Bray 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 Habitat 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 Bray Urban Area.

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 Bray, 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 Bray Urban 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

Bray is an urban centre and seaside town located on the mid-east coast of Ireland in Co. Wicklow. In recent years the town's population has significantly increased, as it becomes part of the east coast commuter belt to Dublin, being located only 20 km south of the Capital. Its close proximity to Dublin, together with improved road and rail networks are likely to further increase development pressure on the town in the medium term.

The natural habitats within Bray urban area are often overlooked 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 Bray Head located within the Bray Urban Boundary, and also stretches of costal sea cliffs and their associated habitats in addition to the River Dargle.

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 streams 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.

Some of the Bray urban area is covered under a number of environmental designations. These include SAC and NHA designations (Figure 1) and mainly comprises of Bray Head which is covered under both designations. Under the Bray Town Development Plan (2005-2011) additional conservation measures are incorporated. This includes the proposed Tree Preservation Orders (Figure 2) and the Bray Head Special Area Amenity Order (Figure 3).

While habitat loss and fragmentation, non-native species invasion and scrub encroachment are causing a negative impact on the biodiversity of Bray urban area, 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 Council's 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 Bray Urban Area. 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 enclosed private 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. 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.

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Figure 1. Special Areas of Conservation and Natural Heritage Areas in the Bray Urban Area (Bray Head)

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Figure 2. Proposed Tree Preservation Orders in the Bray Urban Area under the Bray Development Plan (2005-2011)

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Figure 3. Special Amenity Area Order (2007) on Bray Head (Bray Town Development Plan 2005-2011)

4. Results

4.1 Habitat assessment summary

Table 1. Sites surveyed in Bray Urban area (Figure 4). Fossit Classification definitions see Appendix 6.

Site No.	Grid Reference	Habitats present	Threats	Evaluation
1	326141/217232	FW2/GA2/WD5	Non-native planting.	D: Moderate value, locally Important
2	326904/218941	WL2	None evident.	E: Low value, locally Important
3	326874/218962	ED2	Herbicide application. Introduction of invasive non-native species.	D: Moderate value, locally Important
4	326726/219515	GS2/CS3	Development pressure. Spread of invasive non-native species.	C: High value, locally Important
5	326891/218349	BC4/WL2	None evident.	D: Moderate value, locally Important
6	326731/218461	WS3	None evident.	D: Moderate value, locally Important
7	326635/218113	GA2/WL1/WD1/WD5	Domestic dumping.	C: High value, locally Important
8	326316/217929	WL2/GA2	Possible development pressure.	D: Moderate value, locally Important
9	326142/219215	WD1	None evident.	D: Moderate value, locally Important
10	325904/218694	WL2/GA2	Undetermined damage to young trees	D: Moderate value, locally Important
11	326437/216438	GS2/FW2/WD1	Scrub encroachment. Domestic dumping.	C: High value, locally Important
12	325018/216242	WD1/FW2/WS1/WL1/ED1	Spread of invasive non-native species. Domestic dumping.	C: High value, locally Important
13	325811/218309	WD1/FW2	Spread of invasive non-native species. Domestic dumping.	C: High value, locally Important
14	327480/217123	GA1/WL1/WS1/HH1/HD1/ WD1/LR2/CS1/CS3	Burning. Spread of Bracken. Land reclamation	B: Nationally Important

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Bray Urban Uabitats
Fossit code

- BC4
- CS3
- CS3/CS4
- ED2
- ER
- FL4
- FW2
- GA1
- GA2
- GS2
- HH1/WS1/HD1
- HH4
- LR2
- WD1
- WD1/HH1
- WD5
- WL1
- WL2
- WS1
- WS1/HD1
- WS3
- Site Number
- Town Boundary

0 0.25 0.5 1 1.5 2 Kilometers

OSI Licence- CCMA2008/10 Wicklow County Council

Figure 4. Sites surveyed in Bray Urban area with Fossitt classification (Appendix 6)

4.2 Site descriptions.

Site: 1

Habitats Present	Grid Reference
FW2 Depositing/lowland rivers GA2 Amenity grassland WD5 Scattered trees and parkland	326141/217232

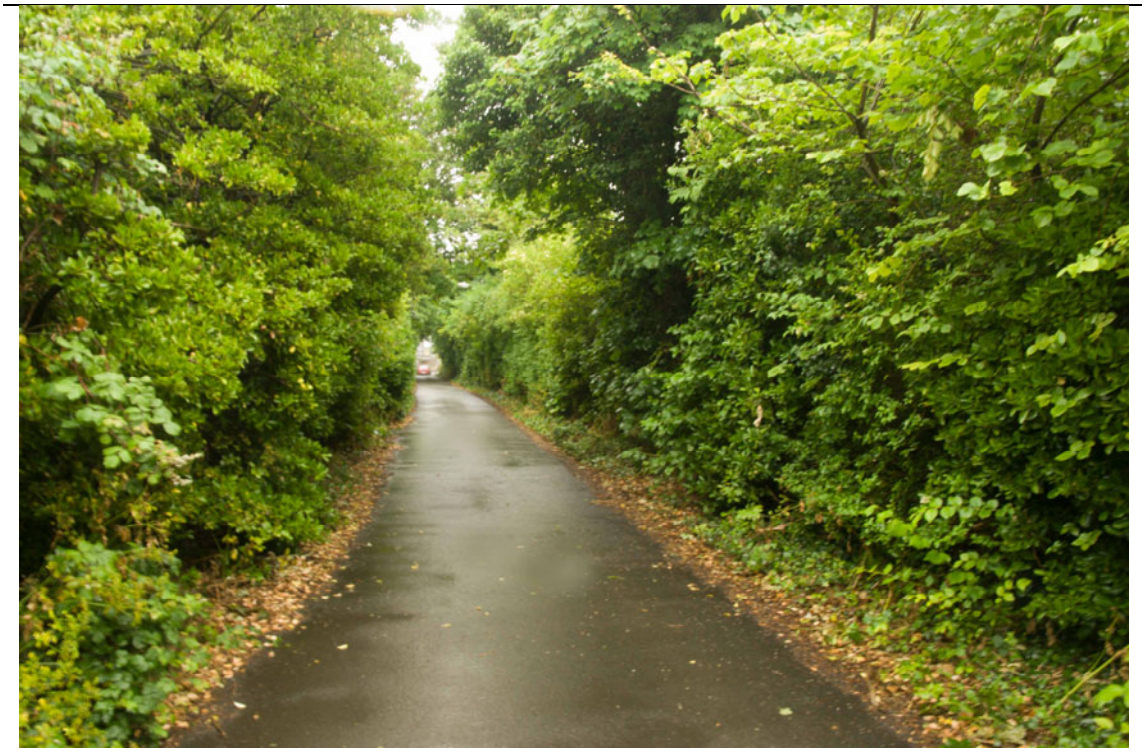
This site consists of a small steep sided stream situated within a small housing estate. The banks of the stream are colonised by a variety of grasses, sedges and herbs including Meadowsweet, Bramble, Ivy, White clover, Creeping buttercup, Water mint, Yellow flag Iris, While clover, Yorkshire fog, Water horse tail and Drooping sedge with occasional trees (Sycamore and Elder) on either side. Some non-native planting, including Bamboo has occurred along the banks of the stream.

Although this is a small and highly modified site, it is of local value due to the species richness of the stream banks and its aesthetic value. While many of the species along the banks are considered to be non-native the site provides a corridor for local wildlife.

The main impacts on the site appear to be from non-native plantings along the riverbank.

Site: 2

Habitats Present	Grid Reference
WL2 Treelines	326904/218941



This site consisted of a tree line following the course of a driveway into a large private house at the side of a railway track. The majority of trees lining the drive were non-native, mainly consisting of Horse chestnut and Sycamore with a shrub layer comprised of Bramble. The ground flora along the tree line was very poorly developed.

The site is of overall low biodiversity value due to the species poor habitat and non-native plantings. However, linear stretches such as tree lines contribute to the overall biodiversity value of the urban area by providing wildlife corridors, shelter and nesting sites for birds.

Threats: none evident

Site: 3

Habitats Present	Grid Reference
ED2 Spoil and Bare ground	326874/218962

This site is represented by a section of railway line and its associated embankment on either side of the track. The vegetation along the embankments are typical of this type of habitat consisting mainly of weedy species and garden escapes including abundant Red Valerian amongst Ivy, Bramble, Meadowsweet, Ragwort, Bindweed, Dandelion, Common nettle, Montbretia and Dog daisy.

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 and the introduction of non-native invasive species.

Site: 4

Habitats Present	Grid Reference
GS2 Dry Meadows and grassy verges CS3 Sedimentary sea cliffs	326726/219515

This site consists of a gently undulating area of grassy meadow adjacent to coastal sea cliffs and is typified by a variety of grasses and broadleaved herbs. Characterising species of the grassy areas included Yorkshire fog, Annual meadow-

grass, Smooth meadow- grass, Meadow sweet, White clover, Dandelion, Bird's-foot trefoil, Creeping buttercup, Spear thistle, Hogweed, Buck's horn plantain and Nettle. Teasel was also noted in the grassy areas. The sloping areas were characterised by abundant Red valerian and Bramble. The sea cliffs adjacent to the site are species poor and erosion was evident along their length.

The site provides a species rich area of grassy meadow with adjacent sea cliffs and is considered to be of high biodiversity value in a local context. It contains many species common to costal areas and typical of the east coast of Ireland. The site provides an amenity area for Bray town. Locals currently use the area as a cliff walk.

The main threats to the site are from erosion to the sea cliffs, and development pressure (At the time of writing the site is subject to a planning application) and scrub encroachment on the adjacent site. Invasion by scrub species, such as bramble and the alien species Red valerian should be controlled to prevent the loss of the grassy areas and their associated flora.

Site: 5

Habitats Present	Grid Reference
BC4 Flowerbeds and boarders WL2 Treelines	326891/218349

Fenced Urban Park laid out in lawn and ornamental boarders and surrounded by trees. Tree species included Spanish chestnut, Rowan and Lime. Ornamental boarders containing planted annuals occur around a central lawn area.

This site is highly managed as an urban amenity park. Although the habitat and species diversity is relatively low it provides a green space within a highly urbanised area.

No current threats or impacts on the site were evident.

Site: 6

Habitats Present	Grid Reference
WS3 Ornamental/non-native shrub	326731/218461

This site is a fenced private urban park with a central area of lawn surrounded by trees and some planting of shrub species. Trees within the park included Eucalyptus, Scots pine, and Sycamore with Hawthorn and Elder.

While this is a private site and contains many non-native plantings and a managed lawn area it provides an urban green space and a habitat for birds and invertebrate species, as such the site contributes to the overall biodiversity of Bray town.

No current threats or impacts on the site were evident.

Site: 7

Habitats Present	Grid Reference
GA2 Amenity grassland (improved)	326635/218113
WL1 Treelines	
WD5 Scattered trees and parkland	
WD1 (Mixed) broadleaved woodland	

This is an area of open amenity space adjacent to a housing estate. The site consists of a large field, which is maintained by mowing on the western half and remains uncut to the east. Recent scattered plantings of Oak occur throughout the field. A hedgerow surrounds the field on the southern side and an area of woodland occurs to the north. A small fenced off area occurs to the north west of the site.

The fenced area within the site is largely overgrown by Rosa sp. and Gorse, but also contains a variety of broadleaved herbs such as Ragwort, Nettle, Dandelion, Meadow sweet and Marsh thistle.

The area of woodland to the north of the site is characterised by Sessile oak (young saplings), Horse chestnut, Sycamore, Hawthorn and Elder with an under story of Gorse, Bramble, Meadow sweet, Ragwort, Ivy, Herb robert, Wood avens, Creeping buttercup, White clover, Butterbur and Bush vetch.

The hedgerow running along the perimeter of the site is typified by Hazel, Sessile oak, Elder, Sycamore, Birch and Bramble with Rosa species.

This site represents a wide range of habitats, many with good species diversity and numerous native species. The site has been managed so that it provides both an amenity area/green space along with more natural wooded areas and areas of uncut grass which have helped to increase species diversity. This site is considered to be of medium to high conservation value in a local context due to the high number of habitats and species diversity, especially those associated with the wooded area and the hedgerows.

Some domestic dumping was evident near the wooded area of the site but otherwise there were no obvious impacts on the site.

Site: 8

Habitats Present	Grid Reference
WL2 Treelines GA2 Amenity grassland (improved)	326316/217929

A private walled garden with a central area of lawn surrounded by tree lines. This site has been largely neglected and over grown. The principle tree species include Sycamore, Cherry and Elder.

This site is of low to medium biodiversity value. While the majority of species are non-native trees, the site provides a habitat for birds and other wildlife.

No impacts are evident. Development pressure is possible.

Site: 9

Habitats Present	Grid Reference
WD1 (Mixed) broadleaved woodland	326142/219215

This site consisted of a linear strip of woodland adjacent to an industrial site. Many of the tress within this site were the subject of previous survey and had been numbered. The principle tree species were Ash, Elder and Sycamore with a dense under story of Ivy, Ragwort, Red valerian, Butterbur, Spear thistle, Nettle, Bramble, Buddleja and Elder.

This site is considered to be of medium conservation value for the species diversity it contains and its function as a corridor for biodiversity.

There were no evident impacts to the site in its current state, although it is likely to have formed part of a larger area of woodland in the past.

Site: 10

Habitats Present	Grid Reference
GA2 Amenity grassland (improved) WL2 Treelines	326437/216438

Fenced urban park (Peoples' Park), set out in lawn with trees fringing the perimeter. The principle tree species included Horse chestnut, Sycamore, Hawthorn, Hornbeam and Prunus. This site is highly managed as an urban amenity park. Although the habitat and species diversity is relatively low it provides a green space within a highly urbanised area.

The site is of medium biodiversity and high amenity value.

There is evidence of damage to new tree plantings on the eastern side of the park where many of the trees have been stripped of bark, although the cause is not known this appears to be of a consequence other than malicious damage.

Site: 11

Habitats Present	Grid Reference
GS2 Dry meadows and grassy verges WD1 (Mixed) Broadleaved woodland FW2 Lowland depositing rivers	326437/216438

This site comprises an area of woodland with a small stream running through it. An area of Grassy meadow occurs alongside the road.

The woodland contains a good variety of native trees including Mountain ash, Sessile oak, Willow, Hawthorn and Scots pine. The open nature of the canopy provides a suitable habitat for a diverse and species rich ground flora characterised by Wood avens, Greater wood rush, Primrose, Herb Robert, Dropping sedge, Bush Vetch, Yellow flag Iris, Bluebell, Creeping buttercup, Hedge Woundwort, Willow herb, Rosa sp., and Soft rush. Ferns such as Hearts-tongue fern and Scaly male-fern along with liverworts and bryophytes and Marsh pennywort occur along the stream side.

The area of grassland alongside the road contains abundant grasses and herbs including *Agrostis* and *Poa* spp., Silverweed, Creeping buttercup, White Clover, Red clover, Spear thistle and Bush Vetch.

This site is considered to be of high biodiversity value as a result of the species richness, extent and diversity of habitats within the site. It contains many native tree species and the open nature of the canopy has allowed the establishment of a

diverse ground flora. This area appears not to be covered by the proposed Tree Preservation Order. It is suggested that is rectified to include this site.

Threats to the site include encroachment of scrub (Gorse and Bramble) in some areas and possible pollution of the stream. Domestic dumping was also evident near the perimeter of the site.

Site: 12

Habitats Present	Grid Reference
FW2 Lowland depositing rivers	325018/216242
WD1 (Mixed) Broadleaved woodland	
WS1 Scrub	
WL1 Treelines	
ED1 Exposed sand, gravel or till	

The River Dargle was surveyed from the bridge at the Southern Cross on the Bray urban boundary to its entry to the sea at Bray town. The River along this length comprises a lowland depositing river with a variety of associated habitats. Accessibility to some areas of the river was not possible as private houses with gardens stretching down to the river occur at a number of points. A good overview of the river was, however, obtained by accessing the river at a number of vantage points, mainly bridges, along its length. Much of the surrounding woodland is subject to proposed Tree Preservation Orders (see Figure 2). The areas encompassed by the habitats described below are indicated on the map that accompanies this report.

Area A, WD1/FW2: Broadleaved woodland along the banks of the River Dargle characterised by Birch, Ash, Sessile oak, Beech and Sycamore with an under story of Buddleja and Laurel. The under story is not well developed and is species poor but contains a herb layer characterised by Grasses, Spear thistle, Ragwort, Creeping buttercup and clover species.

Area B, WD1/FW2: Broadleaved woodland characterised by Birch, Ash, Sessile oak, Beech, Hawthorn, Holly and Sycamore with an under story of Buddleja and Laurel. The canopy is more open at this point and the ground flora more developed with Ivy, Elder, Butterbur, Herb Robert, Dropping sedge, Hearts-tongue fern and Nettle (common) among the herb layer. A number of private landscaped gardens run down to the riverbank in this area.

Area C, WD1: Broadleaved woodland characterised by Horse chestnut, Scots pine, Sycamore, Ash Sessile oak, Hawthorn, Holly, Beech and Elder. Numerous young saplings, particularly of Beech, occur throughout this area. The area has a well-developed ground flora containing Wood avens, Herb-robert, Bush vetch, Ivy, Bramble, Hogweed, Male fern, Goose-grass, and Hogweed. Laurel is common throughout.

Area D, WD1, FW2: An narrow strip of Broadleaved woodland characterised by Birch, Ash, Sessile oak, Beech, Hawthorn, Holly and Sycamore with an under story of Buddleja. A number of young Birch trees, probably recently planted occur in this area.

Area E, WD1: Beech and copper beech dominated woodland with Sycamore, Ash, Sessile oak and Holly. The under story is poorly developed and contains Ivy, Hearts-tongue fern and laurel saplings. A number of individuals of Rhododendron also occur.

Area F, WD1, FW2: Beech, Sycamore, Ash, Scots pine dominated woodland with an under story of Bramble, Laurel and Buddleja along the margins.

Area G, WS1, FW2: At this point the woodland opens up into an area of low scrub along the banks of the river. The scrub is characterised by Gorse, Buddleja and Willow with occasional Ash forming a mosaic with grassy areas along the river-bank. The alien invasive species, Japanese Knot weed, was noted at this point where it has colonised the ground alongside the river.

Area H, WS1, ED1, FW2: Area of scrub and exposed ground along side the river. Characterising species included Willow, Ivy, Bind weed, Bramble and Japanese Knot weed

Area I, WS1, FW2, WL1: Narrow strip of Willow scrub lining the banks of the river. This is essentially a tree line characterised by Willow and Sycamore with Buddleja, Japanese Knot weed, Ivy, Elder and Red valarian.

Area J, WD1: Broadleaved woodland characterised by Birch, Ash, Beech, Holly, Horse chestnut, Scots pine and Sycamore with an under story of Buddleja and abundant Laurel. The ground flora contains Ivy, Bramble, Herb Robert, Bluebell, Wood avens, Bush vetch, Meadow vetchling, Dandelion, Male fern and Woodbine.

Area K, WD1: Broadleaved woodland on a very steeply sloping bank leading down to the river. Characterised by Birch, Ash, Beech, Holly, Horse chestnut, Scots pine and Sycamore with an under story of Buddleja and abundant Laurel. The ground flora contains a dense under story of Ivy and Bramble.

Area L, WD1: Broadleaved woodland on a very steeply sloping bank leading down to the river. Characterised by Birch, Ash, Beech, Holly, Horse chestnut, Scots pine and Sycamore with an under story of Buddleja and abundant Laurel. The ground flora contains a dense under story of Ivy and Bramble.

Area M, WL1: Treeline within the grounds of Ardmore studios dominated by Horse chestnut, Beech, Laurel and Holly.

The River Dargle provides a valuable corridor for both flora and fauna throughout its course through the urban area of Bray. The banks of the river are highly modified and a considerable number of non-native tree species and alien species occur. However, many native tree species also occur and in some areas the associated ground flora provides a good example of a native woodland herb layer.

The site is considered to be of high conservation value due to its value as a wildlife corridor and the high species diversity associated with it. The Dargle is one of Ireland's prime sea trout rivers and also supports Brown Trout and Salmon. Salmon in freshwater are an EU Habitats Directive Annex II species.

Threats to the River are from the occurrence of non-native alien species, especially Japanese Knot weed, Buddleja and Laurel, which are encroaching on the site in many areas. Domestic dumping was also evident at a number of locations although this is of a minor nature at present. The Eastern Regional Fisheries Board stated that development in Bray town has the potential to impact directly a key section (particularly in terms of fish migration) of the River Dargle, an EU Designated Salmonid System (S.I. No. 293/1988: EUROPEAN COMMUNITIES (QUALITY OF SALMONID WATERS) REGULATIONS, 1988). This designation serves to protect the national

ecological importance of the surface water system in this area. This system supports Brown trout and a nationally significant population of Sea trout in addition to a significant population of Atlantic salmon

Site: 13

Habitats Present	Grid Reference
WD1 (Mixed) Broadleaved woodland FW2 Lowland depositing rivers	325811/218309

This site consists of a tributary of the River Dargle and the adjacent habitat, which consists of an area of broadleaved woodland. Sycamore, Ash, Beech and occasional Alder with a shrub layer of Laurel dominate the woodland. The ground cover consists of a herb layer dominated by Butterbur, Ivy, Ragwort, Bindweed and Bramble.

The site is of medium conservation value.

The main impact on the site is the encroachment of Laurel and domestic dumping which is evident within the site close to the bridge on either side of the road.

Site: 14

Habitats Present	Grid Reference
GA1 Improved agricultural grassland	327480/217123
WL1 Hedgerows	
HH1 Dry siliceous heath (EU Code 4030)	
HD1 Dense bracken	
WD1 (Mixed) Broadleaved woodland	
LR2 Moderately exposed rocky shores	
CS1 Rocky sea cliffs	
CS3 Sedimentary sea cliffs	

This section describes the habitats of Bray Head within Bray Urban Area. The areas encompassed by the habitats described below are indicated on the map that accompanies this report. All areas within Site 14 are part of the Bray Head SAAO (Figure 3).

Area A, GA1: a series of improved agricultural fields on the lower slopes of Bray Head currently used for grazing horses. Hedgerows, mainly dominated by Gorse, occur along the perimeter of the fields.

Area B, Private garden/farm buildings.

Area C, HH1/WS1/HD1: A mosaic of heath, scrub and dense bracken with a small outcrop of Scots pine and occasional Ash, Sessile oak, Larch and Holly. The scrub area within this mosaic is characterised by Gorse and Bramble while the heath area is characterised by Ling, Bell Heather and Bilberry.

Area D, WS1/HD1: An area of scrub dominated by Gorse with dense bracken around the margins. Much of this area had been the subject of recent burning at the time of the site visit.

Area E, WD1: An area of Oak, Ash and Scots pine.

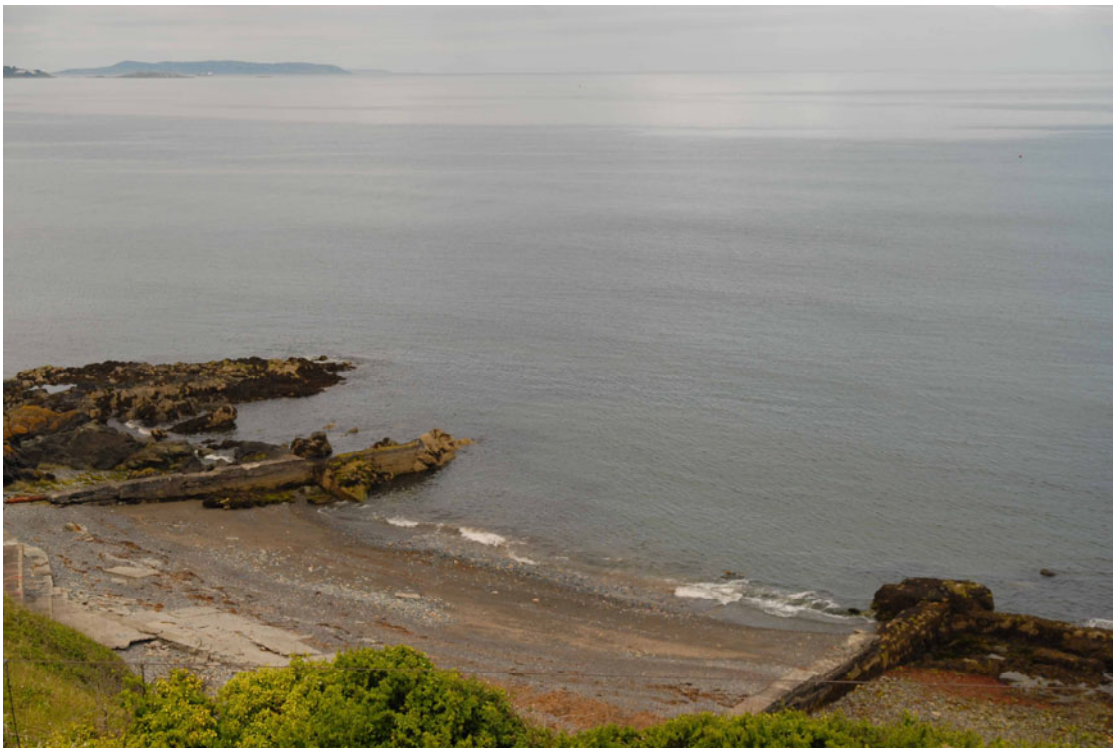
Area F, WD1: Woodland area at the Bray Golf Club (outside urban area). It is dominated by Ash, Sessile Oak, Holly, Sycamore and Beech with Prunus, Hawthorn and Laurel present. The ground flora within the woodland is well developed with Ivy, Bramble, Herb Robert, Willow herb, Creeping buttercup, Goose-grass, Greater plantain, Nettle, Pignut, Greater wood rush and Woodbine common.

Area G, GA1: Area of improved grassland at the base of Bray head. The grassland appears to be rarely cut and supports a diversity of grasses and broadleaved herbs. Locals use this as an amenity area for walking and recreation.

Area H, WD1/HH1: Area of hillside dominated by Gorse, Bracken and Bramble with a small wooded area at the base characterised by Sessile Oak and Holly with Blackthorn, Ash and Willow. The under story in the wooded area is poorly developed and dominated by dense Bracken and Rubus with an absent herb layer.

Area I WD1: Small narrow area of woodland dominated by Sycamore near the coastal path around Bray Head

Area J. LR2: This is a small shingle beach at the base of Bray Head.



Area K, CS1/CS3: Area of both rocky and sedimentary sea cliffs with small patches of heath at the top. Rocky Sea cliffs are protected under Annex 1 of the EU Habitats Directive.

Area L, HH1: Area of heath dominated by Ling and grass species at the top of Bray Head to the east of the cross. This area is mostly outside the urban boundary.

The main threats to this site relate to the heath habitats, which are threatened by reclamation for agriculture and also by frequent burning. The spread of Bracken in some areas is also obvious. The site is a popular recreational area used by walkers throughout the year.

Bray Head is of high conservation importance. Sections of this site are protected under the proposed Tree Preservation Order (Figure 2) and SAC and NHA designation (Figure 1). It has good examples of two habitats (sea cliffs and dry heath) listed on Annex I of the EU Habitats Directive. It also supports a number of rare plant species and has ornithological importance. It is also covered by the Bray Head SAAO (Figure 3)

5. Discussion

5.1 Sites of local biodiversity importance

A total of 28 sites were selected from a review of aerial imagery of the area within Bray urban boundary. 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 14 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 14 sites surveyed 1 was considered to be national importance (Bray Head), 5 were considered to be of high value and locally important. Seven sites were considered to be of moderate value and locally important and one site was considered as low value, but locally important.

Site 14 (Bray Head) already forms part of Bray Head SAC/NHA and is therefore afforded protection as a designated conservation site. Although the area surveyed within Bray Urban Area only forms a small part of the overall SAC/NHA, it is an area of valuable conservation interest at both a local and national level. The area exhibits a wide variety of habitats and species including birds, many of which are protected under the EU Birds Directive (Peregrine Falcon, an Annex I species of the EU Birds Directive, breeds, in the area).

Site 12 (The River Dargle) provides a valuable corridor for biodiversity across much of the area of Bray. It contains good examples of a number of semi- natural habitats, including broadleaved woodland, deposing lowland rivers, hedgerows and scrub and a large number of native Irish tree species in addition to being an important river for Sea Trout, Brown Trout and Salmon. Salmon (in freshwater) are a protected species under Annex II of the EU Habitats Directive.

All proposed management strategies and works in the area must be designed and implemented in an environmentally sound and sustainable manner and should not impede migration of salmonids in this system. The presence of these fish populations highlights the sensitivity of local watercourses and the Dargle catchment in general. The River Dargle fishery habitat is regarded as good for all salmonoid life stages throughout much of this system. All measures necessary should be taken to ensure comprehensive protection of local aquatic ecological integrity, in the first place by complete impact avoidance and only as a secondary approach through mitigation by reduction and remedy.

Sites 4, 7, 11 and 13 are also rated as C Sites (High value and locally important). These four sites represented areas of high species richness and good habitat diversity at a local level and showed a high degree of naturalness. Sites 7 and 11 have no conservation protection of any kind, which should be rectified, while the same is for Site 4. However the latter site was subject to a significant planning application during the fieldwork stage of this study.

The seven sites considered to be D sites (Moderate value, locally important) included a number of highly managed parks in the town. As a result of over maintenance, these sites are of low species richness and habitat diversity. They do however represent an important amenity area and urban green space and for these reasons are considered to be of conservation importance.

Only one site surveyed (Site 2) was regarded as an E site (Low value, locally important). This site, represented by a tree line into a private house, had few native species and was very small in size. However, such tree lines do provide shelter and aesthetic value in urban situations and are worthy of protection.

With the exception of the River Dargle and its tributary, there is little connectivity between the individual sites identified as of being of biodiversity value. Habitats of biodiversity value within the town are largely very small, fragmented and unconnected resulting in numerous small, disjunct habitats. It would be beneficial to link these habitats through additional planting and ecologically sound landscaping

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 Japanese Knotweed, Bracken and Buddleja were noted as a particular problem at a number of sites, particularly Japanese knot weed and Buddleja along the River Dargle and Bracken on Bray Head. Advice and measures for the control of Measures to control Japanese Knotweed and 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.

Burning

Damage from burning was evident at a number of locations on Bray Head, where heath habitats and some woodland habitats had been damaged. The heath and grassland habitats at this site are known to be threatened by frequent burning. More control should be initiated during the legal burning season to ensure that burning is controlled and damage is minimized. Action should be taken to ensure the burning

does not occur outside of the legal burning season, which is designed to protect wildlife with the area.

Erosion

Erosion was noted at sea cliffs at one site (Site 4) to the north of Bray town. Efforts should be made to control erosion at this site to protect both the habitats and its amenity value.

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.

Planting of native herbaceous plants, shrubs and wildflower meadows

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*. Areas in these parks and open areas could be set aside for the planting of wildflower meadows. This would add significantly to the biodiversity value but also the amenity value of the area, while reducing on maintenance of manicured areas.

Creation and management of Hedgerows

Hedgerows are a 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.

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.

Restoration ecology

The River Dargle 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.

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 river banks within their sites. It is recommended that Bray Town Council initiate a system to engage with local business in this regard.

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 Bray 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 River Dargle and Bray Head. 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 Bray Head and the various areas under the proposed Tree Preservation Orders. 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	FW2/GA2	Favourable	Non-native planting.	Promote local awareness amongst house holders in the estate adjacent to the site informing them of the conservation value of the stream and outlining the need to plant native species only rather than non-native ornamental species. This would contribute to education and awareness of biodiversity as well as providing "ownership" and pride in the site.
2	WL2	Favourable	None evident.	None recommended
3	ED2	Unfavourable	Herbicide application. Introduction of invasive non-native species.	While the cutting of vegetation is a necessary measure on railway embankments for health and safety reasons, the diversity of species could be maintained if the application of herbicide is avoided.
4	GS2/CS3	Unfavourable	Development pressure. Spread of invasive non-native species. Erosion	Encroachment by Bramble and Red valerian on the grassy areas requires control to maintain the species diversity of the site. The site is currently subject to development pressure which may have a negative impact on the conservation value of the site. Defences of the sea cliffs are required to prevent further erosion
5	BC4/WL2	Favourable	None evident.	The planting of native tree species from local indigenous seed would enhance the biodiversity value of this park. Tree and shrub planting should be increased to provide a habitat for birds and other fauna. Amenity planting to include a greater range of species with more educational and biodiversity value such as interesting native species, which are known to attract butterflies and moths, should be considered. Signage to indicate new initiatives should be included to raise the awareness of the local public as to the biodiversity value of the park
6	WS3	Unfavourable	None evident.	This site is a private park. None recommended

Site Number	Habitats present	Conservation rating	Threats	Recommended management practices
7	GA2/WL1/WD1/WD5	Favourable	Domestic dumping.	This site contains a high number of habitats and good species diversity. Some management of the area is already evident and native Oaks have been planted. The current management practice of mowing the grass in only half of the site is contributing towards its biodiversity value. Through selective planting of wild flowers the biodiversity value could be increased significantly. It is recommended that discussions take place with the current managers of this site to ensue that current practices continue. Action should also be taken to ensure dumping does not become a significant problem at this site.
8	WL2/GA2	Unfavourable	Possible development pressure.	Private site, none recommended
9	WD1	Unfavourable	None evident.	Efforts should be made to ensure the native tree species at this site are not removed for development initiatives.
10	WL2/GA2		Undetermined damage to young trees	The planting of native tree species from local indigenous seed would enhance the biodiversity value of this park. Tree and shrub planting should be increased to provide a habitat for birds and other fauna. Amenity planting to include a greater range of species with more educational and biodiversity value such as interesting native species, which are known to attract butterflies and moths, should be considered. Signage to indicate new initiatives should be included to raise the awareness of the local public as to the biodiversity value of the park
11	GS2/FW2/WD1	Unfavourable	Scrub encroachment. Domestic dumping.	This area of woodland and the adjacent grassland should be actively managed to remove dumped material and non-native tree species. Signage should be introduced to highlight the biodiversity vale of the woodland. Part of the site is currently the subject of a planning application. If this is allowed to proceed part of the site and its associated biodiversity will be lost.
12	WD1/FW2/WS1/ WL1/ED1	Unfavourable	Spread of invasive non-native species. Domestic dumping.	Attempts to control non-native invasive species should be made. Recommended control measures for Japanese Knotweed are provided in appendix 2. Dumped domestic

Site Number	Habitats present	Conservation rating	Threats	Recommended management practices
				refuse should be removed from site as soon as it is identified as evidence shows that the dumped material not removed from sites attracts further dumping. Consideration should be given to the planting of native trees species.
13	WD1/FW2	Unfavourable	Spread of invasive non-native species. Domestic dumping.	Attempts to control non-native invasive species should be made. Recommended control measures for Japanese Knotweed are provided in appendix 2. Dumped domestic refuse should be removed from site as soon as it is identified as evidence shows that the dumped material not removed from sites attracts further dumping. Consideration should be given to the planting of native trees species.
14	GA1/WL1/WS1/HH1/HD1/WD1/LR2/CS1/CS3	Unfavourable	Burning. Spread of Bracken. Scrub encroachment. Land reclamation. Under grazing in some areas.	Control of the spread of Bracken should be considered (see appendix 2). Under grazing can lead to scrub encroachment and an optimum level of grazing should be established to help prevent scrub encroachment. Burning is a problem on Bray Head and vigilance, especially during drier summer periods is required.

Appendix 1: List of plant species mentioned in the text

Annual meadow-grass	*Poa annua*
Ash	*Fraxinus excelsior*
Bamboo	*Phyllostachys* sp.
Beech	*Fagus sylvatica*
Bilberry	*Vaccinium myrtillus*
Bindweed	*Convolvulus arvensis*
Bluebell	*Hyacinthoides non-scriptus*
Bramble	*Rubus fruiticosus*
Buddleja (Butterfly-bush)	*Buddleja davidii*
Bush vetch	*Vicia sepium*
Butterbur	*Petasites hybridus*
Cherry	*Prunus sp.*
Copper beech	*Fagus sylvatica* Purpurea
Common gorse	*Ulex europaeus*
Common nettle	*Urtica dioica*
Creeping buttercup	*Ranunculus repens*
Creeping thistle	*Cirsium arvense*
Dandelion	*Taraxacum* sp.
Dog daisy	*Leucanthemum vulgare*
Downy birch	*Betula pubescens*
Drooping sedge	*Carex pendula*
Elder	*Sambucus nigra*
Eucalyptus	*Eucalyptus* sp.
Greater plantain	*Plantago major*
Grey willow	*Salix cinerea*
Goose-grass	*Galium aparine*
Hart's-tongue	*Phyllitis scolopendrium*
Hawthorn	*Crataegus monogyna*
Hazel	*Corylus avellana*
Heather	*Calluna vulgaris*
Herb robert	*Geranium robertianum*
Hogweed	*Heracleum sphondylium*
Honeysuckle	*Lonicera periclymenum*
Hornbeam	*Carpinus betulus*
Holly	*Ilex aquifolium*
Horse-chestnut	*Aesculus hippocastanum*
Ivy	*Hedera helix*
Japanese knotweed	*Fallopia japonica*
Larch	*Larix leptolepis*
Laurel	*Prunus laurocerasus*
Lime	*Tilia platyphyllos*
Male-fern	*Dryopteris filix-mas*
Marsh pennywort	*Hydrocotyle vulgaris*
Marsh thistle	Cirsium palustre
Meadowsweet	*Filipendula ulmaria*
Meadow vetchling	*Lathyrus pratensis*
Montbretia	*Crocosmia x crocosmiflora*
Pignut	*Conopodium majus*
Primrose	*Primula vulgaris*
Ragwort	*Senecio jacobaea*
Red clover	*Trifolium pratense*
Red Valarien	*Centranthus ruber*
Ribwort plantain	*Plantago lanceolata*
Rose	*Rosa* sp.
Rosebay willowherb	*Chamerion angustifolium*
Rowan	*Sorbus aucuparia*
Scaly male-fern	*Dryopteris affinis*

Scots pine	*Pinus sylvestris*
Sessile oak	*Quercus petraea*
Silverweed	*Potentilla anserina*
Soft rush	*Juncus effuses*
Spanish chestnut	*Castanea sativa*
Spear thistle	*Cirsium vulgare*
Sycamore	*Acer pseudoplatanus*
Teasel	*Dipsacus fullonum*
Water horsetail	*Equisetum fluviatile*
Water mint	*Mentha aquatica*
White clover	*Trifolium repens*
Willow Herb	*Epilobium montanum*
Wood avens	*Geum urbanum*
Woundwort	*Stachys sylvatica*
Yellow iris	*Iris pseudacorus*
Yorkshire fog	*Holcus lanatus*

Appendix 2: Information on the control of Japanese knotweed and Bracken

Japanese knotweed (*Fallopia japonica*)

Japanese knotweed is a non-native invasive perennial. It is believed to have been introduced into Ireland as an ornamental garden plant from Japan and has subsequently spread across Ireland and the UK. It is particularly prevalent along water courses, transport routs and in waste areas. It can spread via its rhizomes (underground roots) or by extremely small cuttings from the stem. Japanese knotweed has vigorously invaded natural habitats and out competes native plants. Japanese knotweed forms tall thickets that exclude all other vegetation, shading the area below. Native plants can rarely compete with this invasive species and local plant biodiversity is reduced. Rivers, hedgerows, roadsides and railways form important

The National Parks and Wildlife Service in association with the Environment and Heritage Service of Northern Ireland have produced an information sheet on the best practice management guidelines for the control of Japanese knotweed. This document is available to download at:
http://www.invasivespeciesireland.com/files/public/BPM%20Guidance/Japanese%20knotweed%20BPM.pdf

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 scheme

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 Synopses for areas under environmental designation in the Bray area.

SITE SYNOPSIS
SITE NAME: BRAY HEAD
SITE CODE: 000714

This coastal site is situated in the north-east of Co. Wicklow between the towns of Bray and Greystones. Bedrock geology is Cambrian quartzites and shales (with mudstones and greywackes). Bray Head consists of a plateau of high ground, with five prominent quartzite knolls and has a maximum height of 241 m. The more exposed higher ground has a covering of shallow acidic soils, with protruding bedrock and scree. Elsewhere, deeper soils are formed by drift deposits, calcareous in character.

Heath, a habitat listed on Annex I of the EU Habitats Directive, is the principal habitat over much of the Head. The vegetation of the upper plateau area is dominated by dwarf shrubs, mainly Ling (*Calluna vulgaris),* Bell Heather (*Erica cinerea)* and Gorse (*Ulex europaeus* and *U. gallii*). Broom (*Cytisus scoparius*) also occurs and associated with the gorse and broom is the Red Data Book species Greater Broomrape (*Orobanche rapum-genistae)*. In the areas where the shrubs are less dense Tormentil (*Potentilla erecta)*, Milkwort (*Polygala vulgaris)*, Heath Bedstraw (*Galium saxatile)* and a variety of grasses (e.g. *Aira praecox, Agrostis tenuis, Deschampsia flexuosa*) are present. Where rock outcrops occur species such as English Stonecrop (*Sedum anglicum)* and Sheep's-bit Scabious (*Jasione montana)* are found. Bracken (*Pteridium aquifolium)* is dominant in some areas.

The heath communities which occur on the dry slopes above the sea-cliffs, especially those south-facing, are more open in character and dominated by grasses rather than dwarf shrubs. The annual plant communities which develop here are very typical of those found only on sites in south-eastern Ireland. Common species include Wood Sage (*Teucrium scordonia)*, clovers (*Trifolium dubium, T. campestre)*, Scarlet Pimpernal (*Anagallis arvensis)* and Field Madder (*Sherardia arvensis)*. An uncommon annual species which can appear abundantly in the heath after a fire event is Yellow Fumitory (*Corydalis claviculata)*. Some rare plants are found in this habitat, notably Bird's-foot (*Ornithopus perpusillus)* and Spring Vetch (*Vicia lathyroides)*, both Red Data Book species.

Calcareous dry grassland, typically species-rich, occurs on deposits of glacial till. The primary grass species are Quaking Grass (*Briza media*), Smooth Meadow-grass (*Poa pratensis*) and Red Fescue (*Festuca rubra*). Typical calcicole herbs include Pale Flax (*Linum bienne*), Salad Burnet (*Sangusiorba minor*), Burnet-saxifrage (*Pimpinella saxifrage*), Carline Thistle (*Carlina vulgaris*) and Kidney Vetch (*Anthyllis vulneraria*). Orchids are a feature of this habitat, with five species known from the area - Pyramidal Orchid (*Anacamptis pyramidalis*), Common Spotted Orchid (*Dactylorhiza fuchsii*), Common Twayblade (*Listera ovata*), Fragrant Orchid (*Gymnadenia conopsea*) and Bee Orchid (*Ophrys apifera*). Bloody Crane's-bill (*Geranium sanguineum*) was refound recently in this community at Bray Head - this is a typical species of the Burren and is very rare in eastern Ireland.

Rocky sea cliffs, another Annex I habitat, form most of the seaward boundary at this site and extend for approximately 2 km. Steep clay cliffs extend southwards for a further 1 km, with a small area of clay cliff also at the northernmost part of site. The rocky cliffs are divided by a railway track built in the 1800s. The lower cliffs are fairly steep in places but above the track they are less steep and often support heath or dry grassland vegetation. In parts the cliffs are up to 60 m in height. Typical species

of the more exposed rock areas are Common Scurvy-grass (*Cochlearia officinalis)*, Rock Spurrey (S*pergularia rupicola),* Thrift *(Armeria maritima),* Sea Campion *(Silene maritima),* and Sea Samphire *(Crithmum maritimum)*. On some sections of the cliff face, the locally scarce Tree Mallow (*Lavatera arborea*) is found. Species of the upper cliff flora include Kidney Vetch (*Anthyllis vulneraria)* and Red Fescue*.* A widespread species found from the mid to upper zones of the cliff face is Ivy (*Hedera helix)*. Associated with the Ivy is the scarce *Rubia peregrina.* The clay cliffs in the southern part of the site are steep and unstable and have little vegetation.

A stand of mostly native woodland occurs in the northern part of the site. This is a fairly pure Sessile Oak (*Quercus petraea)* dominated woodland, with some Ash (*Fraxinus excelsior*) and Birch (*Betula pubescens*). Understorey trees which occur are Holly (*Ilex aquifolium)* and Hawthorn (*Crataegus monogyna*). The wood is on shallow drift and the ground flora often has species more associated with heath than woodlands. Other habitats which are found at this site include bedrock shore, a sandy/shingle beach and an area of shallow marine water.

Bray Head has an important seabird colony. A census in 1999 gave the following populations: Fulmar (55 pairs), Shag (8 pairs), Kittiwake (781+ pairs), Guillemots (286 individuals), Razorbills (191 individuals) and Black Guillemots (123 individuals). A few pairs of gulls also breed. Both the Kittiwake and Black Guillemot populations are of national importance.

Peregrine Falcon, an Annex I species of the EU Birds Directive, breeds, as well as Raven and Kestrel. Characteristic bird species of the heath areas are Stonechat, Whitethroat, Linnet and Skylark.

The heath and grassland habitats at this site are threatened by reclamation for agriculture and also by frequent burning. The site is a popular recreational area and is especially used by walkers.

Bray Head is of high conservation importance as it has good examples of two habitats (sea cliffs and dry heath) listed on Annex I of the EU Habitats Directive. It also supports a number of rare plant species and has ornithological importance.

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 and 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 march
	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