Board has commented on its significance for salmonids. Survey work carried out by Goodwillie (2005) reported the presence of four bat species (soprano pipistrelle, common pipistrelle, Leisler's bat and Daubenton's bat). It is the key green infrastructure feature in Gowran.

The hedgerows (H01, H06, H13), drain (FW4), dry grassland (GS1) and stone bridges and stone ruins (BL1A, BL1B) in the Gowran river valley are of high local ecological value as they provide complementary habitats or act as corridors linked directly to the nationally important habitats or species found in the core area.

The ecological network provides several services to society. It is an important reservoir of biodiversity, linked functionally to an internationally important cSAC; the River Barrow/Nore. It contains a habitat of international significance, wet woodland, listed in the Habitats Directive. The wetlands around the river perform a regulatory function as they absorb floodwaters and may have the potential to remove pollutants. They act as a natural attenuation area reducing the risk of flooding elsewhere in the catchment. The wet woodland is a carbon sink, mitigating for climate change. While this area now only provides a visual amenity there is potential to develop a publicly accessible walking/cycling route along the dried up mill race.

The biodiversity of this area adds value to features of cultural importance such as stone buildings, walls and bridges, the Holy Well, former mill race and features associated with a designed landscape.

The network of diverse types of wetlands south of Gowran contributes strongly to its distinctive landscape.

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

GR2 Fields north of village

To the north of the village is found an ecological network principally comprising several patches of the habitat dry meadows/grassy verges (GS2) linked to good quality hedgerows (H07 and H08) and small area with GS1. An area of amenity grassland is contained within this network. While amenity grassland is not normally considered of biodiversity value this example qualifies as it is cut irregularly and shares many species with the other more natural grassland types. This area was originally characterised by CAAS (2003), as being important for flora and birds. Survey work in 2010 has amended the boundary of the area of biodiversity interest to include hedgerows and a grassed sports field. While grass pitches are generally of low value for biodiversity (and characterised as GA2, Amenity Grassland), this field is exceptional as it has not been reseeded and is cut infrequently. It thus retains a diversity of plant species similar to those found in adjacent semi-natural grasslands (GS1 and GS2). As grassland plants principally remain uncut in the habitat dry meadows and grassy verges (GS2) they provide seeds for birds and over wintering sites for invertebrates. Hedgerows adjacent to this unmanaged grassland provide commuting routes for small mammals and nesting sites for birds which feed on the grassland. Additional small (and unmapped) areas of

wet grassland (GS4) and scrub (WS1) with brambles, gorse and blackthorn increase its biodiversity value.

Green infrastructure – GR2

The core (GS1) and linking corridors (H07, H08) are of high local ecological value. The open grassland habitat is a core green infrastructure feature. The hedgerows are principally corridor features linking the built up parts of the village to the wider rural landscape. They are linked to the grasslands as they provide roosting and nesting sites for birds feeding on tall grasslands.

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

- It supports habitats of high local value (GS1 and adjacent hedgerows).
- It provides a corridor for wildlife between the countryside north of Gowran and mature gardens in houses and green spaces in the village.
- It is used as an amenity as part of the site is a lightly managed pitch used for casual games of football.
- Development in this area should seek to integrate hedgerows with new development and retain some of the grasslands (GS1, GS2) within open spaces/parks.

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. These comprised twelve hedgerows within or on the study area boundary and another outside the boundary. Some are associated with important ecological networks (H01, HO6,H07,H08,H13).

The extent of hedgerows reflects field patterns and history of land management. A large field within the LAP which was managed as parkland has no field divisions. As no historical research was carried it is not clear if the hedgerow network was once more extensive in Gowran. The presence of parkland, a planned demesne landscape explains the low cover of hedgerows in one section of the study area. Inspection of hedgerows suggests that the total number of hedgerows has remained constant. However hedgerow length and quality have been reduced by development around the village.

Hedgerow numbers are shown on 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 Gowran.

Table 2. Hedgerow Evaluation

Hedgerow Numbers	Rating	Description
-	1 *	Low value – least important
H02, H03, H04 , H06, H07, H09, H11	2 **	Moderate value - of moderate importance
H01, , H05, H08, H10, H12, H13	3 ***	High value – most important

The majority of hedgerows are of cultural value as they are shown on the 1st edition OS map (1837-1842). Three of these, H01, H08 and H09, lie along townland boundaries, suggesting greater antiquity. All of the hedgerows surveyed in Gowran were found to be of either of moderate or high biodiversity value.

Two-thirds are associated with banks, raised linear mounds of earth on which plants were originally established. The important hedgerow (H13) in the river based ecological network is associated with a functional drainage ditch (FW4). H01 which is also associated with this network is adjacent to a former millrace which is now filled in.

The hedgerows surveyed have few mature trees. The exceptions are H11 and H12 highlighted by CAAS (2003) and also suggested by BirdWatch Ireland as being important for birds. Ash is the main species of tree (found in eight hedgerows). English elm is present in three hedgerows, hazel in two, while beech, alder and goat willow occur in only one hedgerow each. Alder is present in H01 adjacent to the wet woodland. The non-natives sycamore and Leyland cypress are present occasionally. The latter is found around the village.

Ten different shrubs were recorded from the surveyed hedgerows. Hawthorn occurred in all of them. Elder and blackthorn were found in the majority of hedgerows. Other native shrubs included hazel, holly, dog rose, and bramble. Privet and raspberry were also found.

The highest ranking hedgerow is H01 and it scored 26. It is found on the south side of the filled-in mill race and is part of the river based ecological network. It scored highly on structural and biodiversity characteristics and gappiness (<5%). Overall species diversity is high as it supports species associated with the former mill race and adjacent woodland. Thus the vegetation in the hedgerow and bank is more typical of an oak-ash-hazel woodland. Species include wood avens, soft shield fern and cow parsley. One side has been managed recently. High scoring hedgerows (>20) were more likely to contain banks or ditches, have a better structure (with tree, shrub and herb layers) and fewer gaps. Total numbers of woody native species were usually high relative to other hedgerows. The other hedgerows that are of high value are: H01, H05, H08, H10, H12, and H13.

Moderately ranked hedgerows (H02, H03, H04, H06,H07,H09,H11) were generally younger, had poor structural diversity (some had just a shrub layer), more gaps and were more likely to be directly affected by recent development of housing and gardens. H06 is recently planted within last 20 years.

With few exceptions management of hedgerows as stock-proof barriers and for biodiversity is poor. This is typical of the situation throughout the country. Few hedgerows showed signs of appropriate management within the last five years. H01 had been trimmed (one side only). H06 has been trimmed recently. However no herb layer was associated with it as cut material was dumped at its base.

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 ecological network /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. H01,H06,H07, H08, 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 these important hedgerows.

Other features of biodiversity interest

Other features of biodiversity interest include good examples of the following habitats; stone walls and stone buildings (BL1A and BL1B). They are found along roads, old bridges and buildings such as St. Mary's Church of Ireland Church, Gowran Roman Catholic Church and Flour Mill:. Survey work showed that they provide a habitat for native plants and feeding area for birds. While no bat surveys were carried out, the ecology of bats suggests that some have potential value as roosting sites particularly if they are linked by hedgerows, lines of trees or blocks of semi-natural vegetation to wetlands.

Mature trees (WL2) including individual elms in the field south east of the castle, the lime trees on the fair green (Plate 3) the yew trees in the graveyard in St. Mary's Church and the mature trees adjacent to the Roman Catholic Church are valuable as potential roosting sites for bats, habitat for insects and food for birds. Mature gardens which are associated with older residences in Gowran provide nesting, roosting and feeding areas for birds.

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



Plate 3. Trees on Fair Green (most are London Plane with one Lime Tree) form part of the tree line (WL2).

Green infrastructure value of features (listed above)

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

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

- They provide habitats principally of low local value of importance to common bird species and invertebrates within the built-up urban area.
- They have potential as roosting sites for rare species.
- Mature trees and publicly accessible green spaces improve the appearance of the streetscape and provide a passive amenity for the community.
- Farmland has an important provisioning function in terms of food supply.

3.3 Summary of biodiversity assessment/evaluation

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

Table 3. Summary of biodiversity assessment/evaluation in Gowran

Ecological network/Habitats	Ecological network element	Ecological evaluation
GR1: River (FW2), wet woodland (WN6), wet grassland (GS4) and marsh (GM1)	Core area	Nationally important
GR1: Drain (FW4), dry grassland (GS1), former millrace within GR1 shown on Map 2	Corridors /habitats linked to core area	Local importance (higher value)
GR1: Stone features (BL1 A, BL1B), Hedgerows (H01, H06, H13)	Habitats/Corridors linked to network	Local importance (higher value)
GR1: Semi-natural habitats: GS2,FL8,ED3	Buffer (GS2) Nature rehabilitation areas (ED3, FL8)	Local importance (lower value)
GR2: Highest quality grassland GS1 and linking hedgerows (H07,H08)	Core area and corridors Important to the network	Local importance (higher value)
GR2: Other grasslands GS2/GA2	Habitats linked to core areas	Local importance (lower value)
Hedgerows not related to networks which scored 20 + : H05, H10, H12	Corridors	Local importance (higher value)
Hedgerows (WL1) not related to networks which scored 10 +: H02, H03, H04, H09, H11	Corridors	Local importance (lower value)
Stone walls (BL1A), stone buildings (BL1B) (not within networks), tree lines (WL2 where mapped)	Core and corridor features	Local importance (lower value)

4 Guidelines for Sustainable Development of Hedgerows and Drainage Ditches

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

Hedgerows

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

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

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

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

If a new boundary has to be established encouragement should be given to replace the original semi-natural feature (hedgerow, 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.

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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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: GR1

Habitat codes

WN6, GS1, FW4, ED3, GS4, GM1, FL8

Scientific name	Common name
<i>Acer pseudoplatanus</i>	Sycamore
<i>Achillea filipendula</i>	Yarrow
<i>Agrostis</i> sp.	Bent grass
<i>Alnus glutinosa</i>	Alder
<i>Angelica sylvestris</i>	Wild angelica
<i>Anthriscus sylvestris</i>	Cow parsley
<i>Apium nodiflorum</i>	Fool's watercress
<i>Bellis perennis</i>	Daisy
<i>Blechnum spicant</i>	Hard fern
Bryophytes	Moss
<i>Caltha palustris</i>	Marsh marigold
<i>Cardamine pratensis</i>	Ladies smock
<i>Carex panicea</i>	Carnation sedge
<i>Carex pendula</i>	Pendulous sedge
<i>Carex sylvatica</i>	Sedge
<i>Cerastium fontanum</i>	Common mouse ear
<i>Chrysosplenium oppositifolium</i>	Opposite leaved golden saxifrage
<i>Cirsium arvense</i>	Creeping thistle
<i>Cirsium arvensis</i>	Creeping thistle
<i>Cirsium palustre</i>	Marsh thistle
<i>Cirsium vulgare</i>	Common thistle
<i>Crataegus monogyna</i>	Hawthorn
<i>Cynosurus cristatus</i>	Crested dogs tail
<i>Dactylis glomerata</i>	Cocksfoot
<i>Epilobium hirsutum</i>	Great willowherb
<i>Fagus sylvatica</i>	Beech
<i>Filipendula ulmaria</i>	Meadowsweet
<i>Fraxinus excelsior</i>	Ash
<i>Geum urbanum</i>	Wood avens
<i>Glyceria</i> sp.	Flote-grass
<i>Hedera helix</i>	Ivy
<i>Heracleum sphondylium</i>	Hogweed
<i>Holcus lanatus</i>	Yorkshire fog
<i>Hypochoeris</i> sp.	Cats ear
<i>Ilex aquifolium</i>	Holly
<i>Iris pseudacorus</i>	Flag iris
<i>Juncus articulatus</i>	Jointed rush
<i>Juncus effusus</i>	Soft rush
<i>Juncus inflexus</i>	Hard rush
<i>Lemna</i> sp.	Duckweed
<i>Leycesteria formosa</i>	Himalayan honeysuckle
<i>Ligustrum vulgare</i>	Privet
<i>Lonicera nitida</i>	Box leaf honeysuckle
<i>Lonicera periclymenum</i>	Honeysuckle
<i>Lotus corniculatus</i>	Bird'sfoot trefoil
<i>Nasturtium officinale</i>	Water cress
<i>Phalaris arundinacea</i>	Reed canary grass

<i>Phyllitis scolopendrium</i>	Hart's tongue fern
<i>Plantago lanceolata</i>	Narrow leaved plantain
<i>Polypodium vulgare</i>	Common polypody fern
<i>Polystichum setiferum</i>	Soft shield fern
<i>Potentilla sterilis</i>	Barren strawberry
<i>Prunella vulgaris</i>	Self heal
<i>Quercus robur</i>	Pedunculate oak
<i>Ranunculus ficaria</i>	Lesser celandine
<i>Ranunculus repens</i>	Creeping buttercup
<i>Rubus fruticosus</i> agg.	Bramble
<i>Rumex obtusifolius</i>	Broad leaved dock
<i>Salix cinerea</i>	Grey willow
<i>Sambucus nigra</i>	Elder
<i>Trifolium pratense</i>	Red clover
<i>Trifolium repens</i>	Creeping clover
<i>Typha latifolia</i>	Bulrush
<i>Ulmus glabra</i>	Wych elm
<i>Urtica dioica</i>	Nettle
<i>Veronica beccabunga</i>	Brooklime

Ecological network feature: GR2

Habitat codes

GS2

Scientific name	Common name
<i>Achillea millefolium</i>	Yarrow
<i>Agrostis stolonifera</i>	Creeping bent
<i>Anthoxanthum odoratum</i>	Sweet vernal grass
<i>Centaurea nigra</i>	Knapweed
<i>Cerastium fontanum</i>	Common mouse ear
<i>Cirsium arvense</i>	Creeping thistle
<i>Cirsium vulgare</i>	Common thistle
<i>Cynosurus cristatus</i>	Crested dogs tail
<i>Dactylis glomerata</i>	Cocksfoot grass
<i>Daucus carota</i>	Wild carrot
<i>Elytrigia repens</i>	Scutch grass
<i>Festuca rubra</i>	Red Fescue
<i>Holcus lanatus</i>	Yorkshire fog
<i>Juncus articulatus</i>	Jointed rush
<i>Juncus bufonius</i>	Toad rush
<i>Juncus inflexus</i>	Hard rush
<i>Leucanthemum vulgare</i>	Ox-eye daisy
<i>Odontites verna</i>	Red bartsia
<i>Plantago lanceolata</i>	Narrow leaved plantain
<i>Potentilla reptans</i>	Creeping cinquefoil
<i>Prunus spinosa</i>	Blackthorn
<i>Ranunculus repens</i>	Creeping buttercup
<i>Rubus fruticosus</i> agg.	Bramble
<i>Senecio jacobaea</i>	Ragwort
<i>Trifolium pratense</i>	Red clover
<i>Trifolium repens</i>	White clover
<i>Ulex europaeus</i>	Gorse

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	4	4	4	2	2	4	26	1
H02	4	2	2	4	1	1	1	2	17	2
H03	2	4	0	4	3	0	2	1	16	1
H04	2	2	3	4	4	0	1	1	17	1
H05	4	3	2	4	4	0	2	1	20	2
H06	4	1	2	4	1	0	2	1	15	1
H07	4	2	3	4	2	1	1	2	19	2
H08	3	2	3	4	2	1	1	4	20	1
H09	4	2	4	4	2	1	0	2	19	2
H10	3	2	4	4	2	1	0	4	20	1
H11	4	3	1	4	3	1	1	2	19	2
H12	4	3	1	4	3	1	2	2	20	2
H13	4	3	1	4	3	3	3	2	23	2

Appendix 5 Summary of Fossitt habitat classification

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

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

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

Appendix 6 Ecological evaluation criteria

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

Species listed on the relevant Red Data list.

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

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*).

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.

County Importance:

Area of Special Amenity.⁶

Area subject to a Tree Preservation Order.

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

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

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

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

Species protected under the Wildlife Acts; and/or

Species listed on the relevant Red Data list.

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

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

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

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

Local Importance (higher value):

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

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

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

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

Species protected under the Wildlife Acts; and/or

Species listed on the relevant Red Data list.

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

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

Local Importance (lower value):

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

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

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

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

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

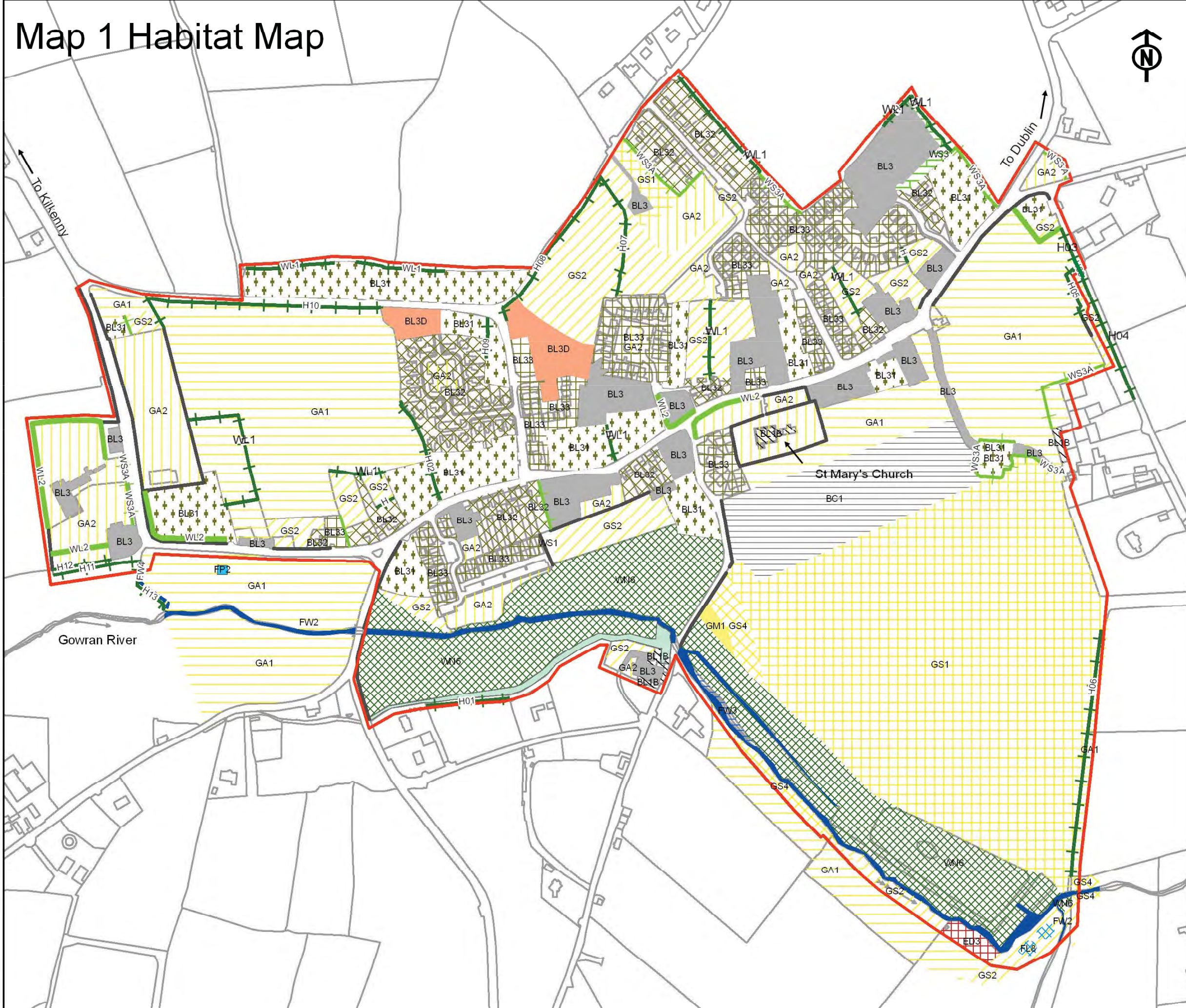
⁸ BAP: Biodiversity Action Plan

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

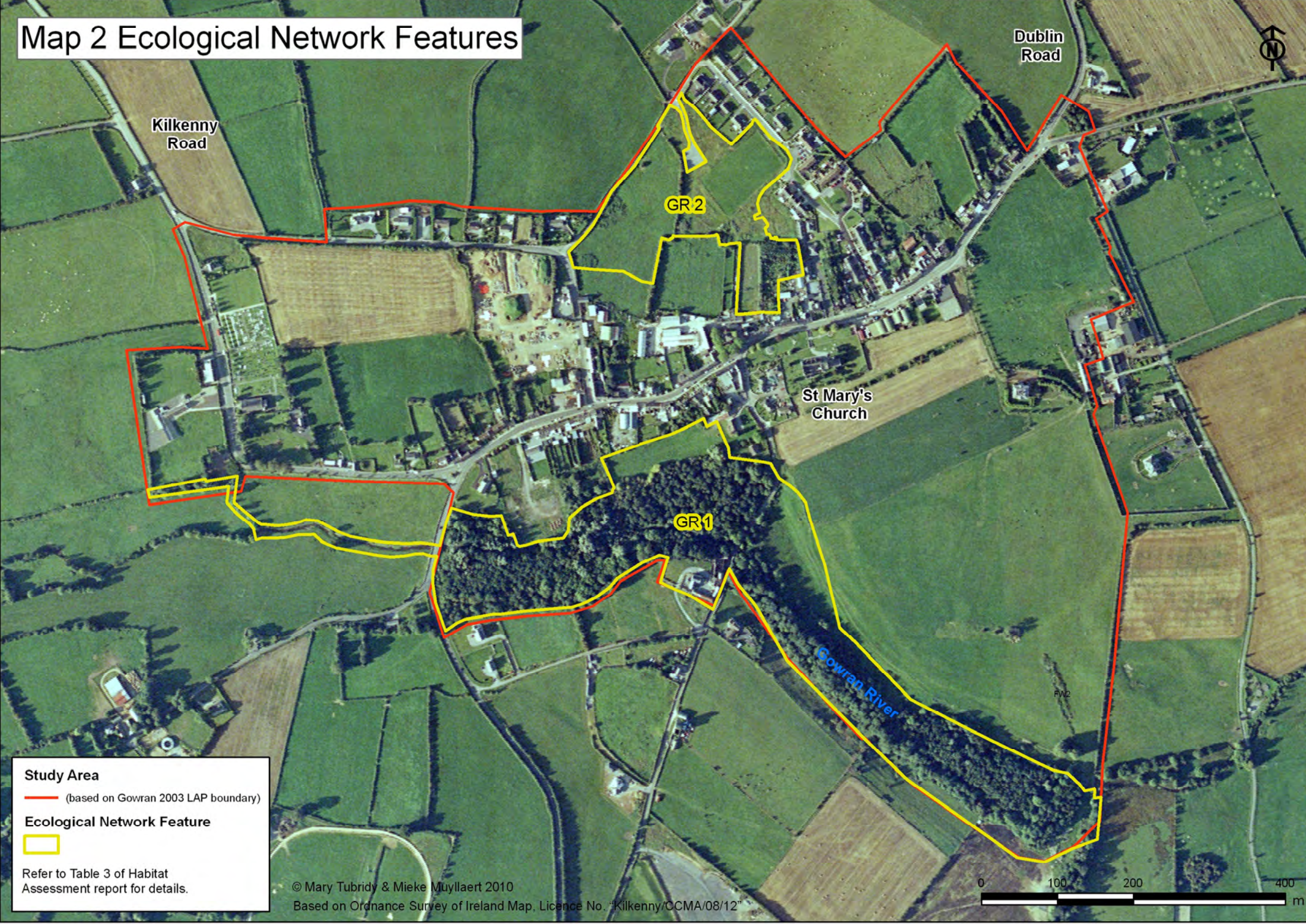
Legend

- Study Area**
 (based on Gowran 2003 LAP boundary)
- Habitats**
- Arable crops (BC1)
 - Stone building (BL1B)
 - Buildings and artificial surfaces (BL3)
 - Houses with big gardens (BL31)
 - Houses with medium gardens (BL32)
 - Houses with small gardens (BL33)
 - Land under development (BL3D)
 - Recolonising bare ground (ED3)
 - Other artificial lakes and ponds (FL8)
 - Non-calcareous springs (FP2)
 - Depositing/lowland rivers (FW2)
 - Canals (FW3)
 - Improved agricultural grassland (GA1)
 - Amenity grassland (improved) (GA2)
 - Marsh (GM1)
 - Dry calcareous and neutral grassland (GS1)
 - Dry meadows and grassy verges (GS2)
 - Wet grassland (GS4)
 - Wet willow-alder-ash woodland (WN6)
 - Ornamental/non-native shrub (WS3)
- Hedgerows & Treelines**
- Hedgerows (H00: surveyed; WL1: unsurveyed)
 - Treelines (WL2)
 - Non native hedge (WS3A)
- Stone Walls**
- Stone wall (BL1A)
- Drainage**
- Drainage ditches (FW4)
- Former Millrace**
-
- Base Map**
-

Map 1 Habitat Map



Map 2 Ecological Network Features



Kilkenny Road

Dublin Road

GR2

St Mary's Church

GR1

Gowran River

FW2

Study Area
— (based on Gowran 2003 LAP boundary)

Ecological Network Feature
□

Refer to Table 3 of Habitat Assessment report for details.

