Arklow Urban Habitat Mapping
November 2008

An Action of the County Wicklow Heritage Plan 2004-2008

An Chomhairle Oidhreachta
The Heritage Council

Report prepared by:

MERC Consultants
environmental and conservation services

1. Introduction

1.1 Project brief

Wicklow County Council commissioned the Urban Habitat Mapping Project 2008 with the primary objectives of carrying out habitat surveys (classified to Fossitt level III and Habitats Directive Annex 1) of the towns of Bray, Wicklow and Arklow and their environs, identifying Areas of Local Biodiversity Value, and producing habitat management guidelines for each town.

The outcomes of the survey will be used to guide policy development and best practice in relation to urban areas of biodiversity value, which will be aided by the identification of conservation priorities and management recommendations. This report examines the area that lies within the boundary of Arklow Town.

The specific aims of this project are to:

- Create, using the Heritage Council draft methodology, habitat maps and vegetation surveys for sites within the urban area of Arklow, Co. Wicklow.
- Identify locally important biodiversity areas.
- Assess the ecological value of the biodiversity areas and threats to their conservation
- Identify linkages between identified biodiversity areas and the surrounding countryside in order to strengthen their overall biodiversity value and the local network of biodiversity areas.
- Use the data collected to make recommendations on conservation priorities and any future work that should be carried out.
- Use the data collected to produce a set of user-friendly habitat management guidelines for the town.
- Collate and make this information available for future research, through a detailed survey report, annotated maps and a set of raw data (including field notes and maps) as appendices.

1.2 Background

Biodiversity, the shortened term for “Biological diversity" means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.

Under International, EU and National legislation, Ireland has an obligation to protect and enhance its biodiversity. Throughout the country a number of areas and species are protected under this legislation.

In Ireland environmental designation and protection of biodiversity sites concentrates mainly on international and nationally important sites. As a consequence, there is a lack of information on locally important biodiversity areas, which precludes their consideration at policy level through development plans, in development control, in the provision of services or engaging with communities in the promotion of biodiversity at the local level. In particular, areas of biodiversity value within an urban setting are becoming increasingly threatened by development pressure in addition to other anthropogenic impacts due to their proximately to large centres of population.

It is now widely recognised that the biodiversity of urban areas needs to be known, understood, protected and managed, not only to provide protection for the habitats and species that occur within it, but also to enhance the human well-being of the communities that dwell within our urban areas.

This survey has provided the baseline information on the flora, fauna and habitats of “green sites” within Arklow Town Area required to allow informed management decisions to be made. This information, together with the management guidelines and recommendations provided, will assist in the planning and management of these areas and help to prevent negative impacts to sensitive ecosystems. It will also contribute to positively enhancing the biodiversity value of the sites identified by providing recommendations to improve the biodiversity value of sites and by indicating linkages, where possible, between the network of sites in order to strengthen the biodiversity value of individual sites within the area.

2. Summary

Arklow, situated at the mouth of the Avoca River on the east coast is the third largest town in Co. Wicklow with a population of 11,759 (2006 census). The town has expanded rapidly in the last decade and Arklow's proximity to Dublin and its consequent attractiveness to commuters have led to much of the recent expansion.

The natural habitats within Arklow Town area are often over looked as the town is located within County Wicklow, known for its many sites of conservation importance. However, a number of areas within the town are of high conservation value, not only in a local context but also at a national scale. Of particular importance are the those areas of Arklow Town Marsh (NHA) located within Arklow Town

Smaller pockets of green space within the town, which include both public and private parks, areas of railway embankments and small areas of woodland along roadsides and the Avoca all provide areas of valuable biodiversity importance. Many of these areas are in close proximity to each other and as such can provide corridors to link smaller green spaces further contributing to the enhancement of biodiversity within the town.

While habitat loss and fragmentation, non-native species invasion and scrub encroachment are causing a negative impact on the biodiversity of Arklow, there are still a number of areas of high biodiversity value within the area, together with corridors that interconnect some of these areas.

3. Methodology

3.1 Desk study

As recommended in the Heritage Councils guidelines for Habitat Survey and Mapping in Ireland (2002) the desk study was conducted by carrying out a full review of the aerial imagery (from year 2005) for Arklow Town. Due to the relatively small size of the area under study it was possible to examine the aerial imagery for the entire area and to ascertain likely areas of biodiversity interest. All areas of possible biodiversity interest (river valleys, streams, public parks, green fields, shorelines etc) were marked on the aerial imagery and the associated six-inch maps Ordnance Survey maps (1906 3rd edition) of the area. Areas that were clearly private enclosed gardens were excluded from the study. In addition, consultation took place with the National Parks and Wildlife Conservation Officer for the area and the Heritage Officer for Wicklow County Council. Further information was sourced from individuals and bodies (e.g. the Eastern Regional Fisheries Board) with local knowledge of the area.

All areas, which appeared to contain habitats of biodiversity value, were subsequently marked on the aerial imagery and associated six-inch maps so that they could be fully assessed during the field survey.

3.2 Field study

Louise Scally and Bryan Deegan conducted fieldwork during the months of July and August 2008. Each site indicated through the desk study was visited during the field survey. Subsequently, some sites were deemed not worthy of further study in the field. Generally this occurred where sites had been developed post 2004/5, the year for which the latest available aerial imagery is available or were private enclosed gardens. All other sites were fully surveyed to assess the habitat/s present, the characterising species, any negative impacts or activities occurring within the site and the production of a site map indicating the boundaries and the habitat/s present using the Fossitt habitat classification code (Fossitt, J.A. 2000).

Photographic records were made of each site to provide an overview of the site and these images are contained in a separate DVD that accompanies this report.

3.3 Assessment of the biodiversity value of sites

Following field survey an assessment of the biodiversity value of each site was made. This assessment was based on the Ratcliffe criteria for site evaluation (as recommended by the Heritage Council draft methodology for habitat mapping) and also the National Roads Authority Site Evaluation Scheme. The Ratcliffe scheme produces a largely qualitative result and it is therefore unsuitable for allowing consistent evaluations to be made across sites. For this reason the National Roads Authority Site evaluation scheme was used in conjunction with the Ratcliffe scheme to allow more quantitative comparisons to be made between sites.

Figure 1. Natural Heritage Areas in the Arklow

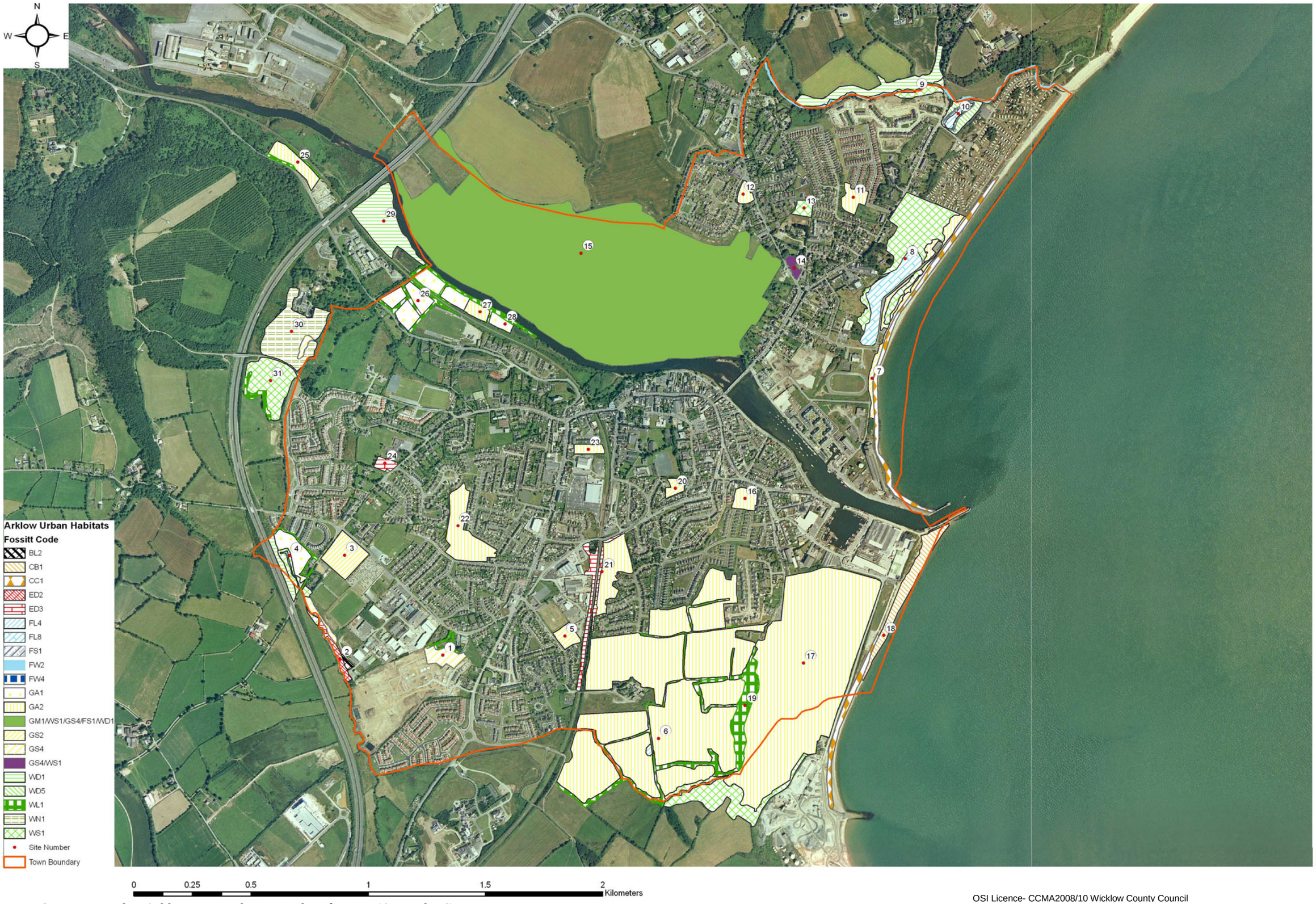
4. Results

4.1 Habitat assessment summary

Table 1. Sites surveyed in Arklow Town area

Site No.	Grid reference	Habitats present	Threats	Evaluation
1	323490/172330	GS4/WL1	None evident.	D: Moderate value, locally Important
2	323050/172314	FW2/BL2/ED2/ED3	Commercial dumping. Pollution to stream. Land slides.	C: High value, locally Important
3	323071/172769	GS2	Herbicide application to grass verges.	C: High value, locally Important
4	322835/172767	GA1/FW2/WS1/WL1/WD1	None evident.	C: High value, locally Important
5	324010/172414	GS2	None evident.	D: Moderate value, locally Important
6	324410/171965	GA2/WL1/FW2	Possible development pressure.	C: High value, locally Important
7	325320/173545	GS2/CC1	None evident.	D: Moderate value, locally Important
8	325462/174070	FL8/GA2/WS1	Eutrophication of lake. Bracken invasion.	C: High value, locally Important
9	325503/174805	FW2/WD1/WS1	None evident.	C: High value, locally Important
10	325688/174706	WD5/FW4/FL5	Eutrophication of lake.	D: Moderate value, locally Important
11	325240/174340	GA2	None evident.	D: Moderate value, locally Important
12	324770/174353	GA2	None evident.	D: Moderate value, locally Important
13	325030/174292	WS1	None evident.	D: Moderate value, locally Important
14	324988/174030	GS4/WS1	None evident.	D: Moderate value, locally Important
15	324079/174095	GM1/GS4/WS1	Damage to scrub	B: Nationally Important
16	324778/173018	GA2	N/A	E: Low value, locally Important
17	325028/172295	GA2	None evident.	D: Moderate value, locally Important
18	325370/172417	CB1/CC1	None evident.	D: Moderate value, locally Important
19	324778/172109	WL1	Bracken encroachment. Possible thinning of hedgerow.	C: High value, locally Important
20	324481/173062	GS2	None evident.	E: Low value, locally Important

Site No.	Grid reference	Habitats present	Threats	Evaluation
21	324168/172697	ED3/GA2	Herbicide application.	D: Moderate value, locally Important
22	323554/172899	GA2	Possible development.	E: Low value, locally Important
23	324110/173233	GA2	Possible development.	E: Low value, locally Important
24	323243/173173	ED3	N/A	E: Low value, locally Important
25	322871/174494	GA2	Overgrazing.	C: High value, locally Important
26	323384/173886	GA1	Scrub encroachment	C: High value, locally Important
27	323648/173836	GA2	None evident.	D: Moderate value, locally Important
28	323755/173783	GA1	None evident.	C: High value, locally Important
29	323238/174235	FW2/WD1	Non-native invasive species invasion. Scrub encroachment.	C: High value, locally Important
30	322845/173750	WN2	Non-native invasive species invasion. Domestic dumping.	C: High value, locally Important
31	322755/173535	WS1/WL1	None evident.	D: Moderate value, locally Important



OSI Licence- CCMA2008/10 Wicklow County Council

Figure 2. Sites surveyed in Arklow area with Fossitt classification (Appendix 6)

4.2 Site descriptions.

Site: 1

Habitats Present	Grid Reference
GS4: Wet grassland WL1: Hedgerows	323490/172330

This is a private site consisting of a house with out buildings adjacent to a water logged field surrounded by a hedgerow. The field is typified by stands of Soft rush and grasses with frequent Ragwort, Red and White clover, Spear thistle, Marsh thistle and Nettle. The hedgerow is dominated by Hawthorn.

The site is of low to medium conservation value. In an urban setting as it provides a refuge for birds, invertebrates and small mammals.

The site is currently unused and there are no obvious impacts

Site: 2

Habitats Present	Grid Reference
FW2: Lowland/depositing rivers	323050/172314
BL2: Earth banks	
ED2: Spoil and bare ground	
ED3: Recolonising bare ground	

This site comprises a stream running along the urban town boundary with a steep bank running down to it. The bank is colonised by a variety of herbs, rushes and grasses including Soft rush Spear thistle, Marsh thistle, Creeping buttercup, Hogweed, Dandelion, Woundwort, Goose-grass, Lesser spearwort, Butterbur, Nettle, Bindweed, Water horsetail, Willow herb and Ragwort. The stream is boarded by fringing Willow.

This site is of medium to high conservation value as it forms part of a corridor running along the town boundary and is relatively species rich. However, the bank has suffered from dumping of topsoil and builders rubble from works at an adjacent commercial site, which has impacted on the vegetation and also on the stream below. Turbidity levels in the stream appeared particularly high at the time of survey.

Site: 3

Habitats Present	Grid Reference
GS2: Dry meadows and grassy verges	323071/172769

An old graveyard with areas of cut lawn and occasional Yew.

Graveyards are often considered to be of high biodiversity value due to their often rich species composition in an otherwise urban environment. They are also known to provide a refuge for birds and small mammals as well as for their value as a repository of built heritage. This particular site is well maintained and not particularly species rich. It is therefore considered to be of medium conservation value.

Threats include over cutting of the grassy verges and the use of herbicide

Site: 4

Habitats Present	Grid Reference
GA1: Improved agricultural grassland	322835/172767
FW2: Lowland/depositing rivers	
WL1: Hedgerows	
WS1: Scrub	
WD1: (Mixed) broadleaved woodland	

This site consists of an agricultural field (likely to be used for grazing) with a stream, forming part of the Arklow urban boundary on one side. The field consists of rough grassland with stands of Soft rush, while a hedgerow characterised by Hawthorn, Willow and Bramble with Buddleja at the margins boards the stream. The woodland area consists of a mix of native and non-native tree species including Sycamore, Ash and Elder.

The conservation value of this site is considered medium, as the site forms part of a biodiversity corridor linking other sites and also provides a habitat for birds, invertebrate species and small mammals.

No obvious threats were noted.

Site: 5

Habitats Present	Grid Reference
GS2: Dry meadows and grassy verges	324010/172414

This site consists of an area of rough grassland characterised by tall grasses together with Nettle, Bindweed, Water horsetail Ragwort and areas of gorse bramble and bindweed.

The site is of moderate conservation value.

No threats were noted.

Site: 6

Habitats Present	Grid Reference
GA2: Improved agricultural grassland	324410/171965
WL1: Hedgerows	
FW2: Lowland/depositing rivers	
FL4: Mesotrophic lakes	
WS1: Scrub	

This site is represented by a series of fields separated by hedgerows. Most of the fields are grazed by cattle and are relatively species poor and somewhat wet. Stands of Soft rush are frequent throughout. A small pond occurs on the site with fringing Soft rush and Flagstaff iris. The margins of the fields are more species rich with Ragwort, Creeping buttercup, Marsh thistle, Willow herb, Silverweed, Water horsetail, Meadow vetchling, Meadowsweet and Wood avens frequent. The hedgerows exhibit a wide range of species with Willow, Oak and Holly, Ash and Elder present together with Bramble, Rosa sp. and Woodbine.

This site is of high conservation value in an urban context. The site displays a good variety of habitats and good species richness.

Threats to the site may include development pressure and drainage.

Site: 7

Habitats Present	Grid Reference
GS2: Dry meadows and grassy verges CC1: Sea walls, piers and Jetties	325320/173545

This is a coastal site consisting of a grassy verge adjacent to a boulder defence along the shoreline. The site is very species poor.

This site is of low conservation value but does provide a green space with its associated aesthetic value.

No treats to the site are evident.

Site: 8

Habitats Present	Grid Reference
FL8: Other artificial lakes and ponds GA2: Amenity grassland (Improved) WS1: Scrub	325462/174070

This is a managed public area consisting of a small lake and amenity grassland and scrub areas. The lake is fringed with Common reed and Willow scrub in parts while other areas are paved up to the lake edge. The lake has a large population of Mallard, Greylag geese, Mute swans and Coot. The remainder of the site consists of managed grass verges and an area of scrub which appears to be largely unmanaged and dominated by Gorse, Bramble, Willow and Sycamore with occasional Scots pine. Bracken encroachment is evident in this area.

The site of medium conservation status for its value to bird life and also as an amenity area.

The main threat to the lake is likely to be increased nutrient loading from the presence of a large population of birds and the associated feeding of them. Bracken has also starting to encroach on the scrub area and is likely to cause a further reduction of the already poor ground flora.

Site: 9

Habitats Present	Grid Reference
FW2: Depositing/lowland rivers WD1: (Mixed) broadleaved woodland WS1: Scrub	325503/174805

This site consists of a small river boarded with Willow, Sycamore, Birch, Prunus and Bramble. The under story is characterised by Lesser celendine, Nettle, Ragwort and Ivy and is rather species poor.

This site is of medium conservation value. Although not particularly species rich it provides both a corridor and refuge for birds and other wildlife.

No obvious threats to the site were recorded.

Site: 10

Habitats Present	Grid Reference
WD5: Scattered trees and parkland	325688/174706
FW4: Drainage ditches	
FL5: Eutrophic lakes	
FS1: Reed and large sedge swamps	

This site comprises the grounds of a caravan park. Wet grassy areas with frequent Soft rush occur together with drainage ditches and a small eutrophic pond with fringing Common reed. Mute swan and Mallard occurred on the pond.

The site is of low conservation value as it is highly modified and species poor.

Site: 11

Habitats Present	Grid Reference
GA2: Amenity grassland (improved)	325240/174340

Species poor amenity grassland of low conservation value.

Site: 12

Habitats Present	Grid Reference
GA2: Amenity grassland (improved)	324770/174353

Species poor amenity grassland of low conservation value.

Site: 13

Habitats Present	Grid Reference
WS1: Scrub	325030/174292

Scrub containing area characterised by Gorse with Bramble. The area is rather small and of low conservation value.

Site: 14

Habitats Present	Grid Reference
GS4: Wet grassland WS1: Scrub	324988/174030

Wet grassland at the side of the road with an adjacent drainage ditch. Common reed and willow dominate together with Bramble. The area is rather small and of low conservation value.

Site: 15

Habitats Present	Grid Reference
GM1: Marsh	324079/174095
GS4: Wet grassland	
WS1: Scrub	

This site comprises Arklow Town Marsh NHA. This site is now the principal wetland area in Arklow. It is a large marsh located north of the Avoca estuary on the perimeter of Arklow town. An overgrown disused roadway bisects the site from east to west. The site was not surveyed in detail due to difficulties with access in many areas but this site synopsis relating to the site can been seen in appendix 5.

This site is of high conservation value.

No obvious treats were noted.

Site: 16

Habitats Present	Grid Reference
GA2: Amenity grassland (improved)	324778/173018

Grassy field surrounded by houses. This field frequently foods and was quite wet at the time of survey. The area is managed by the Arklow County Council who cut the grass. This site is species poor and of low conservation value.

Site: 17

Habitats Present	Grid Reference
GA2: Amenity grassland (improved)	325028/172295

Golf links and environs. Generally this is a species poor environment in common with many golf links. There are a few areas of scattered trees throughout but otherwise the site is very species poor.

Conservation status: Low

The site is already a highly modified environment with poor species richness so further threats to the site are not applicable.

Site: 18

Habitats Present	Grid Reference
CB1: Shingle and gravel banks CC1: Sea walls piers and Jetties	325370/172417

A shingle beach with sparse vegetative cover. The site is backed by a road so banks are absent and as a result the area is devoid of vegetation

The conservation value of this area relates to its amenity value rather than its biodiversity value and it is considered to be of low to medium conservation value.

There are no obvious threats to this site.

Site: 19

Habitats Present	Grid Reference
WL1: Hedgerows	324778/172109

A wide series of hedgerows of Hawthorn, Gorse and Bramble with woodbine throughout. The margins of the hedgerow were quite wet and supported a ground flora of Water horsetail, Bush vetch and Bracken. The Common frog was noted at this site.

The conservation value of hedgerows, especially species rich hedgerows is high as they provide a wildlife corridor and a refuge for fauna including nesting sites for birds. The Common frog is a protected species under Annex 2 of the EU Habitats Directive.

Threats include bracken encroachment and thinning of the hedgerow.

Site: 20

Habitats Present	Grid Reference
GS2: Dry meadows and grassy verges	324481/173062

This site consists of a grassy field adjacent to houses. It is of low conservation value and species poor.

Site: 21

Habitats Present	Grid Reference
ED3: Recolonising bare ground GA2: Amenity grassland (Improved)	324168/172697

This site is represented by a section of railway line and its associated embankment on either side of the track and a field adjacent to the railway track. The vegetation along the embankments of the railway track are typical of this type of habitat consisting mainly of weedy species and garden escapes including abundant Red Valerian amongst Bramble, Ragwort, Dandelion and Water Horsetail. The grassy field beside the railway track is currently used as an amenity area by an adjacent housing estate.

While the site is neither species rich or a natural habitat it does provides a suitable habitat for many bird species and a wildlife corridor to other sites within the area and in this regard is considered to be of medium ecological value. Threats to the embankment include spraying with herbicide.

Site: 22

Habitats Present	Grid Reference
GA2: Amenity grassland (Improved)	323554/172899

A greenfield site adjacent to a housing estate. Species poor and of low conservation value. Likely threats include possible development.

Site: 23

Habitats Present	Grid Reference
GA2: Amenity grassland (Improved)	324110/173233

Area of rough grassland to the rear of a housing estate. Species poor and of low conservation value. Likely threats include possible development.

Site: 24

Habitats Present	Grid Reference
ED2:Spoil and bare ground	323243/173173

Water tower with spoil heaps surrounding it. Several weedy species such as Ragwort, Clover, Dandelion and Bracken have started to recolonise the bare ground. This site is currently of very low conservation value.

Site: 25

Habitats Present	Grid Reference
GA2: Amenity grassland (Improved) WL1: Hedgerow	322871/174494

Grassy field adjacent to a halting site currently used for horse grazing. There are many bare patches in the field due to excessive grazing and poaching of the ground by horses. A hedgerow surrounding the field contains many native tree species including Oak, Ash and Hawthorn.

The conservation value of the field is low while that of the hedgerow is considered medium to high due to the many native tree species contained within it.

The main threats to the site relate to continued over grazing.

Site: 26

Habitats Present	Grid Reference
GA1: Improved agricultural grassland WL1: Hedgerows	323384/173886

Strip of rough grassland adjacent to the river currently used for horse grazing. Ragwort, Dandelion and Marsh thistle were frequent with patches of Gorse and Bramble. A Hedgerow along the perimeter of the site contained Sycamore, Ash, Scots pine and Holly.

The conservation status of this site is medium due to the presence of the hedgerow.

The main treat to the site is possible scrub encroachment.

Site: 27

Habitats Present	Grid Reference
GA2: Amenity grassland (Improved)	323648/173836

This site comprises an area of amenity grassland currently the site of a football pitch. The site is consists of species poor grassland and is of low conservation value.

Site: 28

Habitats Present	Grid Reference
GA1: Improved agricultural grassland WL1: Hedgerows	323755/173783

This site is a continuation of site 26.

Site: 29

Habitats Present	Grid Reference
FW2: Depositing/lowland rivers (Avoca) WD1: (Mixed) Broadleaved woodland	323238/174235

Area of mixed broadleaved woodland along the banks of the Avoca River. The lower reaches of the banks were dominated by Willow, while Birch, Holly, Beech, Scots pine, Alder and Oak occurred further up the banks. *Rhododendron ponticum* was also recorded at this site.

The conservation value of this site is high as it represents a good mix of tree species many of which are native. It also provides a wildlife corridor for other wildlife. The north side of this stretch of the river is the Arklow Town Marsh (NHA) enforcing the importance of this area as a corridor.

The main threat to the site is invasion by Rhododendron.

Site: 30

Habitats Present	Grid Reference
WN2: Oak-ash-hazel woodland GS4: Wet Grassland	322845/173750

Semi-natural woodland characterised by Oak, Ask and Hazel and Birch with Holly and Beech present. The open nature of the canopy has allowed the development of a species rich ground flora including Water horsetail, Water mint, Wood sorrel, Common Vetch, Soft rush, Bluebell, Herb robert, Ivy, Male fern and heart's-tongue fern. Ash saplings were frequent. *Rhodondentron ponticum* was also present at this site. This area surrounds a small area of wet grassland.

This site is of high conservation value as it represents an example of semi-natural woodland and a species rich ground flora which is now limited in its distribution across Ireland.

The main threats to the site include invasion from Rhododendron and Gorse, especially in the vicinity of a small pond, which occurs on the site. Domestic dumping was also evident near the site of the pond. Planning permission was being sought for a substantial development adjacent to this site.

Site: 31

Habitats Present	Grid Reference
WS1: Scrub WL1: Treeline	322755/173535

Area of Willow scrub of moderate conservation value with mature treeline to the south.

5. Discussion

5.1 Sites of local biodiversity importance

A total of 46 sites were selected from a review of aerial imagery of the area within Arklow Town. All of these sites were examined in the field and a number of them were subsequently excluded from more detailed survey. Sites were excluded from further survey if they had been developed post 2005 (the latest year for which aerial imagery is available), or were gardens attached to larger houses, or were considered to have little biodiversity value.

A total of 31 sites were surveyed in detail as outlined in table 1. The areas surveyed were evaluated using a combination of the Ratcliffe Criteria (Heritage Council 2002) and the National Roads Authority site evaluation scheme (2002) (see Appendix 1). The Ratcliffe Criteria provides an overview of each site in terms of its size, diversity, naturalness, rarity, fragility, typicalness, while the National Roads Authority site evaluation scheme provides a system for assessing sites in terms of qualifying criteria and criteria for assessing impact significance.

Of the 31 sites surveyed 1 was considered to be national importance (site 15). 12 were considered to be of high value and locally important. 14 sites were considered to be of moderate value and locally important and 5 sites were considered as low value, but locally important.

Site 15 (Arklow Town Marsh NHA). This site is a large wetland area located north of the Avoca estuary on the perimeter of Arklow town. An overgrown disused roadway bisects the site from east to west. The site provides a good example of a relatively large wetland and is therefore of high conservation value, especially in an urban context.

12 sites were rated as C sites, High value, locally important. These comprised of site numbers 2, 3, 4, 6, 8, 9, 19, 25, 26, 28, 29 and 30. Sites were considered to be of high value and locally important were they contained either a good range of habitats and native species or habitats that provided additional biodiversity value, such as hedgerows, which in addition to often containing a good range of native species are considered an important wildlife corridor that can contribute to the overall connectivity of sites within the town.

13 sites were rated as D sites, Moderate value and locally important. These comprised site numbers 1, 5, 7, 10, 11, 12, 13, 14, 17, 18, 21, 27 and 31. These sites were considered to be of moderate value and locally important if they contained a high percentage of non-native species and/or were small in size thereby reducing their chance of being capable of supporting a natural habitat and its associated species in the medium to long term. However such sites are still of considerable biodiversity value as they can provide nesting sites for birds and can also contributed to connecting sites of higher biodiversity value.

5 sites were considered to be E sites, Low value and locally important. These sites comprised site numbers 16, 20, 22, 23 and 24. Generally these sites were either destroyed, consisting of wasteland or were very small and of very low species diversity. Those species that did exist were generally non-native. However, many such sites would be capable of providing suitable habitats and contributing to the overall biodiversity of the town if suitably managed and maintained.

5.2 Management recommendations for each site

Many of the sites identified in section four require some degree of management to enhance their biodiversity value and/or to mitigate negative impacts. In urban situations habitat loss and fragmentation, a major driver of biodiversity loss, has already occurred to a large degree. Therefore most realistic management recommendations can only deal with measures to prevent further habitat loss and fragmentation and methods to enhance the biodiversity of the remaining sites. Specific recommendations for each site are outlined in table 2. General recommendations to deal with each of the issues identified as having a negative impact in addition to enhancement measures are outlined below.

5.2.1 Control of Damaging Practices

Invasive non-native species.

Invasion by non-native species is becoming an increasing problem throughout Ireland. During this study Bracken and Rhododendron were noted as a particular problem at a number of sites. Advice and measures for the control of Measures to control Bracken are provided in Appendix 1.

Dumping

Dumping on a small scale was noted at a number of sites. All of the instances of dumping recorded related to the dumping of domestic rubbish, so called “Fly-tipping”. Evidence has shown that, unless removed as soon as possible small scale dumping can lead to an increase in dumping in the same area by others. An inititive known as PURE (Protecting Uplands & Rural Environments) and supported by Wicklow County Council aims to raise awareness as well as removing dumped rubbish in the Wicklow and Dublin Mountains. The expansion of projects such as PURE into the area of urban biodiversity hotspots, could assist in educating the public and keeping areas of urban areas of biodiversity value rubbish free.

5.2.2 Enhancement measures

Planting of native tree species

The planting of native tree species should be encouraged, especially in urban parks and also on streets. Increasing the number and variety of native tree species will assist in providing habitats and shelter for birds in addition to enhancing the aesthetic value of streetscapes. Currently in Arklow there is little connection between sites and many areas are devoid of trees. The exceptions are those sites near the Avoca and on the Eastern boundary of the town. A significant planting regime of native trees would assist in enhancing the aesthetic nature of the town as well as its biodiversity value. The absence of trees is particularly noticeable in the centre of the town and in many of the housing estates.

Planting of native herbaceous plants and shrubs

The planting of native herbaceous plants and shrubs in urban parks would greatly increase species diversity, while providing a habitat for invertebrates and birds. It could also be used as a tool for education and awareness of biodiversity if appropriate signage were placed *in situ*.

Creation and management of Hedgerows

Hedgerows are a very significant wildlife habitat, providing an essential refuge for a variety of plants and animals. They also act as a corridor for biodiversity, allowing dispersal and movement between other habitats. Even within an urban setting the planting of native hedgerows is possible. While it may be preferable to keep hedgerow size to a minimum in urban parks for health and safety reasons, consideration should be given to the provision of low hedgerows and/or areas consisting of native shrub and tree species to increase both species diversity and provide shelter.

Today, neglect of, and damage to, hedgerows have replaced direct loss as the most significant factors affecting the habitat. Excessive flailing and cutting of hedges down to a metre or so in height, the use of agricultural pesticides, herbicides and fertilisers right up to base of hedgerows has led to physical damage, loss of species and nutrient enrichment. Lack of traditional hedgerow management such as coppicing or laying has led to hedges growing tall or becoming fragmented. Positive management can play a major part in enhancing and recreating damaged and neglected hedgerows.

Currently in Arklow well established hedgerows are seen in the fields to the south of the town. The development potential of this site is vast and should development take place, the hedgerows should be maintained.

Management of scrub in woodland habitats

Scrub tends to develop on grassland and may also form an under story in open canopy woodlands which are neither cut nor grazed. While scrub, as a habitat in its own right, may be beneficial as a nesting site for birds and for providing shelter for other small mammals, dense Scrub in a woodland habitat can shade out herbaceous woodland plants and attempts should be made to control it. Once scrub is cleared, re-growth will be suppressed and an open habitat maintained only if grazing levels or other form of cutting are sufficient. In urban habitats where grazing is absent this type of scrub formation in the more open canopy woodlands is inevitable unless some for of management is implemented. Removal of scrub and the selective felling of non-native species should be considered at sites 9 and 29 in Arklow.

Restoration ecology

The Avoca River would benefit from the application of the principle of restoration ecology. The woodland areas along the banks are suffering from the encroachment of scrub with the subsequent loss of the natural ground flora due to the closing in of the scrub layer. Management of the river bank, to remove low scrub species and invasive non-native species would enhance the biodiversity of the area by allowing the development of a more diverse native ground flora. A similar encroachment is seen at site 8, the park to the east of the Town Marsh. In this area Gorse/Bracken are beginning to dominate at the expense of the ground flora.

Engaging local business

The topic of engaging with local business to enhance the biodiversity value of their sites is becoming an increasingly important area of research at EU level. Evidence shows that engaging with local business often leads to their willingness to enhance the biodiversity value of their sites. For example, a number of golf clubs in Ireland have initiated measures to increase the biodiversity value of their sites by introducing native tree species, wildflower meadows and by building suitable habitats for nesting birds on riverbanks within their sites. It is recommended that Arklow Town Council initiate a system to engage with local business in this regard. Sites 17 (Golf links), 23 (beside Tescos), 10 (beside Caravan Park) and 2 (beside Industrial estate) could benefit from such a measure.

Building links with the Planning Departments

Planning Departments have significant means at their disposal to ensure the conservation/ enhancement of biodiversity in both urban and rural environments. The promotion of sound ecological principles/conservation measures through the planning process would assist in not only maintaining current areas of biodiversity, but would encourage and enhance biodiversity in the Arklow area.

During the planning stages of any development the power to enhance biodiversity is significant and should be encouraged. The enhancement, creation and amalgamation of wildlife corridors and areas of biodiversity would be key in the overall strategy in conserving biodiversity through planning. This should be done in such a manner so as to encourage areas of biodiversity and wildlife corridors e.g. treelines, ponds and small woodlands.

Fragmentation of the remaining wildlife corridors should be avoided at all costs. If roadways etc. are to bisect a corridor, measures should be taken to minimise disruption of the corridor e.g. passes, bridges, planting etc. Of prime importance are the Avoca River, Arklow Town Marsh and Site 30, the area of semi natural woodland just outside the town boundary. It is essential that these areas are maintained and enhanced where possible. In general, the promotion of green areas with native planting should be encouraged. The creation of native hedgerows surrounding open areas should also be promoted.

In relation to larger developments, preplanning meetings should be encouraged and the importance of biodiversity expressed to the developer. This would include the importance of hedgerows, treelines, shrubs, ponds (in conjunction with sustainable urban drainage systems) etc. This would allow for the creation of unfragmented areas for biodiversity, that would compliment and feed into current areas of biodiversity in the town.

The monitoring and enforcement of biodiversity related decisions would be key and essential in the enhancement of biodiversity. For example the Council would not take charge of an area until all biodiversity actions have been completed.

In the Wicklow Urban Habitats Study many of the areas and habitats examined had no protection or conservation measures. The exceptions to this are the Arklow Town Marsh. Conservation measures should be sought for the areas of high biodiversity that remain unprotected.

Table 2: Site conservation rating and management practices

Site Number	Habitats present	Conservation rating	Threats	Recommended management practices
1	GS4/WL1	Unfavourable	None evident.	Private site. None recommended.
2	FW2/BL2/ED2	Unfavourable	Commercial dumping. Pollution to stream. Land slides.	The issue of dumped commercial waste should be addressed. This should be removed to allow regeneration of the natural flora and prevent possible leaching of pollutants into the stream below.
3	GS2	Unfavourable	Herbicide application to grass verges.	The use of herbicide should be discouraged.
4	GA1/FW2/WS1	Unfavourable	None evident.	Manage hedgerows: see section 5.2.2.
5	GS2	Unfavourable	None evident.	
6	GA2/WL1/FW2	Unfavourable	Possible development pressure.	Manage hedgerows: see section 5.2.2.
7	GS2/CC1	Unfavourable	None evident.	None recommended.
8	FL8/GA2/WS1	Unfavourable	Eutrophication of lake. Bracken invasion.	Manage bracken encroachment and scrub. See section 5.2.2. Encourage wildflower planting. Species selection is important due to proximity to the sea.
9	FW2/WD1	Unfavourable	None evident.	Replace non-native tree species with natives. Manage the woodland to keep reduce scrub encroachment and encourage native ground flora.
10	WD5/FW4/FL5		Eutrophication of lake.	Private site. None recommended.
11	GA2	Unfavourable	None evident.	None recommended.
12	GA2	Unfavourable	None evident.	None recommended
13	WS1	Unfavourable	None evident.	None recommended
14	GS4/WS1	Unfavourable	None evident.	None recommended
15	GM1/GS4/WS1	Unfavourable	Damage to scrub areas	Monitor scrub defoliation.
16	GA2	Unfavourable/destroyed	N/A	None recommended
17	GA2	Unfavourable	None evident.	Encourage golf cub to increase species and habitat diversity by disseminating information on the importance of biodiversity and

				methods to enhance it, including information indicating how other golf clubs have addressed this issue. The Druids Glen Golf club in particular has initiated measures to vastly enhance biodiversity at that golf club.
18	CB1	Unfavourable	None evident.	None recommended.
19	WL1	Unfavourable	Bracken encroachment. Possible thinning of hedgerow.	Manage hedgerows: see section 5.2.2
20	GS2	Unfavourable	None evident.	None recommended.
21	ED3/GA2	Unfavourable	Herbicide application.	Discourage use of herbicide.
22	GA2	Unfavourable/destroyed	Possible development.	None recommended.
23	GA2	Unfavourable/destroyed	Possible development.	None recommended.
24	ED3	Unfavourable/destroyed	N/A	None recommended.
25	GA2	Unfavourable	Overgrazing.	Manage hedgerows: see section 5.2.2
26	GA1	Unfavourable	Scrub encroachment	Manage hedgerows: see section 5.2.2. Control scrub encroachment.
27	GA2	Unfavourable	None evident	None recommended.
28	GA1	Unfavourable	None evident.	None recommended.
29	FW2/WD1	Unfavourable	Non-native invasive species invasion. Scrub encroachment.	Manage woodland scrub: see section 5.2.2. Control Rhododendron encroachment.
30	WN2	Unfavourable	Non-native invasive species invasion. Domestic dumping.	Manage woodland. Remove dumped material. Control encroachment of Rhododendron.
31	WS1	Unfavourable	None evident.	None recommended.

Appendix 1: List of species mentioned in the text.

Ash	*Fraxinus excelsior*
Beech	*Fagus sylvatica*
Bindweed	*Convolvulus arvensis*
Bluebell	*Hyacinthoides non-scriptus*
Bramble	*Rubus fruiticosus*
Bush vetch	*Vicia sepium*
Butterbur	*Petasites hybridus*
Creeping buttercup	*Ranunculus repens*
Common gorse	*Ulex europaeus*
Common nettle	*Urtica dioica*
Common reed	*Phragmites australis*
Common vetch	*Vicia cracca*
Creeping thistle	*Cirsium arvense*
Dandelion	*Taraxacum* sp.
Downy birch	*Betula pubescens*
Elder	*Sambucus nigra*
Greater plantain	*Plantago major*
Grey willow	*Salix cinerea*
Goose-grass	*Galium aparine*
Hart's-tongue	*Phyllitis scolopendrium*
Hawthorn	*Crataegus monogyna*
Hazel	*Corylus avellana*
Herb robert	*Geranium robertianum*
Hogweed	*Heracleum sphondylium*
Honeysuckle	*Lonicera periclymenum*
Holly	*Ilex aquifolium*
Ivy	*Hedera helix*
Lesser celendine	*Ranunculus ficaria*
Male-fern	*Dryopteris filix-mas*
Marsh thistle	Cirsium palustre
Meadowsweet	*Filipendula ulmaria*
Meadow vetchling	*Lathyrus pratensis*
Ragwort	*Senecio jacobaea*
Red clover	*Trifolium pratense*
Red Valarien	*Centranthus rubber*
Rhododendron	*Rhododendron ponticum*
Rose	*Rosa* sp.
Rosebay willowherb	*Chamerion angustifolium*
Scots pine	*Pinus sylvestris*
Sessile oak	*Quercus petraea*
Silverweed	*Potentilla anserina*
Soft rush	*Juncus effuses*
Spear thistle	*Cirsium vulgare*
Sycamore	*Acer pseudoplatanus*
Water horsetail	*Equisetum fluviatile*
Water mint	*Mentha aquatica*
White clover	*Trifolium repens*
Willow Herb	*Epilobium montanum*
Wood sorrel	*Oxalis acetosella*
Woundwort	*Stachys sylvatica*
Yellow iris	*Iris pseudacorus*
Yew	*Taxus baccata*

Appendix 2: Information on the control of Bracken

Bracken (*Pteridium aquilinum*)

Bracken is a native Irish fern. Originally a woodland species, bracken is now capable of spreading into open areas without canopy cover and it has become widespread and abundant across much of the Irish landscape. Changes in land use practice, especially fewer grazing cattle in uplands resulting in less trampling of the bracken, poor management of heather and grassland among other factors have contributed to the spread of bracken. While the spread of bracken on a large scale ultimately leads to decreased species and habitat diversity, there are benefits to allowing limited stands of bracken within a habitat mosaic.

A dense cover of bracken inhibits the growth of other plants and ultimately leads to reduced species diversity and habitat diversity. It also inhibits woodland regeneration. Bracken is carcinogenic and toxic to animals and the spores are also considered a hazard to human health. Bracken can also contribute to the risk of fire. However, as part of a habitat mosaic, bracken can be important for many forms of wildlife including invertebrates, small mammals and certain bird species. It can also contribute to the prevention of erosion on steep hillsides.

While there are a number of methods for the control of bracken, consideration should first be given to the reasons for the control of bracken, the desired result of this control and the physical character of the landscape in which control is required. Scottish Natural Heritage have published guidelines on the control of bracken and this publication is available to download at:
http://www.sepa.org.uk/pdf/publications/leaflets/bracken/bracken_leaflet.pdf

Appendix 3: National Roads Authority Site Evaluation Scheme

Rating	Qualifying Criteria
A Internationally Important	Sites designated (or qualifying for designation) as an SAC[1] or SPA[2] under the EU Habitats or Birds Directives. Undesignated sites containing good examples of Annex I *priority* habitats under the EU Habitats Directive. Major salmon river fisheries or major Salmonid (salmon, trout or char) lake fisheries.
B Nationally Important	Sites or waters designated or proposed as an NHA[3] or Statutory Nature Reserve. Undesignated sites containing good examples of Annex I habitats (under EU Habitats Directive). Undesignated sites containing *significant numbers* of resident or regularly occurring populations of Annex II species under the EU Habitats Directive or Annex I species under the EU Birds Directive. Major trout river fisheries. Water bodies with major amenity fishery value or commercially important coarse fisheries.
C High value, locally Important	Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or significant populations of locally rare species. Small water bodies with known salmonid populations or with good salmonid habitat. Sites containing *any* resident of regularly occurring populations of Annex II species under the EU Habitats Directive or Annex I species under the EU Birds Directive. Large water bodies with some coarse fisheries value.
D Moderate value, locally Important	Sites containing some semi-natural habitat or habitat locally important for wildlife. Small water bodies with some coarse fisheries value or some potential salmonid habitat. Any waterbody with unpolluted water (Q-value rating 4-5).
E Low value, locally Important	Artificial or highly modified habitats with low species diversity and low wildlife value. Water bodies with no current fisheries value and no significant potential fisheries value.

[1] SAC Special Area of Conservation
[2] SPA Special Protection Area
[3] NHA Natural Heritage Area

Appendix 4: Ratcliffe (1977) criteria for site evaluation

Size. The area of a site must be habitat type (e.g. calcareous spring) may not be viable for another (e.g. woodland). large enough to be viable in respect of its resistance to edge effects, loss of species and colonisation by unwanted species. In general, the larger the site the more important it will be for biodiversity conservation because large areas of natural or semi-natural habitat are typically rare. Small sites are less likely to be viable in the long term. However, what is a viable size for one

Diversity. Sites with high species, habitat and structural diversity tend to be of more value for biodiversity conservation than sites with low diversity. Valid comparisons of species diversity can only be made between examples of the same habitat because some habitats (e.g. calcareous grassland) are intrinsically more diverse than others (e.g. raised bog). Species diversity should not be derived from non-native species, recent planting or disturbance.

Naturalness. Most Irish habitats have been modified to a greater or lesser degree by human influences. In general, the more unmodified the habitat, the higher its nature conservation value. Sites with natural or semi-natural habitats are more ecologically valuable than those that contain artificial or highly modified habitats, but there are exceptions.

Rarity. In general, the rarer the habitat or species, the higher its conservation value. Sites that contain rare habitats or species are generally more highly valued than those that do not. Rarity can be considered at national, regional or local levels if the relevant background information on distribution is available. The importance for conservation decreases from national to local.

Fragility. This is a measure of the sensitivity of natural and semi-natural habitats to human impact and climate change, including the probability of such impacts arising. In general, the more fragile the habitat, the higher its conservation value.

Typicalness. A typical habitat is a characteristic one, i.e. one that displays more of the typical features of the habitat type, or that is at the centre of the variation for that habitat type. However, it is important to remember that there is a limit to the extent to which all the features of a given habitat type can be encompassed within a single site. An alternative way to evaluate typicalness may be to ensure that a site selected in a region encompasses the range of habitat variation within that region.

Non-recreatability. The more natural the habitat, the greater the degree of difficulty of re-creating its original richness and complexity if damaged or destroyed. Re-created habitats tend to be inferior to their natural counterparts, which is why such emphasis is placed on the conservation of natural and semi-natural habitats where they occur.

Appendix 5: Site Synopsis for Arklow Town Marsh

SITE NAME: ARKLOW TOWN MARSH

SITE CODE: 001931

This site is now the principal wetland area in Arklow. It is a large marsh located north of the Avoca estuary on the perimeter of Arklow town. A disused roadway bisects the site from east to west.

Much of the site is dominated by Reeds (*Phragmites australis*), with Creeping Bent Grass (*Agrostis stolonifera*) and Valerian (*Valeriana officianalis*) common in places. On the southern side, numerous scattered bushes of Willow (*Salix* spp.) are growing among the Reeds, forming a scrub in places. Drier areas are characterised by large tussocks of Tufted Hair Grass (*Deschampsia caespitosa*). Other plants present include Soft Rush (*Juncus effusus*), Iris (*Iris pseudacorus*), Skullcap (Scutellaria galericulata), Lesser Pond Sedge (*Carex acutiformis*) and several other Sedges (*Carex* spp.).

Wet grassy areas with extensive stands of Water Horsetail (*Equisetum fluviatile*) occur on the northeast margin, with Creeping Bent Grass (*Agrostis stolonifera*), Spike Rush (*Eleocharis palustris*), Meadowsweet (*Filipendula ulmaria*) and Rushes (*Juncus articulatus* & *J. conglomeratus*) present.

The scarce Broad-leaved Cottongrass (*Eriophorum latifolium*) has been recorded growing on this site.

Much of the Willow (*Salix* spp.) has been defoliated, possibly due to atmospheric pollution from the nearby fertilizer factory.

The importance of this site is that it is a good example of a relatively large wetland, despite the impacts of atmospheric pollution and its proximity to Arklow town. The presence of at least one scarce plant species increases the interest of the site.

Appendix 6: Fossitt Habitat Classification

Non-Marine		
F Freshwater	FL Lakes and Ponds	FL1 Dystrophic lakes
		FL2 Acic oligotrophic lakes
		FL3 Limestone/marl lakes
		FL4 Mesotrophic lakes
		FL5 Eutrophic lakes
		FL6 Turloughs
		FL7 Reservoirs
		FL8 Other artificial lakes and ponds
	FW Watercourses	FW1 Eroding/upland rivers
		FW2 Depositing/lowland rivers
		FW3 Canals
		FW4 Drainage ditches
	FP Springs	FP1 Calcareous springs
		FP2 Non-Calcareous springs
	FS Swamps	FS1 Reed and large sedge swamps
		FS2 Tall herb swamps
G Grassland and Marsh	GA Improved grassland	GA1 Improved agricultural grassland
		GA2 Amenity grassland (improved)
	GS Semi-natural grassland	GS1 Dry calcareous and neutral grassland
		GS2 Dry meadows and grassy verges
		GS3 Dry-humid acid grassland
		GS4 Wet grassland
	GM Freshwater marsh	GM1 Marsh
H Heath and dense bracken	HH Heath	HH1 Dry siliceous heath
		HH2 Dry calcareous heath
		HH3 Wet heath
		HH4 Montane heath
	HD Dense bracken	HD1 Dense bracken
P Peatlands	PB Bogs	PB1 Raised bogs

		PB2 Upland blanket bog
		PB3 Lowland blanket bog
		PB4 Cutover bog
		PB5 Eroding blanket bog
	PF Fens and Flushes	PF1 Rich fen and flush
		PF2 Poor fen and flush
		PF3 Transition mire and quaking bog
W Woodland and scrub	WN Semi-natural woodland	WN1 Oak-birch-holly woodland
		WN2 Oak-ash-hazel woodland
		WN3 Yew woodland
		WN4 Wet pedunculate oak-ash woodland
		WN5 Riparian woodland
		WN6 Wet willow-alder-ash woodland
		WN7 Bog woodland
	WD Highly modified/non-native woodland	WD1 (Mixed) broadleaved woodland
		WD2 Mixed broadleaved/conifer woodland
		WD3 Yew woodland
		WD4 Conifer plantation
		WD5 Scattered trees and parkland
	WS Scrub/transitional woodland	WS1 Scrub
		WS2 Immature woodland
		WS3 Ornamental/non-native shrub
		WS4 Short rotation coppice
		WS5 Recently-felled woodland
	WL Linear woodland/scrub	WL1 Hedgerows
		WL2 Treelines
E Exposed rock and disturbed ground	ER Exposed rock	ER1 Exposed siliceous rock
		ER2 Exposed calcareous rock
		ER3 Siliceous scree and loose rock
		ER4 Calcareous scree and loose rock

	EU Underground rock and caves	EU1 Non-marine caves
		EU2 Artificial underground habitats
	ED Disturbed ground	ED1 Exposed sand, gravel or till
		ED2 Spoil and bare ground
		ED3 Recolonising bare ground
		ED4 Active quarries and mines
		ED5 Refuse and other waste
B Cultivated and built land	BC Cultivated land	BC1 Arable crops
		BC2 Horticultural land
		BC3 Tilled land
		BC4 Flower beds and borders
	BL Built land	BL1 Stone walls and other stonework
		BL2 Earth banks
		BL3 Buildings and artificial surfaces
C Coastland	CS Sea cliffs amd islets	CS1 Rocky sea cliffs
		CS2 Sea stacks and islets
		CS3 Sedimentary sea cliffs
	CW Brackish waters	CW1 Lagoons and saline lakes
		CW2 Tidal rivers
	CM Salt marshes	CM1 Lower salt marsh
		CM2 Upper salt marsh
	CB Shingle and gravel banks	CB1 Shingle and gravel banks
	CD Sand dune systems	CD1 Embryonic dunes
		CD2 Marram dunes
		CD3 Fixed dunes
		CD4 Dune scrub and woodland
		CD5 Dune slacks
		CD6 Machair
	CC Coastal constructions	CC1 Sea walls, piers and jetties
		CC2 Fish cages and rafts

Appendix 7 Useful contact names and addresses

Litter Line	(LoCall 1890548837)	
Arklow	(0402)32759	eao@wicklowcoco.ie
Heritage Officer	(0404)20191, (0404)67792	dburns@wicklowcoco.ie
Arklow Town Council	(0402) 32819	
Environmental Awareness Officer	(0404) 64120	eao@wicklowcoco.ie
	(LoCall 1890222276)	
National Parks & Wildlife	(0404) 45800	
Eastern Regional Fisheries Board	(01) 2787022	