







Survey & Mapping of Habitats from Cratloe to Parteen, South East Clare





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Survey Findings Report

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1 EXECUTIVE SUMMARY

Clare County Council in association with the Heritage Council, Clare Biodiversity and Clare Heritage Forum commissioned RPS to survey and map habitats within a designated study area of approximately 150km² in South East Clare.

The extent of the study area includes all rural lands from Sixmilebridge and O' Briensbridge in the north, to Bunratty and Parteen in the south. The study excluded lands designated for nature conservation.

County Clare is rich in its diversity of wildlife and habitats; however little is known about the habitats outside these lands designated for nature conservation. The main aim of the survey in south east Clare is to provide an inventory and classification of the habitats present within the study area and to identify areas of biodiversity importance.

Through this process, we hope to create a more consistent sense of the value and importance of local sites of ecological value, by securing a broader awareness and support for their protection.

Information on the habitats found, was gathered through field by field surveys and interpretation of aerial photography. The habitat boundaries were mapped and classified in accordance with the national habitats classification produced by the Heritage Council, A Guide to Habitats in Ireland (Fossitt, 2000).

The field study was conducted between the months of July and September 2008. All information gleaned from the field studies was then digitised and stored in a Geographical Information System (GIS), which provides a statistical and visual representation of the habitat information.

There are 117 habitat types classified in Ireland (Fossitt, 2000), 89 of these habitat types are terrestrial and 28 of these are marine habitats. Of the 89 terrestrial habitat types, 50 different types of habitats occur within the study area, 8 are classified as under cultivated and built land. The remaining 42 habitats are described in detail in this report.

The occurrence of different types of habitat is greatly dependant on underlying geology, altitude, exposure and landuse. The habitat distribution varies greatly throughout the study

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area, from a diversity of peatland and woodland habitats to the north west of the study area around Sixmilebridge, Woodcock Hill and Cratloe, to the fertile grasslands of Bunratty, Parteen and Coonlara.

The underlying geology has given rise to a number of these habitats. Old red sandstone runs from the west to the north east of the study area and provides acidic conditions and in combination with poor drainage has resulted in upland peat, heathland and woodland habitats forming in this area. Limestone occurs to the south and runs midway through to the east of the study area. The fertile lowlands on the banks of the River Shannon are intensively drained and improved. However, a diversity of wetland habitats occurs here, including a significant area of raised bog.

Within these habitats, the study revealed fourteen habitat types considered rare not only in Clare, but also in Ireland and the rest of Europe. These habitats cover approximately 16% (2,060ha) of the rural lands of the study area.

The fourteen habitat types are listed under Annex I of the EU Habitats Directive. Habitats listed under this Directive are habitats that are considered rare and vulnerable in Europe.

The habitats found within the study area are evaluated based on their naturalness, value and vulnerability. Habitats that are considered good examples of Annex I priority habitats are considered to be of international or national importance. Semi-natural habitats with high biodiversity in a local context and that are vulnerable, are considered to be of High Ecological value in a local context. Habitats that are considered semi-natural habitat or locally important for wildlife are considered to be of Moderate Ecological value in a local context, and robust habitats that have been highly modified are considered to be of Low Ecological value in a local context.

Good examples of habitats that are considered to be of International, National, High and Moderate ecological value are target noted. These target notes provide detailed information on the habitat including, Survey details, Grid Coordinate, Townland Name, Area in Hectares, Ecological Value, Habitat Code and Habitat Description. The target note also provides a habitat map of the site indicating the extent of the area and a photographic record.

The habitat inventory and supporting biodiversity evaluation of the lands in South east Clare has important implications for spatial planning in the area. This information also establishes a forum for education and further research into the biodiversity value of the study area.

2 INTRODUCTION

2.1 BACKGROUND

In June 2008, Clare County Council commissioned the survey and mapping of habitats within a designated study area of approximately 150km² in South East Clare (refer to **Figure 2.1**). This is to fulfil the actions for habitat mapping under the County Clare Heritage Plan.

The study also included a request for a detailed vulnerable landscape mapping and land development potential assessment for Meelick which is a 2km² area within the study area.

The main aim of the survey was to provide an inventory of the habitats present within the study area between Cratloe and Parteen, including the River Shannon and Cratloe Hills (see **Figure 2.1**). The detailed mapping and inventory of the habitats, landscape features and ecological features within the study area will form the basis for a review of the variety and extent of habitats present, the identification of areas of high ecological and biodiversity value and important links between these areas. Recommendations will be made for best practice in relation to the conservation, protection and enhancement of areas of natural heritage and biodiversity importance.



Figure 2.1: Study Area

The purpose of these surveys is to establish the following:

- To provide baseline data on the status of habitats of biodiversity value in South East Clare,
- To continue development of the methodology and make recommendations for future refinements for use of the methodology in Clare,
- To raise awareness of the importance of biodiversity and habitats among landowners and residents in those areas surveyed,
- To inform future conservation policies in relation to habitats in County Clare,
- To utilise the data gathered on landscape features of ecological value in order to engage local communities in strengthening an eco-network at county level, and
- To utilise the data gathered on landscape features to inform the inclusion and mapping of ecological networks in upcoming Local Area Plans, aid Policy Decisions and the review of the County Development Plan.

2.2 BACKGROUND OF THE PROJECT TEAM

The Project Team represents a combination of expertise, experience and resources providing a range of professional services that are directly relevant to the described tasks.

Ecological assessment requires a high level of skill and practical ability. Ecologists and environmental staff in RPS Galway are supported further by ecological staff distributed between offices in Ireland and the United Kingdom. RPS staff are drawn from scientists and conservation practitioners with broad ecological experience that includes, site survey and evaluation, phase I habitat survey; botanical survey; bird survey; terrestrial mammal, bat and invertebrate surveys.

The field surveys were carried out by RPS ecologists. Paula Kearney was the project manager and is a Senior Project Ecologist within the environmental section of RPS Consulting Engineers in Galway. Paula has ten years of professional ecological and environmental experience. Richard Mundy, who is also a Senior Project Ecologist with RPS in Cork, assisted with training and advice in relation to the project. Paula assisted in the field surveys along with Jean Hamilton, Jon Kearney and Daragh Garde. Jean joined RPS in 2006. Since then she has developed her skills in field survey techniques and methodology, and in ecological impact assessment. Jon Kearney and Darragh Garde are both based in our Cork office. They both have extensive experience in terrestrial ecology and botany.

The detailed vulnerable landscape mapping for Meelick was carried out by our Landscape Architects, Paul Waalboer and Tomasz Orczykowski. They specialise in the assessment of internships of landscape architecture and town planning.

Dr. Ruth Staunton is a geologist with over eight years experience and has worked with RPS for over two years. She provided an interpretation of soil, geology and hydrogeology of the study area, using published information available from the GSI.

2.3 SCOPE

The scope of the project as per the brief provided by Clare County Council is as follows;

- 1) to map and provide supplementary information relating to all habitats within the survey area, to level III of the Fossit (2000) classification system,
- 2) to survey, map and provide supplementary information relating to all habitats listed on Annex I of the European Habitats Directive that occur within the survey area.
- to survey, map and provide supplementary information relating to sites of local biodiversity value, flooding potential, ecological corridors and buffer zones within the survey area, and
- 4) a Vulnerable Landscape Survey of all aspect of heritage including archaeology, architecture, geology and cultural interests will be completed for the specified 2km² area around Meelick, located within the study area. This area will be assessed for future land use and development potential, vulnerable aspects identified and specific areas identified for possible integrated development.

2.4 METHODOLOGY

The habitats within the study area were assessed by means of a desk study of literature pertinent to the area and surrounding area and field surveys. In addition all spatial data was digitised onto a Geographical Information System (GIS) MapInfo Professional version 8.5.

2.4.1 DESKTOP STUDY

The desktop study involved a comprehensive review of the existing information. The principal sources of information referred to during the desktop review are outlined below.

- Clare County Development Plan 2005-2011,
- South Clare Economic Corridor Local Area Development Plan (2003),
- Landscape Character Assessment in Ireland. The Heritage Council (2006),
- National and Local, Heritage and Biodiversity Plans,
- A review of the National Parks and Wildlife Service database for conservation sites
- A review of any existing published and unpublished information from the National Parks and Wildlife Service, the Clare County Council and the Heritage Council, and
- Habitat/Land Use Maps available such as CORINE data.

Reference will be made to the methodologies and experience gained from the:

- Draft Habitat Survey Guidelines: a Standard Methodology for Habitat Survey and Mapping in Ireland (Heritage Council, 2002),
- A Guide to Habitats in Ireland.' Fossit, J.A 2000. The Heritage Council, Co. Kilkenny.
- Hedgerow Survey Handbook,
- Local Biodiversity Action Plan, and
- Habitat Action Plans.

2.4.2 GIS, MAPPING & RECORDING

All available digital mapping and aerial photography was divided up into 3km² tiles for ease of processing and field work.

The aerial photography was carefully examined to interpret the type of habitats present within the study area. Using this method some habitats and their spatial extent can be easily identified such as field boundaries, areas of plantation forestry and agricultural grassland. Other habitats are however more difficult to identify such as types of woodland, peatland and swamp. All habitats are classified to Level III of the Fossitt Classification. This classification system is explained in Section 2.4.4.

All spatial data was digitised onto a GIS system (MapInfo Professional version 8.5). The advantages of digital mapping are many and include:

- GIS provides a much more effective and efficient means of storing and accessing mapped data,
- Improved data manipulation capabilities,

- Habitat areas can be calculated with much greater accuracy,
- Precise locations of features of interest can be mapped more accurately using GPS (Geographical Positioning System) data, and
- Alterations to site boundaries / habitat areas can be made much more easily.

2.4.3 FIELD ACCESS

Prior to the commencement of field surveys a meeting was held between the members of the steering group, surveyors and local representatives of the Irish Farmers' Association (IFA). A number of actions resulted from this meeting, including advertising the commencement of the survey on local radio, in parish newsletters and the issuing of information leaflets to the IFA representatives which they circulated to their members.

Where possible, prior to entering land, the landowners were located and asked for permission. Not all fields were entered if a habitat could be assessed from the road such as Improved Agricultural Grassland GA1. Overall, landowners encountered for the duration of the project were cooperative and enthusiastic to impart local knowledge on wildlife, land use and farming practices in the area.

2.4.4 FIELD SURVEY

The field survey was based on a combination of field survey and interpretation of aerial photographs, with the use of supporting information, where available.

A habitat is an area in which a specific plant or animal naturally lives, grows and reproduces; an area that provides a plant or animal with adequate food, water, shelter and living space. Through the mapping of habitats, information can be gathered about the plants and animals, which are associated with an area.

Habitats can vary in naturalness, depending on the extent to which they have been modified by development. Throughout Ireland, there is probably no habitat that can be considered completely natural and therefore an assessment is made related to degrees of naturalness.

Habitats can be in terrestrial, freshwater or marine environments, or a combination of these. Many techniques and methodologies have been developed to map habitats and classify habitats around the world; however the Heritage Council has produced a methodology and classification system specific to habitats found in Ireland. These include the following:

- Fossitt, J. (2000) A Guide to Habitats in Ireland. The Heritage Council, Kilkenny, and
- The Heritage Council (2002) Draft Habitat Survey Guidelines: A standard methodology for habitat survey and mapping in Ireland. The Heritage Council, Kilkenny.

The habitats on site were classified in accordance with the Fossitt Classification system. The classification is a standard scheme for identifying, describing and classifying wildlife habitats in Ireland. The classification is hierarchical and operates at three levels, outlining the correlation between its habitat categories and the phytosociological units (plant communities) of botanical classifications. The scheme identifies 11 broad habitat groups at level 1, 30 habitat subgroups at level 2, and 117 separate habitats at level 3. The codes assigned at each level reflect the names of habitat groups or subgroups. Correspondence with habitats listed in Annex I of the Habitats Directive (92/43/EEC) is also described.

The surveys were conducted during the months of July, August and September. The survey was prolonged due to adverse weather conditions in August which impeded progress.

2.4.5 MAP PRODUCTION

All habitats were mapped individually on MapInfo so that the exact location and true extent of the habitats will be available to Clare County Council and to aid future research.

Photographs were taken for each habitat types and accompany the habitat descriptions on the digital version of the accompanying Habitat Map. A number of photos are also included in Section 4.2 which provides a description for each habitat type. A referenced copy of all photographs will be provided to Clare County Council on completion of the Project.

All maps and scientific data sets are collated, logged and referenced in a database that will be easy to manage and use as a tool for further research or applications by the Council.

2.4.6 VULNERABLE LANDSCAPE SURVEY

A Vulnerable Landscape Survey for the Meelick area was conducted. This area was assessed for future land use and development potential, vulnerable issues identified and specific areas identified for possible integrated development.

The vulnerable landscape survey and assessment included an on site survey identifying the landscape types and its scenic landscape and visual value, but also the value of landscape attributes, such as hedgerows and tree lines. A review of planning designations also assisted in identifying the value of the landscape. Aspects such as archaeology, architecture, geology and cultural heritage also help to define the landscape value.

When the landscape value was established the sensitivity of the landscape was identified. The sensitivity of a landscape is the extent to which a landscape can accommodate change without unacceptable loss of existing character or interference with values. Based upon the landscape value and sensitivity the vulnerability of the landscape was established and mapped. The outcome is used to establish which lands are suitable for development from a landscape point of view.

The principal documents used for the methodology for the Vulnerable Landscape Survey were as follows;

- Department of Environment, Heritage, and Local Government (DoEHLG)'s; Landscape and Landscape Assessment: Consultation Draft of Guidelines for Planning Authorities (2000), and Appendices to Landscape Guidelines, and
- Landscape Institute and Institute of Environmental Assessment (LI/IEA); Guidelines for Landscape and Visual Impact Assessment 2nd Ed. (2002).

3 STUDY AREA CONTEXT

3.1 STUDY AREA

The study area is located in south east Clare, covering approximately 150km² of lands between Cratloe and Parteen to the south, and Sixmilebridge to Bridgetown in the north (see **Figure 2.1**). The study comprised the survey and mapping of habitats within this designated study area. A detailed vulnerable landscape mapping and land development potential assessment for Meelick, which is a 2km² area within the study area was also completed.

The main aim of the survey was to provide an inventory of the habitats present within the study area, excluding the sites already designated for nature conservation. The following section describes the existing environmental conditions within the study area, describing elements such as geology, soils, ecology and land use.

3.2 LANDFORM AND GEOLOGY

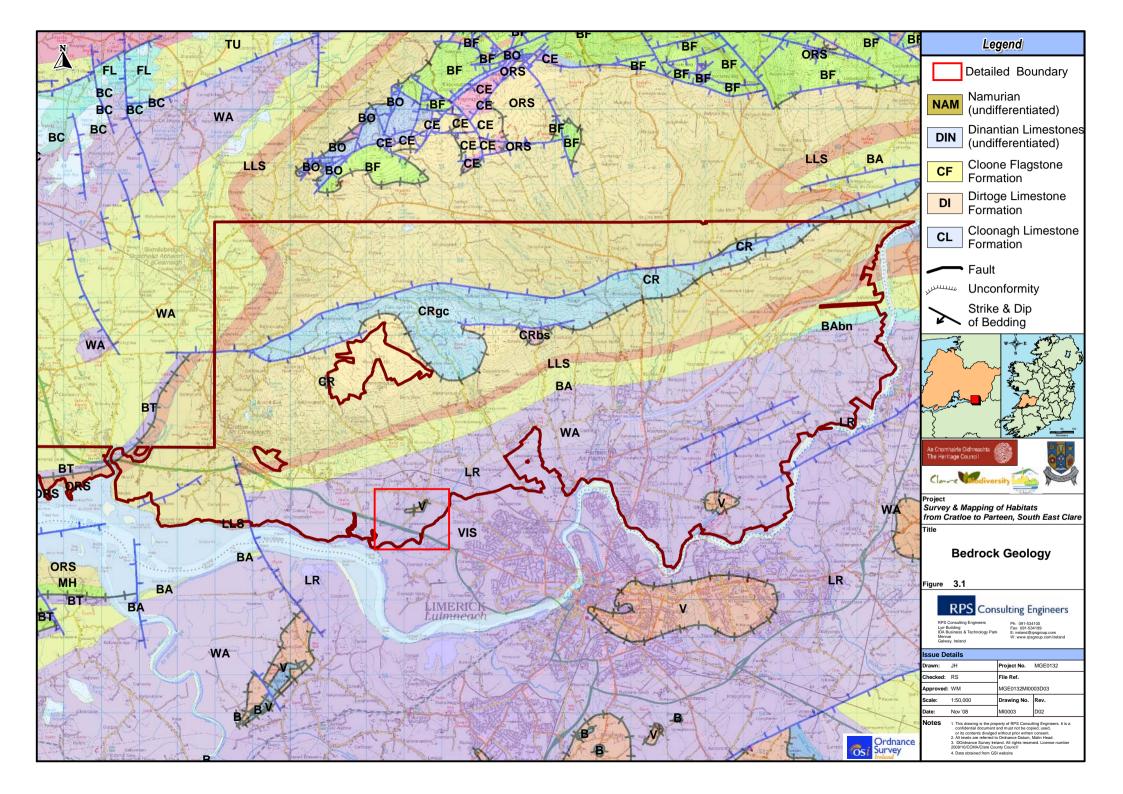
3.2.1 GEOLOGY

The GSI (1:100,000) Bedrock Geology Map (as illustrated in **Figure 3.1**) indicates that old red sandstone (ORS) underlies most of the study area. Other rock types outcrop at the western and southern boundaries of the study area; muddy limestone to the west along with sandstone, mudstones and shales, which also occur at the southern boundary. West-northeast directional faults separate the different rock outcrops at the southern boundary of the study area. Here, outcrops of unbedded mudstone, cherty crinoidal limestone and undifferentiated limestone occur. At the centre of the study area, an outcrop of laminated siltstone and sandstone extends from east to west across the area. In the northern area, a mix of greywacke, siltstone and mudstone, shale and chert outcrops exist.

There is evidence of major regional faults occurring within the study area. The eastern and southern boundaries are bordered by major faults which run in a north-south direction in the east and a west-northeast direction in the south. The central outcrop of laminated siltstone and sandstone is bordered by a fault line at its northern end and by an unconformity¹ at its

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¹ Unconformity is a surface of contact between two groups of unconformable strata which represents a hiatus in the geologic record due to a combination of erosion and cessation of sedimentation.



southern end. This fault line and unconformity separate this rock outcrop from the surrounding old red sandstone.

3.2.2 KARST FEATURES

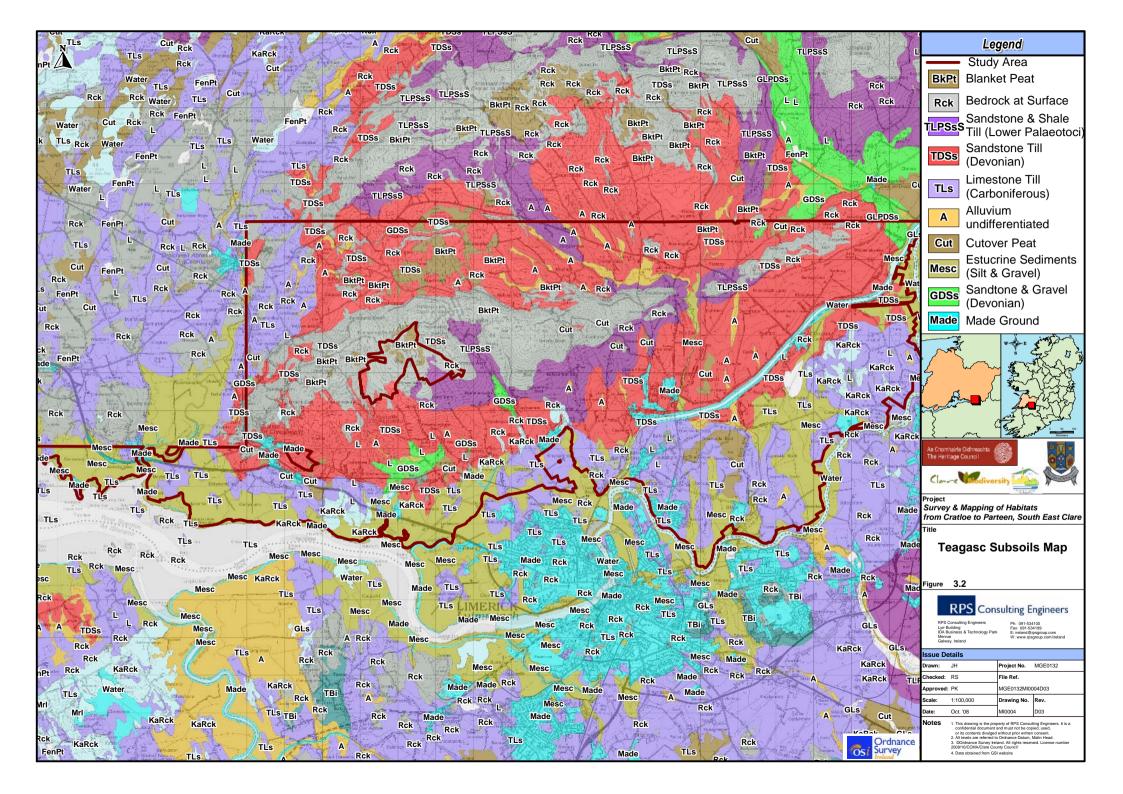
On review of online geological data (http://www.gsi.ie), there is only one karst feature present within the boundaries of the study area. A swallow hole exists in the townland of Mount Catherine which is underlain by clean unbedded limestone.

3.2.3 SUBSOILS

Based on information gleaned from the Teagasc Subsoils map (**Figure 3.2**) the study area is dominated by till. The principal subsoil type is sandstone till, which gives soils often poorly drained, an acidic reaction. Sandstone tills form two large bands, the first running in an east-west direction at the northern boundary of the study area while, to the south, the second forms a northeast-southwest directional band. To the north, these sandstone tills host patches of alluvium soils, rock outcrops and alluvium deposits.

These two bands of sandstone till enclose a central band of blanket peat and sandstone and shale tills. The western part of this central band is characterised by blanket peat with sandstone and shale till becoming more predominant in the centre and towards the eastern boundary (**Figure 3.2**).

The northwest corner of the study area is mainly well drained limestone till with small patches of sandstone till and blanket peat. To the south and south east, the area borders the Shannon estuary which is characterised mainly by estuarine sediments with a mix of limestone till and limestone rock outcrops (**Figure 3.2**). Small patches of made ground and cutover peat also punctuate the area. The southwestern end of the study area is characterised mainly by limestone tills and estuarine sediments with patches of made ground, cutover peat, glaciolacustrine deposits and alluvium. Small rock outcrops are spread intermittently throughout the southwestern end.



3.2.4 SOILS

Based on information gathered from the Teagasc Soils map (**Figure 3.3**), two wide belts of poorly drained acidic mineral soils characterise the area and are punctuated by a belt of shallow and deep well drained acidic soils in the centre.

A variety of soils characterise the southern boundary of the study area. The area along the Shannon estuary in the southwest is characterised by a mixture of marine and estuarine sediments and well drained basic mineral soils. Patches of deep poorly drained soil are spread intermittently across the south-western corner.

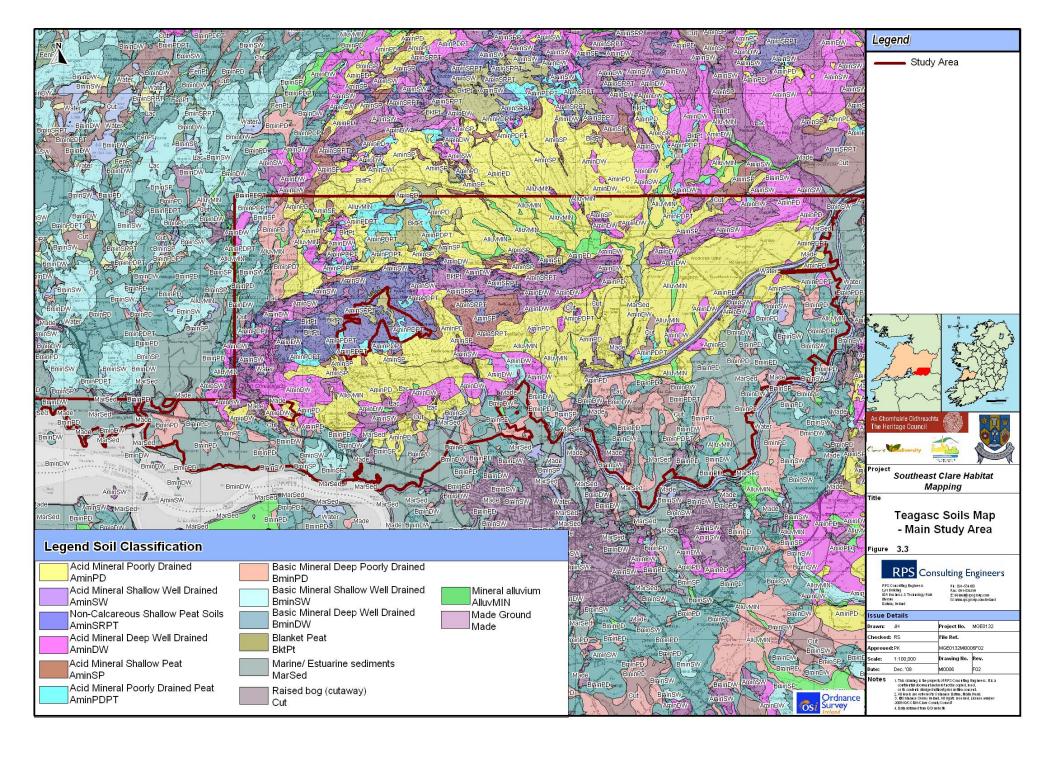
In the northwest corner of the study area peaty topsoil and blanket peat is concentrated in a small patch. Moving eastwards, patches of deep well drained acidic soils are also present giving way to a mix of deep poorly drained acidic soils and well drained basic soils near the boundary.

The headrace canal of Ardnacrusha Hydroelectric Power Station divides the east and south east part of the study area. The northern bank of the canal is bordered predominantly by deep poorly drained acidic mineral soils while the soil makeup south of the canal is characterised by a variety of soils. Estuarine deposits dominate the central area on the southern bank. To the northeast, deep well drained basic soils are predominate with small intermittent patches of poorly drained acid and shallow well basic soils. To the south east there is a mix of deep poorly drained acidic and deep well drained basic soils punctuated by the presence of patches of alluvium and cutaway peat.

3.2.5 GEOLOGICAL HERITAGE

It has been recognised nationally that sites of geological interest are not comprehensively addressed by existing nature conservation designations. Consequently, the Department of the Environment Heritage and Local Government (DoEHLG) and the Geological Survey of Ireland (GSI) are currently compiling a list of sites of national geological and geomorphological interest that will be proposed as Geological Natural Heritage Areas (NHA`s). This forms part of The Irish Geological Heritage (IGH) programme.

Following consultation with the GSI (12th August 2008), there is one site of geological interest in the database at Ballycar South, comprising Wenlock shelly fossils in submarine



channel debris flow. This site is proposed as an NHA under the IGH 2 Precambrian to Devonian Palaeontology Theme. The central grid reference for this site is 156450,164100.

3.2.6 HYDROGEOLOGY

Due to the large region covered by the study area, four different aquifer classifications exist within the study area. The most predominant is classed as a locally important aquifer present throughout much of the area. This aquifer is moderately productive only in local zones. Two belts of poor aquifers run in a northeast – southwest direction across the study area. These are generally unproductive except in local zones. Towards the southern end of the area, the aquifer is classified as a regionally important karstified diffuse aquifer. At the southern boundary of the study area, bordering the River Shannon the aquifer is classed as a locally important, generally moderately productive aquifer.

3.3 LAND USE

The lands of the study area support a wide variety of land uses. The fertile lowlands of the river Shannon to the peatlands and heaths of the uplands of Cratloe, support a number of land uses ranging from pasture, silage, tillage and forestry. In the past, peat extraction was a prominent activity within the study area, such as in the raised bogs to the south east of the study area, to the blanket bogs of the uplands. This industry has all but ceased in the area.

3.4 ECOLOGICAL IMPORTANCE

County Clare covers an area of approximately 3,229km². County Clare has a rich and varied landscape and supports a diversity of wildlife and habitats that are both rare in Ireland and Europe. As a result approximately 735km² (23%) of the landmass is designated for nature conservation. Many watercourses and coastal sites are also designated for their conservation importance, including the River Shannon and Fergus Estuaries which border the study area.

Sites of high conservation importance occur within the study area. These sites have been designated as they support a diversity of species that are protected on a National and International scale. The study excludes sites designated for nature conservation; however a review of these sites provides a valuable insight into the landscape and its capability to support such biodiversity.

A number of sites are currently designated for nature conservation under both European and National legislation. These designated sites include; Natural Heritage Areas (NHA), Special Areas of Conservation (SAC) and Special Protection Areas (SPA). Details of applicable legislation are provided in **Table 3.1** and details of designated sites are detailed in **Table 3.2**, and illustrated in **Figure 3.4**.

Table 3.1: National and European Legislation for Nature Conservation

	Table 3.1: National and European Legislation for Nature Conservation					
Legislation		Explanatory Note				
EU Legislation	Habitats Directive 92/43/EU (transposed into Irish Law under the European Communities (Natural Habitats) Regulations 1997 SI/97/094 as amended)	This legislation is structured around the 'Natura 2000' network of protected sites and a strict system of species protection. Ireland has a legal obligation to protect the habitats and species which are listed in the Annexes to the legislation, as Special Areas of Conservation (SACs). The main objective of the Directive is to maintain or restore natural habitats, and species of plants and animals, which are of conservation importance as defined in the Directives, at a favourable conservation status. Ireland supports 60 Annex I habitats that require special conservation measures and, of these, 16 are priority types that are considered to be in danger of disappearance (see Table 4.2).				
	Birds Directive 79/409/EE	This Directive identifies 194 species and sub-species of birds afforded protection. Annex 1 lists the bird species for which conservation requires the designation of Special Protection Areas (SPAs); this also applies to important concentrations of migratory birds.				
NATIONAL LEGISLATION	Wildlife (as amended) Act 1976	This legislation aims to protect sites of scientific interest because of their habitats, plants and animals, or landforms and geological or geomorphological features from damaging developments and / or land uses. At a national level it provides a mechanism through which statutory protection is afforded as Natural Heritage Areas (NHAs). It also strengthens the protective status of SACs and SPAs by ensuring that protection will in all cases apply from the time of notification of proposed SAC and SPA sites. The Act further encompasses the statutory protection for important geological and geomorphological sites, including fossil sites by designation as NHAs.				
	The Flora (Protection) Order 1999	This order sets out a list of plant species which are protected by Section 21 of the Wildlife Act, 1976 (as amended). If a plant species appears in this list it is illegal to cut, uproot or damage the listed species in any way, or to offer them for sale. This prohibition extends to the taking or sale of seed. It is also illegal to alter, damage or interfere in any way with their habitats. This protection applies wherever the plants are found and is not confined to designated sites.				

Table 3.2: Brief Description of Designated Sites Located within or Adjacent to the Study Area

	y Area
Site Code	Brief Description
pNHA000028	Cloonlara House is a three-storey domestic dwelling house and contains over I00 Leisler's bats (Nyctalus leisleri) during the summer months. One of the biggest nursery sites in Ireland and Europe with over 100 bats recorded. Threats: disruption of site, building improvements.
pNHA 002001	Knockalisheen Marsh pNHA is located mostly within County Clare but is situated just to the north of Limerick city. It consists of unimproved pasture sloping down to a wetland area which drains into the Shannon River. The site is of high ecological value in that it is a good example of unimproved pasture and wetland with good botanical diversity. This habitat type is now scarce, particularly so close to an urban environment. The site is notable for the presence of several species of orchid, including Marsh Helleborine (<i>Epipactis palustris</i>). There is also a colony of Skullcap (<i>Scutellaria galericulata</i>), a wetland plant which is rare in County Clare. The ornithological importance of the site has not been established but it is presumed to be a feeding and roosting area for birds of the Shannon.
NHA 002402	Woodcock Hill Bog NHA , located approximately 5km south-east of Sixmilebridge in County Clare, is an area of upland blanket bog and heath. The site is of great conservation importance due to the presence of blanket bog and wet heath.
pNHA 001012	Garrannon Wood pNHA is a small deciduous wood located just east of Cratloe and approximately 10 kilometres from Limerick City. It is located on a grassy knoll and is surrounded by pasture fields. Oak (<i>Quercus</i> spp.) is the main tree species, and forms a canopy over the site. Birch (<i>Betula</i> spp.) and Hazel (<i>Corylus avellana</i>) are also present in places. Signs of fox, badger and pine marten have been recorded from the site, and several rare beetles have been found there. The site is of high ecological value in that it is a mature and fairly intact woodland – a habitat type which is very uncommon across the country.
SAC 001013	Glenomra Wood SAC is a deciduous wood located approximately 10km north of Limerick City. Downy Birch (Betula pubescens) is the dominant tree in the canopy, and reaches a height of more than 20m in places. Other tree species include Ash (Fraxinus excelsior), Beech (Fagus sylvatica) and Sessile Oak (Quercus petraea). The understory is dominated by Holly (Ilex aquifolium), and also includes Hazel (Corylus avellana), regenerating Birch and Bramble (Rubus fruticosus agg.). Willows (Salix spp.) occur in the wetter areas. This site is of considerable ecological significance as it is a good example of a semi-natural deciduous woodland – a habitat type listed on Annex I of the EU Habitats Directive. Three Red Data Book animals have also been recorded on the site – Pine Marten (Martes martes), Badger (Meles meles) and Hare (Lepus timidus hibernicus).
pNHA 002048 SPA 004077	Fergus Estuary and Inner Shannon, North Shore is a large estuarine complex which comprises the River Fergus estuary from where it becomes tidal at Clarecastle, Co Clare to where it joins with the Shannon estuary and inland towards Limerick City. Habitats within the site include intertidal mudflats with fringing reedbeds, salt marsh, swamps and wet marsh. The site is of high ornithological interest, providing a habitat for wintering and migrating wildfowl. Three of the species that are present regularly on the site – Golden Plover, Whooper Swan and Black-Tailed Godwit – are on Annex I of the EU Birds Directive. It is also of botanical interest, with records of Triangular Clubrush (<i>Schoenoplectus triqueter</i>) from the shores of the Shannon Estuary. Another uncommon plant found within the site is a species of salt marsh grass (<i>Fuccinellia</i> sp.)

cSAC 002165

Lower River Shannon SAC is a large site running along the Shannon Valley from Killaloe to Loop Head / Kerry Head, covering a distance of approximately 120km. The site includes the lower freshwater reaches of the River Shannon, the Shannon and Fergus Estuaries, and a marine area between Kerry Head and Loop Head. The site is of very high ecological value as it plays host to a large number of habitats and species listed on Annexes I and II of the EU Habitats Directive. The site has been chosen as an candidate SAC due to the presence of lagoons and alluvial wet woodlands, and also for Molinla meadows, floating river vegetation, tidal mudflats, estuaries, Mediterranean Salt Meadows, Atlantic Salt Meadows, perennial vegetation of stony banks, sand banks, Salicornia mudflats, reefs, large shallow inlets, sea cliffs and bays - all of which are listed on Annex I of the EU Habitats Directive. The site was also chosen for the presence of several species listed on Annex II of the same directive - River Lamprey, Sea Lamprey, Brook Lamprey, Bottle-nosed Dolphin, Atlantic Salmon, Otter and Freshwater Pearl Mussel. This site forms the eastern and southern boundary of the study area for the South Clare Habitat Survey.

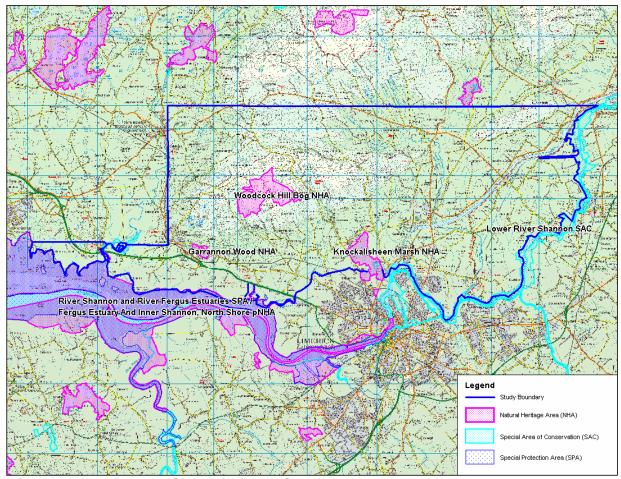


Figure 3.4: Designated Sites within the Study Area

3.4.1 RARE FLORA WITHIN STUDY AREA

3.4.1.1 Flora Atlas

The principal source of information regarding the distribution of flora in Ireland is the *New Atlas of the British & Irish Flora* (Preston *et al.*, 2002). This atlas shows data for vascular plants in individual 10 x 10 km squares. The study area falls within three 10 x 10 km squares including M46, M56 and M66. The records for these 10 km squares were consulted and a search was carried out to investigate if any rare or protected plant species had been recorded in the squares, during the 1987-1999 atlas survey carried out by the Botanical Society of the British Isles (BSBI). The search included the vascular plants that are listed in Annex II of the EU Habitats Directive, Flora Protection Order (FPO) of 1999, the Wildlife Act 1976, the Irish Red Data Book (IRDB) and the NPWS Site Synopsis for designated sites within the study area. The results are displayed in **Table 3.3.**

Table 3.3: Flora Atlas Data

Common Name	Scientific Name	Square M46	Square M56	Square M66
Pennyroyal	Mentha pulegium	+	-	-
Annual Knawel	Scleranthus annuus	+	+	+
Opposite-leaved Pondweed	Groenlandia densa	-	-	-
Meadow Barley	Hordeum secalinum	-	-	-
Triangular Club-rush	Schoenoplectus triqueter	-	-	-

⁺ Plant species recorded in 10 km squares during the 1987-1999 flora atlas survey

Mentha pulegium is protected under the FPO and is also listed on the IRDB and recorded in the 10km square M46 in the 1987-1999 Flora Atlas Survey. This protected floral species is a member of the mint genus and likes damp, shady soils. It is found mostly along tracks and roads, in disturbed and periodically inundated soils. Sometimes it occurs in similar habitat along river valleys and occasionally around the margins of fluctuating lakes. *Scleranthus annuus* is protected under the FPO and is also listed on the IRDB and recorded in the 10km squares M46, M56 and M66 in the 1987-1999 Flora Atlas Survey. *Scleranthus annuus* is a member of the chickweed family and occurs in dry, sandy and gravelly sites and in association with corn fields.

The remaining species listed in **Table 3.2** were not recorded in any of the three 10km squares during the 1987-1999 Flora Atlas Survey; however they are referred to in the NPWS Site Synopsis for designated sites within the study area. The nationally rare club rush *Schoenoplectus triqueter*, also known as *Schoenoplectus triqueter*, is found in tidal channels

⁻ Plant species not recorded in 10 km squares during flora atlas survey.

and creeks within many designated sites in the study area including River Shannon and River Fergus Estuaries (SPA), Lower River Shannon (SAC), Inner Shannon Estuary – South Shore and Fergus Estuary and Inner Shannon, North Shore (p NHAs). The species *Hordeum secalinum* and *Groenlandia densa* are located in the Lower River Shannon (SAC). *Hordeum secalinum* is abundant in saltmarshes and the protected pondweed *Groenlandia densa* is located in the River Shannon.

3.4.1.2 NPWS Data Sources

The NPWS were contacted in relation to records from the County Clare Rare Flora survey carried out under contract to NPWS in 2006. This search revealed that all of the rare vascular plant sites surveyed during this survey are outside of the study area. A search was also conducted of the NPWS rare/threatened vascular plant database and turned up two records from the area - *Mentha pulegium* (Islands & Bunratty, R4/6, Recorder: Wade [1804]) and *Schoenoplectus triqueter* which was recorded in Cratloe Creek in two places on the E & S of the Creek, R55, Recorders: O'Brien [1910] and Curtis & FitzGerald [1993]). There are also additional records for *Schoenoplectus triqueter* that are not yet added to the NPWS database, recorded by NPWS, as part of an M.Sc. project and in connection with the Limerick Southern Ring Road and OPW embankments maintenance projects, i.e. Meelick Creek, from Lansdowne Bridge to the Shannon on both sides of the creek (sample grid refs on record are: R52318,58367 [Clare] and on the Limerick side of river: R53219, 58557), Cratloe Creek (R51/58, R51714/59162 and R51716,59162), Ratty River at Brickhill West (R46/60 and R46/61).

4 HABITATS

4.1 HABITAT EVALUATION

The ecological interest of a site is assessed based on whether it is of *international, national, regional or local importance* as this has a direct bearing on its magnitude and significance. All impacts related to species or habitats protected by statute or Biodiversity Action Plans, priority species or habitats that are considered at national level. Seasonal factors that affect distribution patterns and habitats of species were taken into account when conducting the surveys and the potential of the site to support certain populations.

Consideration was given to the guidelines produced by the National Road Authority 'Guidelines for Assessment of Ecological Impacts of National Road Schemes, NRA Revision 1, 2006'. **Table 4.1** provide a suggested ranking based on the Site Evaluation Scheme as detailed in the NRA Guidelines. The wording in the table has been adjusted slightly and references to fisheries waters have been removed for the purposes of this report.

Table 4.1: Ecological Site Evaluation Scheme

Ratings for	Ecological Sites
A	 Internationally important: Sites designated (or qualifying for designation) as SAC or SPA under the EU, Habitats or Birds Directives, and Undesignated sites containing good examples of Annex I priority habitats under the EU Habitats Directive.
В	Nationally or regionally important: Sites or waters designated or proposed as an NHA or statutory Nature Reserves. Undesignated sites containing good examples of Annex I habitats (under EU Habitats Directive), and 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 or species protected under the Wildlife (Amendment) Act 2000.
С	High Ecological value in a local context 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, and Sites containing any resident or regularly occurring populations of Annex II species under the EU Habitats Directive or Annex I species under the EU Birds Directive.
D	Moderate Ecological value in a local context - Sites containing some semi-natural habitat or locally important for wildlife.
E	Low Ecological value in a local context - Artificial or highly modified habitats with low species diversity and low wildlife value.

The habitats recorded within the study area, percentage cover and overall ranking in accordance with the guidelines in **Table 4.1** are detailed in **Table 4.2**.

Table 4.2: Conservation Value of Habitats Recorded Within the Study Area

Habitat Group	Habitat Sub-Group	Habitat	Links to Annex I Habitats	Townland	% Cover	Ranking
	FL Lakes and Ponds	FL2 Acid oligotrophic lakes	Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea (3130)	Ballintlea Lough (Castlequarter) Lough Coolmeen (Coolycasey)	0.01	C- High
		FL4 Mesotrophic lakes	Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea (3130)	Lough Gorteen (Cratloe Woods, Brickhill East) McNamaras Lough (Ardataggle)	0.03	C- High
		FL5 Eutrophic lakes	**Natural eutrophic lakes with Magnopotamion or Hydrocharition- type vegetation (3150)	Derryvinnaan Gilloge (near the Errina Canal)	0.01	D- Moderate
		FL8 Other Artificial lakes and ponds		Doonass, Capavilla South & Aharinaghmore	0.01	E- Low
F Freshwater	FW Watercourses	FW1 Eroding/upland rivers	Watercourses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation (3260)	Tributaries of the Owenogarney/Ratty River, River Blackwater, Meelick/Crompaun River and Cratloe Creek.	1	C- High
		FW2 Depositing/lowland rivers	**Rivers with muddy banks with Chenopodion rubri p.p. and Bidention p.p. vegetation (3270)	Owenogarney/Ratty River, River Blackwater, Meelick/Crompaun River and Cratloe Creek.	6.4	C- High
		FW3 Canals		Ardnacrusha Headrace & Errina Canal		D- Moderate
		FW4 Drainage ditches		Throughout study area	+	D- Moderate
		FS1 Reed and large sedge swamps		Meelick	0.01	C- High
	FS Swamps	FS2 Tall herb swamps	**Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels (6430)	Moyhill	0.01	C- High
G Grassland & Marsh	GA Improved	GA1 Improved agricultural grassland		Throughout study area	55	E-Low
	grassland	GA2 Amenity grassland		Throughout study area	0.32	E-Low

Habitat Group	Habitat Sub-Group	Habitat	Links to Annex I Habitats	Townland	% Cover	Ranking
		GS1 Dry calcareous and neutral grassland	**Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometea) (important orchid sites) (6210) **Juniperus communis formations on heaths or calcareous grasslands (5130) **Calaminarian grasslands of the Violetalia calaminariae (6130)	Throughout study area	2.06	D - Moderate
	GS Semi-natural grassland	GS2 Dry meadows and grassy verges	Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis) (6510)	Kilmoculla, Ballycar South, Meanagh, Parkroe, Shannakyle	0.01	D - Moderate
		GS3 Dry-humid acid grassland	*Species-rich Nardus grasslands on siliceous substrates in mountain areas (and submountain areas in continental Europe) (6230)	Mainly in north-western section of study area (esp. upland areas around Woodcock Hill, Derrynaveagh, Fisherman's Hill), also in north-eastern section (Cappakea, Earlhill area)	2.83	D - Moderate
		GS4 Wet grassland	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) (6410)	Throughout study area	8.5	D/C- Moderate to High
	GM Freshwater marsh	GM1 Marsh	**Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels (6430)	Mainly in northern section of study area (Cloonsheerea, Derrynaveagh, Ballybrack, Aughboy and other areas)	0.4	D/C- Moderate to High
		HH1 Dry siliceous heath	European dry heaths (4030)	Kilnacreagh, Glenagross, Corlea, Heathmount, Brickhill East.	0.82	C- High
H Heath & Dense Bracken	HH Heath	HH3 Wet heath	Northern Atlantic wet heaths with Erica tetralix (4010)	Mainly in north western section (Heathmount, Clogga, Ballyroe, Corlea, Coolycasey, Derrynaveagh), also Ballycar South in the middle section and Agharinamore in the north eastern section	0.58	C- High
	HD Dense bracken	HD1 Dense bracken		Mainly north western section (Ballycar North, Cappateemore West, Kilmoculla, Clogga, Corlea,	0.17	E - Low

Habitat Group	Habitat Sub-Group	Habitat	Links to Annex I Habitats	Townland	% Cover	Ranking
				Cappanalagh, Carrowmore) and also in Derrynafadda in the south western section.		
	PB Bogs	PB1 Raised bogs	*Active raised bogs (7110)	Small section in Derryfadda (mostly cutover – see Target Note 4623C_TN2)	0.01	A/B- International/National
		PB2 Upland blanket bog	Blanket bog (*if active bog) (7130)	Cratloe	0.01	C- High
P Peatlands		PB4 Cutover bog	Depressions on peat substrates of the Rhynchosporion (7150)	Rossamadda East, Agharinamore	0.15	C- High
	PF Fens and Flushes	PF1 Rich fen and flush	Alkaline fens (7230)	Brickhill East (Cratloe) – Lough Gorteen	0.01	C- High
	riusiies	PF2 Poor fen		Brickhill East	0.01	C- High
W Woodland and scrub	WN Semi-natural woodland	WN1 Oak-birch-holly woodland	Old sessile oak woods with Ilex and Blechnum in the British Isles (91A0)	Concentrated in middle section of study area – in ravine alongside river from Troutstream Bridge south to Mountgordon, Moneenaglinnin South, Lakyle, Woodcock Hill and Aharinamore	0.46	C- High
		WN2 Oak-ash-hazel woodland		Cratloemoyle Doonass	0.03	C- High
		WN4 Wet pedunculate oak-ash woodland	*Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-padion, Alnion incanae, Salicion albae) (91E0)	Small pocket in Cappavilla South Garraun	0.01	D/C- Moderate to High
		WN5 Riparian woodland		Mainly in middle section of the study area – along the River Blackwater from Parteen up to Ballyfinneen, Drummin and Blackwater. Also further north along the Trough River in Trough and Kilmoculla and in Doonass to the south east of the study area.	0.3	D/C- Moderate to High
		WN6 Wet willow-alder-		Ballycannan, Trough, Reaskamoge,	0.28	C- High

Habitat Group	Habitat Sub-Group	Habitat	Links to Annex I Habitats	Townland	% Cover	Ranking
		ash woodland		Corlea, Cloonalira, Cloonoughter.		
		WN7 Bog woodland	*Bog woodland (91D0)	Rossamadda East, Ballybrack	0.1	C- High
	WD Highly modified/non-Native Woodland	WD1 (Mixed) broadleaved woodland		Throughout study area	1.4	D- Moderate
		WD2 Mixed broadleaved/conifer woodland		Throughout study area, but large areas in the western section of the study area around Cratloe, Ballyvoughallan, Cratloekeel, Woodcock Hill, Cappanalaght, Coolycasey and Castlecrine. Other large sections in Derryfadda and Rosamadda East in the south east.	0.86	E/D- Low to Moderate
		WD4 Conifer plantation		Large areas in western section of study area around Cratloe, Woodcock Hill, Derrynaveagh, Cappateemore West. Also in Cloghera to the north.	10.18	E-Low
		WD5 Scattered trees and parkland		Ardnacrusha, Garraun	0.04	E/D- Low to Moderate
	WS Scrub/transitional	WS1 Scrub	**Juniperus communis formations on heaths or calcareous grasslands (5130)	Throughout study area – large areas in western section around Castlequarter, Ballintlea South, Cratloe, Burton Hill and Boolanacausk and in Ballycar North in the middle section.	1.81	E/D- Low to Moderate
	woodland	WS2 Immature woodland		Derryvinnaan, Meanagh, Corlea, Reaskcamoge	0.27	E/D- Low to Moderate
		WS5 Recently-felled woodland		Gallowshill, Knockroe	0.1	E-Low
	WL Linear woodland/scrub	WL1 Hedgerows		Throughout study area		D- Moderate
		WL2 Treelines		Throughout study area		D/C- Moderate to High
E Exposed rock and	ER Exposed rock	ER1 Exposed siliceous rock	**Siliceous rocky slopes with chasmophytic vegetation (8220)	Ballyliddan West, Ballybrack	0.01	D- Moderate

Habitat Group	Habitat Sub-Group	Habitat	Links to Annex I Habitats	Townland	% Cover	Ranking
disturbed ground		ER2 Exposed calcareous rock	**Calcareous rocky slopes with chasmophytic vegetation (8210)	Doonass, Coollisteige	0.01	D- Moderate
		ED1 Exposed sand, gravel or till		Ballycar South, Cratloemoyle	0.03	E-Low
		ED2 Spoil and bare ground		Derrynaveagh, Cottage, Parkroe, Shruhaunabankee	0.02	E-Low
		ED3 Recolonising bare ground		Scattered throughout northern section. Large section in Shannakyle in the south.	0.13	E/D-Low to Moderate
		ED4 Active quarries and mines		Large quarry in Ballycar South	0.13	E-Low
B Cultivated and built land	BC Cultivated land	BC1 Arable crops		Cappavilla South and Wooden Bridge in the south eastern section of the study area, and Knockbrack Upper and Cloghera in the north.	0.15	E/D-Low to Moderate
		BC2 Horticultural land		Cappavilla South	0.02	E/D-Low to Moderate
	BL Built Land	BL3 Buildings & Artificial Surfaces		Throughout study area	5.4	E-Low

^{*} Annex I Habitats also listed as Priority Habitats under the EU Habitats Directive (Directive 92/43/EEC, amended by Directive 97/62/EC). Priority Habitats are habitats at risk from disappearance.
** Annex Habitats not found within study area

4.2 HABITATS RECORDED WITHIN STUDY AREA

Acid Oligotrophic Lakes FL2

Acid Oligotrophic Lakes FL2 occur within and to the north and west of the study area. Lough Gorteen occurs within Cratloe woods and is approximately 100ha in size. The area of open water is significantly smaller than this, as the shallow shores of the lake support Rich Fen and Flush PF1 habitat and Alder Carr woodland. Three lakes are located on Gallowshill and occur between 150 an 170 meters above sea level, and range between 13ha and 25ha in size. Lough Coolmeen is partially located within the study area. It covers an area of 86ha and supports a good population of coarse fish. The substratum surrounding the shoreline appears to be muddy organic matter and the water has a brownish hue typical of such lakes in bog environments. Species typical of this habitat include Bulbous rush (*Juncus bulbosus*), Common rush (*Juncus effusus*), Bog Pondweed (*Potomageton polygonifolius*) and Common Spike-rush (*Eleocharis palustris*).

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
High ecological importance in a local context	Dystrophic Lakes correspond to an Annex I Habitat under the EU Habitats Directive, 'Natural dystrophic lakes and ponds (3160)'.	Ballintlea Lough (Castlequarter) Lough Coolmeen (Coolycasey)



Image 4.1: Acid oligotrophic lakes FL2 Ballintlea Lough (Castlequarter)

Mesotrophic Lakes FL4

The lake located to the south of Bridgetown can be classified as Mesotrophic. The lake is prone to algal blooms, which is evident from the aerial photography; however this was not apparent on the day of the survey. The lake is bordered by Conifer Plantation WD4 and Riparian Woodland WN5. Stoneworts (*Chara spp.*) and pondweeds (*Potamogeton spp.*) were recorded in the waterbody.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
Moderate to High ecological importance in a local context.	Mesotrophic Lakes do not correspond to Annex I Habitats under the EU Habitats Directive.	Lough Gorteen (Cratloe Woods, Brickhill East) McNamaras Lough (Ardataggle)



Image 4.2: Mesotrophic lakes FL4, McNamaras Lough (Ardataggle)

Eutrophic Lakes FL5

A small Eutrophic lake was recorded near the Derryvinaan River in the townland of Meanagh. Eutrophic water bodies that are high in nutrients may also have an abundance of algae at certain times of year. Stagnant drains throughout the study area also support this type of habitat.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
Moderate ecological importance in a local context.	Eutrophic Lakes only correspond to Annex I Habitats when they are naturally occurring. Eutrophic Lakes in Ireland are eutrophic as a result of enrichment from high levels of nutrients entering the water.	Derryvinnaan Gilloge (near the Errina Canal)



Image 4.3: Eutrophic pond FL5, in the townland of Derryvinnaan

Other Artificial Lakes & Ponds FL8

This habitat classification applies to artificial or ornamental bodies of standing water. These water bodies are often stagnant and high in nutrients and are considered to be eutrophic. Flooded quarries are also included in this classification, in addition to water features of amenity areas such as golf courses ad parks.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
Low ecological importance in a local context.	Artificial Lakes & Ponds do not correspond to Annex I Habitats	



Image 4.4 Pond in disused quarry in the townland of Aharinaghmore

Eroding/Upland Rivers FW1

A number of eroding upland rivers drain the study area. The main river systems are the Gourna River (tributary of the Ratty River), River Blackwater, Meelick/Crompaun River and Cratloe Creek. The upper reaches of these river systems are included in this category.

These rivers and stReams are typical of eroding upland rivers with little or no deposition of fine sediment and relatively fast, turbulent flow. The beds of the rivers are characterised by exposed bedrock and loose cobbles. Due to the rapid movement of water and unstable eroding channels, which are key features of such rivers, little vegetation is present. However, some aquatic mosses and liverworts were noted. The main channels have a range of features such as riffles, pools and runs, which are characteristic of eroding / upland rivers.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
High ecological importance in a local context.	Eroding and upland rivers do not correspond to any Annex I or Priority Habitats under the EU Habitats Directive. Freshwater Pearl Mussel (<i>Margaritifera margaritifera</i>), an Annex II species, is known to occur in the Lower River Shannon SAC and therefore may be found in watercourses that flow into this stretch of the river, specifically the River Blackwater.	Tributaries of the Owenogarney/Ratty River, River Blackwater, Meelick/Crompaun River and Cratloe Creek.



Image 4.5 Eroding tributary of the River Blackwater in the townland of Tooreen

Depositing/Lowland Rivers FW2

The Owenogarney/Ratty River, River Blackwater, Meelick/Crompaun River and Cratloe Creek are all tributaries of the River Shannon. Where these rivers flow through flat or gently undulating ground they can be classified as Depositing/Lowland Rivers FW2. The riparian vegetation on the banks of these rivers varies considerably through out the study area, varying between wetland habitats to improved grassland and woodland. The emergent vegetation generally corresponds to Reed Swamp FS1 with species such as Common Club Rush (*Schoenoplectus lacustris*), Common Reed (*Phragmites australis*) and Fools Watercress (*Apium nodiflorum*).

Ecological Interest	Links to Annex I Habitats	Locations within Study Area	
High ecological importance in a local context.	Depositing Lowland Rivers FW2 does not correspond to any Annex I or Priority Habitats	Owenogarney/Ratty River, River Blackwater, Meelick/Crompaun River and Cratloe Creek.	



Image 4.6 River Shannon near the townland of Srawickeen to the east of the study area

Canals FW3

There are two canals located to the south east of the study area. The largest of the canals is the Ardnacrusha head-race canal, which is an eight mile canal into which part of the Shannon is deverted and conveyed to Ardnacrusha to drive the turbines in the power station. The head-race was constructed partly in cutting and partly in embankment. Along one section the embankments reach a height of 18 metres. The second much smaller Errina Canal links the headrace to the River Blackwater. The Errina Canal was built in the latter part of the eighteenth century as part of the Limerick-Killaloe navigation to bypass a sequence of rapids including the Doonass Falls. The canal splits from the Shannon channel 2km south of O'Briensbridge and follows a path via the village of Cloonlara west of the Shannon before following the course of the Blackwater River until it meets the Shannon at Plassey Bridge. The canal is no longer in use.

The embankments of these canals support a number of habitats ranging from semi-improved grasslands to woodlands and scrub.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
Moderate ecological importance in a local context.	Canals FW3 do not correspond to any Annex I or Priority Habitats. The priority species <i>Groenlandia densa</i> is found in the Lower River Shannon SAC. This species may occur in canals and watercourses associated with River Shannon.	Ardnacrusha Headrace & Errina Canal



Image 4.7 Errina Canal overgrown



Image 4.8 Grasslands on the embankments of the Headrace canal of Ardnacrusha being cut for silage

Drainage Ditches FW4

Drainage ditches occur throughout the study area. The drains flow into larger tributaries of the larger rivers within the study area.

The water in drains is slow-moving and stagnant in places. Fools Watercress (*Apium nodiflorum*) and Common duckweed (*Lemna minor*) were also common throughout with Water Mint (*Mentha aquatica*) occurring in the verges. Tall emergent vegetation is evident in drains throughout the study area. This vegetation corresponds with *Reed and Large sedge swamp (FS1)*, and occurs in the deep drains in the low lying areas of the study area in the vicinity of the River Shannon, however these areas are often too small to map. Species such as Common Reed (*Phragmites australis*), Common Club Rush (*Schoenoplectus lacustris*), and Reed canary grass (*Phalaris canariensis*) occur frequently.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
Moderate ecological importance in a local context.	Drains are important for invertebrate diversity, and also Common Frog (<i>Rana temporaria</i>) and Smooth Newts (<i>Triturus vulgaris</i>). Drains flow into designated watercourses and are therefore considered sensitive.	Occurs throughout study area.



Image 4.9 Drain adjacent to Meelick Creek with emergent reed vegetation and water surface completely covered with duck weed

Reed and Large Sedge Swamps FS1

Areas of Reed and large Sedge Swamps occupy drains and the margins of Depositing/Lowland Rivers FW2 throughout the study area, particularly in the lowlands of Meelick and Bunratty. This habitat often forms intimate mosaics with Tall Herb Swamps FS2, Marsh GM1 and Wet Grassland GS4 and were therefore often too small to map. Common Reed (*Phragmites australis*), Great Fen-sedge (*Cadium mariscus*) and Common Club-rush (*Schoenplectus lacustris*) are the dominant species, with commonly occurring species such as Common Reedmace (*Typha latifolia*), Water Mint (*Mentha aquatica*), Purple Loosestrife (*Lythrum salicaria*) and Water Plantain (*Alisma plantago-aquatica*).

Ecological Interest	Links to Annex I Habitats	Locations within Study Area	
Moderate/High ecological importance in a local context.	Reed and Large Sedge Swamps FS1 habitat does not correspond to EU Annex I habitats.	Occurs in drains throughout study area, particularly in the lowlands, in Moyhill, Meelick and Garraun	



Image 4.9 Reed and Large Sedge Swamp adjacent to the new University of Limerick pedestrian bridge crossing the River Shannon

Tall Herb Swamps FS2

Tall Herb Swamp FS2 vegetation is confined to wet hollows and occupies the margins of Depositing/Lowland Rivers FW2, particularly in the flooded lowlands of Meelick and Bunratty. This habitat often forms intimate mosaics with Tall Herb Swamps FS2, Marsh GM1 and Wet Grassland GS4. Tall-herb swamps occur in wet areas where the water table is above the ground surface for most of the year (Fossitt, 2000) or where inundation is frequent but not permanent. These areas of swamp support greater species diversity than Reed and large Sedge Swamps FS1, species such as Yellow Iris (*Iris pseudacorus*), Water-plantain (*Alisma plantago-aquatica*), Water Horsetail (*Equisetum fluviatile*), Fool's Water-cress (*Apium nodiflorum*) some rush species (*Juncus spp.*) and sedge species (*Carex spp.*) also occur. The invasive species Himalayan Balsam (*Impatiens glandulifera*) was also prominent in this habitat type, particularly in the Meelick Area.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
High ecological importance in a local context.		,



Image 4.10 Tall herb swamp in the lands adjacent to Meelick Creek, grading into Wet
Grassland and Wet Willow Alder Ash Woodland WN6

Improved Agricultural Grassland GA1

Improved agricultural Grassland GA1 represents the overall character of the area. This habitat type comprises primarily a grassy sward of typical agricultural grassland cultivars, typically a Perennial Rye-grass (*Lolium perenne*) and White Clover (*Trifolium repens*) mix. Cock's-foot (*Dactylis glomerta*), Fescues (*Festuca* spp.), Yorkshire Fog (*Holcus lanatus*) and Meadow species (*Poa* spp.) also occurring, particularly in the field margins.

Herb species such as Ribwort Plantain (*Plantago lanceolata*) and Daisy (*Bellis perennis*) occur abundantly. Depending on management practices species such as Thistles (*Cirsium* sp.), Dandelion (*Taraxacum* sp.), Creeping Cinquefoil (*Potentilla reptans*), Silverweed (*Potentilla anserina*), Chickweed (*Cerastium glomeratum*), Common Mouse-ear (*Cerastium fontanum*) and Common Nettle (*Urtica dioica*), can be common.

However, the margins and field boundaries of Improved Agricultural Grassland GA1 provide some ecological value. Uncultivated vegetation occurs along hedgerows, stonewalls and fences. A diversity of grassland species may occur in these margins and the tall sward provides food, shelter and commuting routes for small animals and insects.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area	
Low ecological importance in a local context.	This habitat type does not correspond to EU Annex I Habitats	Throughout Study Area	



Image 4.11 Improved Agricultural Grassland GA1

Amenity Grassland (Improved) GA2

The amenity grassland occurs in parks, golf courses and football pitches, and comprises a short sward which is maintained through regular mowing. The species composition includes; ryegrass species (*Lolium* spp.), bents (*Agrostis spp*) and fescues (*Festuca* spp.). Daisy (*Bellis perennis*) and Buttercup also occur. Rank vegetation occurs in the verges and margins of the amenity grassland and pumping station.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
Low ecological importance in a local context.	This habitat type does not correspond to EU Annex I Habitats	Scattered throughout Study Area



Image 4.12 Golf course in the townland of Doonass

Dry Calcareous and Neutral Grassland GS1

Semi Improved Dry Grassland GS1 occurs throughout the study area, on free draining soils in areas of low intensity agriculture. Calcareous grassland was not recorded within the study area. Neutral Grassland GA1 can be very species diverse containing grass species such as bents (*Agrostis* spp.), meadow-grasses (*Poa* spp.), Meadow Foxtail (*Alopecurus pratensis*), Timothy (*Phleum pratense*), fescues (*Festuca* spp.), Sweet Vernal-grass (*Anthoxanthum odoratum*), Crested Dog's-tail (*Cynosurus cristatus*), Cock's-foot (*Dactylis glomerata*) and Yorkshire-fog (*Holcus lanatus*) occur. Common broadleaved herbs include clovers (*Trifolium* spp.), Yarrow (*Achillea millefolium*), Common Knapweed (*Centaurea nigra*), Selfheal (*Prunella vulgaris*), Bird's-foot Trefoil (*Lotus corniculatus*). This grassland type is the dominant grassland on the banks of the Ardnacrusha headrace canal. This grassland is grazed by sheep and cut for silage at least twice a year.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
Moderate ecological importance in a local context.	Calcareous grasslands with either high numbers or diversity of orchids correspond to the priority habitat, 'semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometea) (*important orchid sites) (6210)'. During the field survey the grasslands that are considered under this classification were found to be more neutral than calcareous.	Occurs throughout Study Area, particularly in Ardnacrusha and to the south east of the



Image 4.13 Headrace of Arnacrusha, grazed by horses and sheep

Dry Meadows and Grassy Verges GS2

This grassland habitat is uncommon within the study area. Few agricultural fields are now managed as traditional hay meadow and this habitat is largely confined to field and road margins. As these grasslands are rarely fertilised, a good diversity of grassland species develops. Species include; False Oat-grass (*Arrhenatherum elatius*), Cock's Foot (*Dactylus glomerata*), Meadow Foxtail (*Alopecurus pratensis*) and Yorkshire Fog (*Holcus lanatus*). There is also a good diversity of herbaceous species, including Spear Thistle (*Cirsium vulgare*), Cowslip (*Primula veris*), Ragwort (*Senecio jacobaea*), Meadowsweet (*Filipendula ulmaria*), Red and White Clover (*Trifolium pratense* and *T. repens*), Willowherb (*Epilobium sp.*) and Selfheal (*Prunella vulgaris*). Also present are species such as Meadow Vetchling (*Lathyrus pratensis*) which climb the stems of other plants. Lesser Trefoil (*Trifolium dubium*), Daisy and Shepherd's Purse (*Capsella bursa-pastoris*) can occur in the disturbed areas.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
Moderate ecological importance in a local context.	This grassland habitat corresponds to the annexed habitat, 'Lowland hay meadows (<i>Alopecurus pratensis, Sanguisorba officinalis</i>)'. This habitat type is declining in the Irish landscape due to changes in farming practises. As these grasslands are not fertilised or intensively grazed, these grasslands are species diverse and provide good habitat for many species of invertebrates.	Kilmoculla, Ballycar South, Meanagh, Parkroe, Shannakyle, Ardnacrusha



Image 4.14 Hay Meadow in the townland of Shanakyle

Dry-Humid Acid Grassland GS3

This habitat type occurs on shallow free draining soils on the steeper slopes of the study area, forming intimate mosaics with scrub, heath and peatland habitats; it exhibits a good species diversity of vascular plants, herbs and mosses. Species include Purple moor grass (Molinia caerulea), Matt Grass (Nardus stricta), Bent grass (Agrostis spp), Wavy Hair Grass (Deschampsia flexuosa), Fescue Grasses (Festuca spp.), Tormentil (Potentilla erecta), Self Heal (Prunella vulgaris), Sheep's Sorrel (Rumex acetosella) and Devil's-bit Scabious (Succisa pratensis). Hard Fern (Blechnum spicant) and Bracken (Pteridium aquilinum) and mosses such as, Brachythecium rutabulum, Pleurozium schreber and Polytrichum commune also occur.

Ecological Interest	Links to Annex I Habitats	Locations within Study
Moderate ecological importance in a local context.	EU Habitats Directive Annex I Habitat: Dry-humid Acid Grassland corresponds to the priority habitat 'species-rich Nardus grasslands on siliceous substrates in mountain areas (6320)'. These grasslands are often heavily poached through intensive grazing and areas that have been abandoned are under threat from scrub encroachment.	Woodcock Hill, Derrynaveagh, Fisherman's Hill), also in north-eastern section (Cappakea, Earlhill



Image 4.15 Dry Humid Acid Grassland with very short sward and abundance of Devil's-bit Scabious

Wet grassland GS4

This habitat occurs throughout the study area, on upland slopes where drainage is impeded and poorly drained fields in the lowlands. On acidic substrates this habitat is characterised by rushes (*Juncus articulatus/acutiflorus/effuses/inflexus*), sedges (*Carex spp*), Purple Moorgrass (*Molinia caerulea*), Tormentil (*Potentilla erecta*), Devil's-bit scabious (*Succisa pratensis*), Bog Asphodel (*Narthecium ossifragum*) and Heath Milkwort (*Polygala serpyllifolia*). Bog mosses (*Sphagnum spp.*) can often be found in the damp hollows throughout. This habitat often forms mosaics with Wet Heath HH3 and Cutover Bog PB4.

In the foothills and lowland reaches of the study area, Meadowsweet (*Filipendula ulmaria*), Purple Loosestrife (*Lythrum salicaria*), Lesser Spearwort (*Ranunculus flammula*), Meadow buttercup (*Ranunculus acris*), and grasses such as Yorkshire Fog (*Holcus lanatus*), Creeping Bent (*Agrostis stolonifera*), Rough Meadow Grass (*Poa trivialis*), Cuckoo Flower (*Cardamine pratensis*) and Meadow Foxtail (*Alopecurus geniculatus*) occur.

Molinia dominated Wet Grassland GS4 also occurs, particularly in the upland areas, in association with peatland habitats. These grasslands occur in Ballycar, Cratloe and the uplands south of Bridgetown to the north east of the study area. The species diversity of this grassland type varies considerably throughout the study area and is largely determined by management practices. Species rich and diverse examples of Wet Grassland are target noted.

Ecological Interest	Links to Annex I Habitats	Locations within Study
		Area
Moderate ecological importance in a local context.	The Wet Grassland GS4 habitats particularly in the upland areas of the study area contain examples of the EU Habitats Directive Annex I Habitat: 'Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)' (6410). Devil's-bit Scabious, prevails in a number of sites. Wet grasslands are susceptible to agricultural management practices; therefore species rich examples are under constant threat. Although this habitat type is widespread, it is considered to be of moderate ecological value.	Mainly in north-western section of study area (esp. upland areas around Woodcock Hill, Derrynaveagh, Fisherman's Hill), also in north-eastern section (Cappakea, Earlhill area)



Image 4.16 Species rich Wet Grassland GS4

Marsh GM1

Marsh GM1 habitats are common throughout the study area, occurring predominately in the margins of rivers in association with other habitats such as Reed and large Sedge Swamps, Tall Herb Swamps FS2, and wet hollows in Wet Grassland GS4 habitats. Marsh GM1 habitat comprises a diversity of species similar to Wet Grassland GS4; however there is a predominance of herbs including Ragged Robin (*Lynchnis flos-cuculi*) and Marsh Woundwort (*Stachys palustris*), with horsetails (*Equisetum* spp), Yellow Iris (*Iris pseudacorus*), and Reedmace (*Typha latifolia*) occurring.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
Moderate ecological importance in a local context.	Marsh may sometimes contain pockets of the Annex I habitat, 'hydrophilous tall herb fringe communities of plains and of the montane to alpine levels (6430)'. No examples of this particular habitat were found during the survey however. Marsh GM1 often occurs in mosaics with other wetland habitats, significant areas were not recorded. However, a good example of this habitat type is located to the south of the study area, and is designated as Knockalisheen Marsh pNHA.	Mainly in northern section of study area (Cloonsheerea, Derrynaveagh, Ballybrack, Aughboy and other areas)



Image 4.17: Marsh GM1 dominated by rushes and horsetails

Dry Siliceous Heath HH1

Small areas of dry dwarf heath vegetation occur on the free-draining podzolic soils, on the elevated rocky mounds interspersed with acid grassland species. This habitat is evident on exposed rocky outcrops in the vicinity of Woodcock Hill. Ling heather (*Calluna vulgaris*), Crossed-leaved Heath (*Erica tetralix*) and Bilberry (*Vaccinium myrtillus*) are common and Heath Bedstraw (*Galium saxatile*) and Mat Grass (*Nardus stricta*) occur occasionally. Purple moor-grass (*Molinia caerulea*), Fescue grass (*Festuca sp.*), Bent grass (*Agrostis sp.*), Tormentil (*Potentilla erecta*) also occur.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
High ecological importance in a local context.	Dry Dwarf Scrub Heath is affiliated with 'European dry heaths (4030)'. This habitat has a moderate speciesrichness and is has limited distribution throughout study area. This habitat is considered to be of high conservation value.	Kilnacreagh, Glenagross, Corlea, Heathmount, Brickhill East.



Image 4.18: Dry Siliceous Heath dominated by Ling (*Calluna vulgaris*) adjacent to conifer plantation in the townland of Ballycar North

Wet Heath HH3

Wet Heath HH3 occurs in the upland areas of the area and also occurs on the dry cut banks of Cutover Bogs PB4 in the lower slopes, and this habitat also forms a complex mosaic with Upland Blanket Bog PB2 and Dry siliceous heath HH1.

Wet Heath vegetation typically occurs on shallow peat, generally under 0.5 metres in depth. The wet heath species include Ling Heather (*Calluna vulgaris*) and Crossed-leaved Heath (*Erica tetralix*), Bilberry (*Vaccinium myrtillus*), Purple Moor-grass (*Molinia caerulea*), Common Rush (*Juncus effusus*), Heath Rush (*Juncus squarrosus*), Heath Milkwort (*Polygala serpyllifolia*), Devil's bit Scabious (*Succisa pratensis*) and Cotton grass (*Eriophorum vaginatum*). Mosses such as *Rhytidiadelphus loreus*, *Hylocomium splendens* and *Polytrichum commune* are common, with *Sphagnum* species and Star Sedge (*Carex echinata*) occurring in the flushed areas.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
High ecological importance in a local context.	Wet heath corresponds to the Annex 1 habitat 'northern Atlantic wet heaths with <i>Erica tetralix</i> (4010)'.	Mainly in north western section (Heathmount, Clogga, Ballyroe, Corlea, Coolycasey, Derrynaveagh), also Ballycar South in the middle section and Agharinamore in the north eastern section



Image 4.19: Wet Heath habitat in Heathmount in the western section of the study area

Dense Bracken HD1

Small areas of Dense Bracken HD1 occur in a variety of habitats within the study area, such as in the areas of scrub and woodland. This habitat also occurs in the upland grasslands in areas of low intensity grazing.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
Low ecological importance in a local context.	This habitat does not correspond to EU Habitats Directive Annex 1 Habitats. This vegetation type can be invasive and is considered to be of low conservation value.	Mainly north western section (Ballycar North, Cappateemore West, Kilmoculla, Clogga, Corlea, Cappanalagh, Carrowmore) and also in Derrynafadda in the south western section.



Image 4.20: Dense Bracken in Derrynafadda

Raised Bogs PB1

Uncut raised bogs are a rarity in Ireland and those found within the study area are no exception. Raised bogs are found mostly in the midlands of Ireland; however they also occur in a limited number of areas in County Clare. They form in lowland areas in river valleys, hollows and lake basins. Their domed shape gives rise to the name 'raised bog' and some of these bogs were as deep as 13m. A significant area of raised bog occurs within the study area, in the townland of Derryfadda, west of Parteen. The original active bog area was in excess of 50 ha, however most of is has been depleted through peat extraction over the last hundred years. Cutting ceased in this bog in the 1980's and cut banks and ramparts have now been colonized by Wet Heath HH3 vegetation. The edges of the bog have been planted with conifers and bog woodland has also developed. The dome is still evident in the central area.

The bog supports a floral assemblage typical of this habitat type such as; Deergrass (*Trichophorum caespitosum*), Common Cottongrass (*Eriophorum angustifolium*.), Bog Rosemary (Andromeda polifolia), Bog Asphodel (*Narthecium ossifragum*), White Beak Sedge (*Rhynospora alba*), Purple Moor-grass (*Molinia caerulea*) and Sundew (*Drosera rotundifolia*) with Sedge (*Carex spp.*) and Rush species (*Juncus spp.*). Ling Heather (*Calluna vulgaris*), Cross-leaved Heath (*Erica tetralix*) and occasional dwarf shrubs also occur such as Bilberry (*Vaccinium myrtillus*) and Bog Myrtle (*Myrica gale*). Wetter areas and pools containing large patches of Sphagnum are interspersed across the bog with Reindeer Mosses (*Cladonia spp.*) on the drier hummocks.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
High ecological importance in a national context.	Raised bogs correspond to the priority habitat, '*active raised bogs (7110)' if they are still capable of peat formation, or if peat formation has temporarily ceased. 'Degraded raised bogs still capable of natural regeneration (7120)' are also listed as an annexed habitat. These are damaged bogs where it is judged that the peat forming capability can be restored within 30 years. The annexed habitat, 'depressions on peat substrates of the Rhynchosporion (7150)' occurs in pockets as a subhabitat of raised bog. This habitat is of high national conservation value.	Small section in Derryfadda



Image 4.21: Raised Bog with *Sphagnum* spp, *Erica tetralix* & *Narthecium* ossifragum Derrynafadda

Upland Blanket Bog PB2

Areas of pristine Upland Blanket bog are rare within the study area. This habitat once draped the uplands of Cratloe and Sixmilebridge, but has suffered a great deal in the past due to anthropogenic activities including reclamation for agriculture, peat extraction, overgrazing and forestry. Pristine examples of this habitat can be found within the confines of Woodcock Hill NHA and small areas can be found in the surrounding landscape in combination with other upland habitats.

The bog supports a floral assemblage typical of this habitat type such as; Deergrass (*Trichophorum caespitosum*), Common Cottongrass (*Eriophorum angustifolium.*), Bog Pimpernel (*Anagellis tenella*), Bog Asphodel (*Narthecium ossifragum*) and Sedge species (*Carex spp.*) and Rush species (*Juncus spp.*), Ling Heather (*Calluna vulgaris*), Cross-leaved Heath (*Erica tetralix*), Purple Moor-grass (*Molinia caerulea*) and some occasional dwarf shrubs such as Bilberry (*Vaccinium myrtillus*) also occurs. *Sphagnum* spp. can be found throughout and with Reindeer Mosses (*Cladonia spp.*) on the dry hummocks and exposed peat haggs.

Unplanted areas of Upland Blanket Bog within the forestry that are left as fire breaks and are heavily eroded below the rooting level of plants are generally considered as **Eroding**

Blanket Bog (PB5). However, these small patches of bare or poorly vegetated ground are well dispersed throughout the Cratloe area and therefore are not classified separately in this instance. Some regeneration is evident, Common Cottongrass (*Eriophorum angustifolium*) has started to recolonise areas of bare peat.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
High ecological importance in a national context.	EU Habitats Directive Annex 1 Species: Blanket bogs that are still capable of peat formation correspond to the priority habitat 'blanket bogs (*if active bog) (7130)', while the annexed habitat 'depressions on peat substrates of the <i>Rhynchosporion</i> (7150)' can occur as a sub habitat of blanket bog. Limited areas of intact blanket bog are evident at higher altitudes. These habitats are of high national conservation importance.	Cratloe



Image 4.22: Small area of Blanket Bog to the North of Woodcock Hill NHA

Cutover Bog PB4

Turf banks occur throughout the Raised Bog PB1 and Upland blanket bog PB2 areas within the study area. These ramparts are relics of a long history of peat extraction in the area. Bare banks are still evident where turbary harvesting of peat is ongoing. The areas of modified Raised Bog PB1 and Upland Blanket Bog habitat PB2, that have been cut have re-vegetated with varying assemblages of species, depending on hydrology, depth of peat remaining, nature of the peat and underlying substratum. The peat banks as a result of natural succession have been colonised with heath vegetation. However, the wetter hollows are usually dominated by Deer Grass (*Trichophorum cespitosum*), Bog Cotton Grasses (*Eriophorum angustifolium*) and Bog Asphodel (*Narthecium ossifragum*). The Sphagnum species occur throughout.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
High ecological importance in a national context.	EU Habitats Directive Annex 1 Species: The annexed habitat 'depressions on peat substrates of the <i>Rhyncosporion</i> (7150)' can occur in pockets on cutover bog. This annexed habitat occurs in wet depression it the areas of cut Raised Bog. Significant areas of this phenomenon occurs in the bog in the Townland of Derryfadda	Rossamadda East, Agharinamore



Image 4.23: Cutover Blanket Bog with pools of Rhyncosporion alba

Rich Fen and Flush PF1

Fens develop from damp or water logged hollows in the landscape. They are generally associated with lake edges, flood plains and river valleys. Fens often form mosaics with a variety of woodland, wetland and open water habitats.

This habitat is uncommon within the study area, however it is best represented in the lake margins of Lough Gorteen in Cratloe Woods. The shallow peaty waters of the lake margins have given rise to this habitat. This habitat supports species such as Bogbean (*Menyanthes trifoliata*), Purple Moor-grass (*Molinia caerulea*), Common Cottongrass (*Eriophorum angustifolium*), Velvet Bent (*Agrostis canina*), Yorkshire-fog (*Holcus lanatus*), Marsh Pennywort (*Hydrocotyle vulgaris*), Water Mint (*Mentha aquatica*), Common Butterwort (*Pinguicula vulgaris*) and Devil's-bit scabious (*Succisa pratensis*). This habitat occurs in close association with Alder Carr and Wet Willow-Alder-Ash woodland WN6.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
High ecological importance in a local context.	The annexed habitat 'Alkaline Fens (7230)'. Areas of Rich Fen and Flush PF1 are considered to be of high conservation value in a local context.	Brickhill East (Cratloe) – Lough Gorteen



Image 4.24: Species Rich Fen and Flush in the margins of Lough Gorteen, Cratloe

Poor Fen and Flush PF2

Small areas of this habitat occur to the north west of the study area in the townland of Ballintlea South, northwest of Cratloe woods. This habitat is fed by groundwater such as a spring or a perched water table, which is an aquifer that occurs above the regional water table. The vegetation of Poor Fen and Flush PF2 habitat is typically dominated by rushes (*Juncus* spp.) and sedge species (*Carex* spp.).

This habitat also supports species such as Common Cottongrass (*Eriophorum angustifolium*), Velvet Bent (*Agrostis canina*), Yorkshire-fog (*Holcus lanatus*) and broadleaved herbs such as Marsh Violet (*Viola palustris*), Heath Bedstraw (*Galium saxatile*), Tormentil (*Potentilla erecta*) and Marsh Cinquefoil (*Potentilla palustris*) also occur.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
High ecological importance in a local context.	Poor Fen and Flush PF2 habitat is not linked to Annexed Habitats however their distribution is limited in Ireland. Therefore should be considered to be of high ecological value in a local context.	Ballintlea South



Image 4.25: Species Poor Fen and Flush PF2 habitat to the background

Oak-Birch-Holly woodland WN1

This woodland type has limited distribution in the study area and is confined to the steep slopes of river ravines on the southern slopes of Woodcock Hill. This woodland types occurs free draining acid or base-poor soils. A good example of this woodland type can be found in the designated sites Glenomra Wood NHA/SAC, which borders the study area to the northeast. This woodland type is dominated by Oak in particular; Sessile Oak (*Quercus petraea*) with Downy Birch (*Betula pubescens*), Ash (*Fraxinus excelsior*) and Beech (*Fagus sylvatica*), Holly (*Ilex aquifolium*) and Hazel (*Corylus avellana*), occur intermittently. Bluebell (*Hyacinthoides non-scripta*), Wood Anemone (*Anemone nemorosa*), Great Wood-rush (*Luzula sylvatica*), Ivy (*Hedera helix*) and Wood Sorrel (*Oxalis acetosella*) constitute the ground flora of these woodlands.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
High ecological importance in a local context.	This habitat corresponds to the annexed habitat 'old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles'. Good examples of this habitat occur in the designated sites within or adjacent to the study area such as Garrannon Wood NHA, which is located in Cratloe and Glenomra Wood NHA and SAC, which borders the study area to the north east. Small areas of this habitat occur within the study area.	section of study area – in ravine alongside river from Troutstream Bridge south to Mountgordon, and in Moneenaglinnin South, Lakyle and Woodcock Hill. Also in



Image 4.26: Oak Birch Holly Woodland in a ravine on the southern slopes of Woodcock Hill

Oak-Ash-Hazel Woodland WN2

This habitat has limited distribution within the study area. It occurs on exposed limestone outcrops in Doonass and the Cratloemoyle. This habitat is best represented in Garrannon Wood pNHA is a small deciduous wood located just east of Cratloe This type of woodland occurs on base rich soils that are well drained and comprises Oak (*Quercus robur*), Ash (*Fraxinus excelsior*), and Hazel (*Corylus avellana*), with Holly (*Ilex aquilinum*) occurring intermittently. The ground flora comprises Ivy (*Hedera helix*), Lords and Ladies (*Arum maculatum*), grasses and ferns.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
High ecological importance in a local context.	Semi-natural woodlands are a rarity in a landscape otherwise dominated by agricultural grassland, heath and conifer plantations. This habitat does not correspond to Annex I habitats, however the habitat is considered to be of moderate to high conservation value in a local context.	Cratloermoyle Doonass



Image 4.27: Oak Ash Hazel Woodland on thin soils in an area of calcareous rock outcrop in the townland of Doonass

Wet Pedunculate Oak-Ash Woodland WN4

This habitat is uncommon throughout the study area. Small areas of this woodland occur in wet hollows in the low-lying lands around Cloonlara and Parteen. The species found in this habitat include mature Sessile Oak (*Quercus robur*), Ash (*Fraxinus excelsior*), Hawthorn and Alder. The ground flora typically comprises Rye Grass, Goosegrass (*Galium aparine*), Meadowsweet (*Filipendula ulmaria*), Nettle (*Urtica dioica*), Thistles (*Cirsium* spp.), Bramble (*Rubus fruticosa*), Herb Robert (*Geranium robertianum*), meadow grasses (*Poa* spp.), Yorshire Fog (*Holcus lanatus*), Broad-leaved Dock (*Rumex obtusifolius*), Willowherb (*Epilobium* spp.) and invasive species such as Giant Hogweed (*Heracleum mantegazzianum*).

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
High ecological importance in a local context.	Semi-natural woodlands are a rarity in a landscape otherwise dominated by agricultural grassland, heath and conifer plantations. This habitat corresponds to the Annex I priority habitats 'alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) 91E0"	Small pocket in Cappavilla South Garraun



Image 4.28: Wet Pedunculate Oak-Ash Woodland in the townland of Cappavilla South

Riparian Woodland WN5

This woodland occurs in the low lying river margins of the River Blackwater, the River Shannon to the south east of the study area, and the Craumpaun River in Meelick. Riparian woodland WN5, is dominated by willow species (*Salix* spp.) with Alder (*Alnus glutinosa*) and Birch (*Betula pendula*) occurring infrequently. The ground flora varies depending on levels of water inundation. In very wet sites the ground flora reflects species found in Reed and Large Sedge Swamps FS1. More often the species composition is similar to Wet Grassland GS4 Habitat.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
Moderate to High ecological importance in a local context.	This habitat occurs in ribbon-like strips on the edges of lakes and river margins. These areas of woodland area limited to the riparian zone of the watercourses, restricted by agriculture and land reclamation. Semi-natural woodlands are a rarity in a landscape otherwise dominated by agricultural grassland. This habitat does not correspond to Annex I habitats, however the habitat is considered to be of moderate to high conservation value in a local context.	Mainly in middle section of the study area – along the River Blackwater from Parteen up to Ballyfinneen, Drummin and Blackwater. Also further north along the Trough River in Trough and Kilmoculla and in Doonass to the south east of the study area.



Image 4.29: Riparian Woodland showing willows with lichen-covered bark

Wet willow-alder-ash woodland WN6

This classification includes woodlands of permanently waterlogged sites that are dominated by willows (*Salix* spp.), Alder (*Alnus glutinosa*) or Ash (*Fraxinus excelsior*). The field layer generally comprises; Creeping Bent (*Agrostis stolonifera*), Meadowsweet (*Filipendula ulmaria* and Purple-loosestrife (*Lythrum salicaria*) and Skullcap (*Scutellaria galericulata*). A woodland that can be classified as Alder Carr can be found in the flooded lake margins of Lough Gorteen in Cratloe Woods. The ground flora reflects the species found in the Rich Fen and Flush PF1 habitat.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
High ecological importance in a local context.	This habitat does not correspond to Annex I habitats, however the habitat is limited within the study area, in particular Alder Carr and is therefore considered to be of high conservation value in a local context.	Ballycannan, Trough, Reaskamoge, Corlea, Cloonalira, Cloonoughter.



Image 4.30: Wet willow-alder-ash woodland in Ballycannan

Bog Woodland WN7

This woodland was only found at two locations within the study area, on the edges of the cut over raised bog in Derryfadda and Aharinaghmore. Bog woodland typically occurs on peat bogs of significant depth, where the upper layers are well drained as is the situation in Derryfadda. The dominant tree species is Downy Birch (*Betula pubescens*), with occasional Silver Birch (*Betula pubescens*), Scots Pine (*Pinus sylvestris*) and willow (*Salix spp.*). Royal Fern (Osmunda regalis), Ivy (*Hedra helix*), Ling Heather (*Calluna vulgaris*), Bilberry (*Vaccinium myrtillus*), Bog Myrtle (*Myrica gale*), cross-leaved heath (*Erica tetralix*) and bog rosemary (*Andromeda polyfolia*) occur in the understory. Sedges, rushes and bracken also occur.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
High ecological importance in a local context.	This habitat corresponds to the Annex I habitat 'Bog Woodland (91DO)', this classification refers to woodland of intact raised bog. The woodland occurs on the fringes of cutover raised bog and is considered to be of moderate to high conservation value in a local context.	Rossamadda East, Ballybrack



Image 4.31: Bog woodland in Rossamadda East

(Mixed) Broadleaved Woodland WD1

This woodland type occurs throughout the study area. This classification is the most common broadleaved woodland found within the study area. The largest example of this habitat occurs on the lands owned by Ardnacrusha. Smaller compartments are evident in the lands surrounding Parteen and Cloonlara, representing remnants of the large estates that once existed here. The woodlands range in species diversity including Oak (*Quercus* spp), Beech (*Fagus sylvatica*), Sycamore (*Acer pseudoplatanus*) Ash (*Fraxinus excelsior*), Horsechestnut (*Aesculus hippocastanum*), Sitka Spruce (*Picea sitchensis*), and various Pine species (*Pinus* spp). The scrub layer and ground flora varies dramatically between the sites, depending on species mix of trees, drainage and management practices.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
Moderate ecological importance in a local context.	This habitat does not correspond to Annex I habitats and is quite common throughout the study area. However, compartments of deciduous woodland can be valuable to wildlife, providing refuge and foraging for a variety of animals. It is therefore considered to be of moderate conservation value in a local context.	Throughout Study Area



Image 4.32: Mixed broadleaved woodland

Mixed Broadleaved/Conifer Woodland WD2

This habitat comprises mixed stands of broadleaved trees (25-75%) and conifers (25%-75%), whilst it is scattered throughout the study area, it is generally confined to Plantation Forestry WD4 in Cratloe and Woodcock Hill.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
Low to moderate ecological importance in a local context.	This habitat does not correspond to Annex I habitats, but does however offer some refuge to wildlife.	Throughout study area, but large areas in the western section of the study area around Cratloe, Ballyvoughallan, Cratloekeel, Woodcock Hill, Cappanalaght, Coolycasey and Castlecrine. Other large sections in Derryfadda and Rosamadda East in the south east of the study area.



Image 4.33: Immature Mixed Broadleaved Conifer Woodland on Woodcock Hill

Conifer Plantation WD4

Commercial plantation forestry swathes much of uplands to the north east of the study area, from Cratloe to Sixmilebridge. The plantations are harvested for commercial forestry. The closed canopies of these woodlands deprive the ground layers of light and are therefore a diverse woodland flora is absent. Deciduous trees are often planted on the edge of conifer plantations to increase species diversity.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
Low to moderate ecological importance in a local context.	This habitat does not correspond to Annex I habitats.	Large areas in western section of study area around Cratloe, Woodcock Hill, Derrynaveagh, Cappateemore West. Also in Cloghera to the north.



Image 4.34: Immature Conifer plantation

Scattered Trees and Parkland WD5

Areas of scattered trees and parklands occur in the old estates of Doonass Demesne and Kincora around Parteen and Cloonlara. Large mature native and non-native trees are a prominent feature in the landscape. Horse chestnut, Beech and Oak are a regular feature. They occur in improved agricultural grasslands and semi improved pastures.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
Low to moderate ecological importance in a local context.	This habitat does not correspond to Annex I habitats, does some exquisite examples of mature trees have persisted in these landholdings.	Ardnacrusha, Garraun



Image 4.35: Scattered trees and parkland

Scrub WS1

Areas of scrub occur throughout the study area. They often occur on thin soils where agricultural has been abandoned and scrub has encroached. The species composition of this habitat varies between sites. To be considered scrub, the habitat must comprise 50% of shrubs, low trees and /or brambles with a canopy height of less than 5m. Species such as Gorse (*Ulex europea*) are a common component, with Bramble (*Rubus fruticosus* agg.), Hawthorn (*Crataegus monogyna*), Blackthorn (*Prunus spinosa*) and Guelder Rose (*Viburnum opulus*).

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
Low to moderate ecological importance in a local context.	This habitat does not correspond to Annex I habitats, however it can be important for wildlife, particularly insects and birds.	Throughout study area – large areas in western section around Castlequarter, Ballintlea South, Cratloe, Burton Hill and Boolanacausk and in Ballycar North in the middle section.



Image 4.36: Area of Scrub adjacent to Ardnacursha Headrace Canal

Immature Woodland WS2

Plots of immature woodland occur scattered throughout the study area. Ash is the main species planted in these broadleaved plantation woodlands. The plantations are principally on marginal agricultural land such as Wet grassland GS4 and Cutover Bog PB4, and the ground flora reflects these habitats.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
Low to moderate ecological importance in a local context.	This habitat does not correspond to Annex I habitats, however it can be important for wildlife, particularly insects and birds.	Derryvinnaan, Meanagh, Corlea, Reaskcamoge



Image 4.37: Immature woodland

Recently-Felled Woodland WS5

Timber harvesting is an ongoing activity, particularly in the extensive Coillte Forestry lands in the uplands of Cratloe. Post harvesting, unless the areas are replanted, tend to colonise with pioneering species such as willowherb, grasses and scrub species predominate.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
Low ecological importance in a local context.	This habitat does not correspond to Annex I habitats.	Gallowshill, Knockroe



Image 4.38: Recently-felled woodland

Hedgerows WL1

Hedgerows occur throughout the study area. They are often found in association with stonewalls and earth banks. These linear features are prominent in the landscape particularly to the south and east of the area. Good examples of well-managed and diverse examples were recorded, with the greatest species diversity occurring in the hedgerows bordering roads. These species included native and ornamental/non-native species; native species included Honeysuckle (*Lonicera periclymenum*), Hawthorn (*Crataegus monogyna*), Blackthorn (*Prunus spinosa*), Gorse (*Ulex europaeus*), Holly (*Ilex aquifolium*), Elder (*Sambucus nigra*) and Willow (*Salix* spp).

Taller mature trees were also recorded with the hedgerows, but to be considered hedgerows these must not dominate the feature. Non-native species recorded include Fushia and Snowberry, both of which can be very invasive species. The ground flora of hedgerows within the study area was equally diverse supporting a variety of species corresponding to Dry Meadows and Grassy Verges Habitat GS2.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
Moderate ecological importance in a local context.	This habitat does not correspond to Annex I habitats.	Throughout study area



Image 4.39: Hedgerows criss-crossing landscape throughout study area

Tree-lines WL2

Exceptional examples of mature tree-lines can be found enclosing farmlands, particularly in the south eastern section of the study area and also in the foothills of Woodcock Hill in Cratloe and Meelick. Mature Oak (*Quercus* spp) is a prominent feature with Scots Pine (*Pinus sylvestris*), Ash (*Fraxinus excelsior*), Beech (*Fagus sylvatica*) and Sycamore (*Acer pseudoplatanus*), Horsechestnut (*Aesculus hippocastanum*) and Poplars (*Populus Spp.*) occur occasionally. Hedgerows dominated by Lalandii Cyprus (*Cupressocyparis leylandii*) and Laurel (*Prunus laurocerasus*), were also recorded, usually bordering houses. A good diversity of herbaceous species was found in the understorey, including Herb Robert (*Geranium robertianum*), Creeping Buttercup (*Ranunculus repens*), Bramble (*Rubus fruticosa*), Couch Grass (*Elytrigia repens*), Ivy (*Hedera helix*), Willowherb (*Epilobium* spp.), Broad-leaved Dock (*Rumex obtusifolius*) and Cleavers (*Galium aparine*). The ground beneath the herbaceous layer has a dense covering of moss. The treelines provide suitable nesting habitat for many species of bird and can also be valuable as wildlife corridors providing linkages between habitats.

Invasive exotic species were also recorded such as Japanese Knotweed (*Fallopia japonica*) Japanese knotweed is one of the most invasive species in the world. Japanese knotweed threatens our native plant communities and habitats, easily displacing our native flora. It reproduces quickly, spreads rapidly and is extremely difficult and expensive to control.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area	
Moderate to High ecological	This habitat does not	Throughout study area	
importance in a local context.	correspond to Annex I habitats.		



Image 4.40: Tree-lined hedgerow in Cloonlara

Exposed Siliceous Rock ER1

Outcrops of siliceous rock comprising a mix of greywacke, siltstone and mudstone, shale and chert, occur to the north of the study area. These outcrops are often vegetated with heath and deciduous scrub species. Habitats correspond to Dry siliceous heath HH1 and Scrub WS1 vegetation.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
Moderate ecological importance in a local context.	This habitat corresponds to the annexed habitat, 'siliceous rocky slopes with chasmophytic vegetation (8220)'.	Throughout study area



Image 4.41: Exposed Sandstone in Ballybrack in area of Dry Humid Acid Grassland GS3

Exposed Calcareous Rock ER2

Limestone outcrops occasionally feature to the southwest of the study area. These outcrops are vegetated deciduous Scrub WS2 and woodland habitats such as Oak Ash Hazel Woodland WN2. This habitat corresponds to two annexed habitats, 'calcareous rocky slopes with chasmophytic vegetation (8210)' and '*limestone pavements (8240)' which is also a priority habitat. These habitats do not occur within the study area.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
Moderate ecological importance in a local context.	Exposed calcareous rock corresponds to two annexed habitats, 'calcareous rocky slopes with chasmophytic vegetation (8210)' and '*limestone pavements (8240)'. The latter is a priority habitat and does not occur within the study area.	Southwest of Study area Doonass



Image 4.42: Exposed Limestone in the townland of Coollisteige, surrounded by Scrub WS1

ED1 Exposed Sand, Gravel or Till

There area areas of exposed sand, gravel and till, in the vicinity of the active quarry in Ballycar South, north east of Ardnacrusha. This habitat is also found at a disused quarry at Cratloemoyle. This habitat is often colonised by a diversity of herbs, however vegetation cover must be less than 50% to be considered in this category.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
Low ecological importance in a local context.	This habitat does not correspond to Annex I habitats.	Ballycar South Cratloemoyle

ED2 Spoil and Bare Ground

Small areas of spoil and bare ground occur throughout the study area and are often associated with excavations for the construction of buildings and dredging of drains, and watercourses. Spoil heaps are often transient in nature but will colonise with pioneer plant and ruderal species if left for length of time.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
Low ecological importance in a local context.	This habitat does not correspond to Annex I habitats.	Derrynaveagh, Cottage, Parkroe, Shruhaunabankee

ED3 Recolonising Bare Ground

This habitat classification is used to describe areas of bare ground or derelict sites that have been colonised by herbaceous plants. The vegetation cover must exceed 50% to be considered under this classification. This habitat can support a diversity of early pioneer plants and ruderal species including Nettle (*Urtica dioica*), Dandelion (*Taraxacum* spp.), Colts Foot (*Tussilago farfara*), Teasel (*Dipsacus fullonum*), Willowherbs (*Epilobium* spp.) and grasses favoring disturbed ground such Annual Meadow Grass (*Poa annua*) may also occur.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
Low ecological importance in a local context.	This habitat does not correspond to Annex I habitats.	Scattered throughout northern section. Large section in the townland of Shannakyle in the south.



Image 4.43: Teasel (*Dipsacus fullonum*) growing in area of disturbed ground in Shannakyle

ED4 Active quarries and mines

A large active quarry is operating in the townland of Ballycar South and provides stone for road building and general construction material. The stone quarried from this facility is Greywacke, which is a dark-coloured, poorly graded, argillaceous sandstone. Abandoned quarry faces can provide suitable nesting opportunities for birds such as Peregrine Falcon.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
Low ecological importance in a local context.	This habitat does not correspond to Annex I habitats.	Ballycar South

BC1 Arable crops

Arable crops include cereals, root, leaf and energy or fibre crops such as sugar beet, turnips, rape and flax. Areas of agricultural land cultivated and managed for Arable Crops BC1 are few throughout the study area. Where they occur, cereals such as maize were grown. Ploughed arable fields, stubble and tillage fields can be important for birds such as Yellow Hammers and Lapwing.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
Low-Moderate ecological importance in a local context.	This habitat does not correspond to Annex I habitats.	Cappavilla South and Wooden Bridge in the south eastern section of the study area, and Knockbrack Upper and Cloghera in the north.

BC2 Horticultural land

This type of agriculture is limited within the study area. A small area exists in the tonwland of Cappavilla South. Horticultural land is used for growing fruit, vegetables ornamental flowers and plants.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
Low-Moderate ecological importance in a local context	This habitat does not correspond to Annex I habitats.	Cappavilla South

BL3 Buildings & Artificial Surfaces

This classification includes all buildings including, domestic, agricultural, industrial and artificial surfaces including car parks, pavements, roads, tracks etc. Older structures can be important for wildlife including, birds and bat species.

Ecological Interest	Links to Annex I Habitats	Locations within Study Area
Low ecological importance in a local context	This habitat does not correspond to Annex I habitats.	Throughout study area

4.3 SIGNIFICANCE OF HABITATS

Over the centuries this landscape within the study area has been heavily influenced by anthropogenic activities such as reclamation of wetlands for agriculture, peat harvesting, plantation forestry, quarrying of sands and gravels, and residential and industrial development. As a result, Improved Agricultural Grassland GA1 now provides the overall character of the surrounding landscape; comprising 55% of the total area surveyed, with some semi-natural habitats persisting in the less intensively managed areas. The uplands of the northern and western section provide the greatest diversity of upland peatland habitats; however Conifer Plantation WD4 is also extensive in this area. The eastern section also has an array of semi-natural habitats, including Oak Ash Hazel Woodland WN2, Cutover Bog PB4, Wet Heath HH3 and semi-natural grasslands.

Freshwater resources, including rivers, lakes and associated wetland habitats are under increasing pressure from pollution and reclamation. Reed and Large Sedge Swamps FS1 can be found in drains and the margins of Depositing/Lowland Rivers FW2 throughout the study area, particularly in the lowlands of Meelick and Bunratty. Tall Herb Swamps FS2 has a limited distribution, however a good example of the habitat occurs in the margins of Meelick Creek. This habitat forms an intimate mosaic with a number of habitats in this area including Wet Grassland GS4, Marsh GM1, Reed and Large Sedge Swamps FS1 and Riparian Woodland WN5. Fen habitats are limited within the study area. Rich Fen and Flush PF1 habitat occurs on the shores of Lough Gorteen, which is located within Coillte Forest Park, which is a local amenity area which offers some protection of the habitat. Other lakes and ponds within the study area are under threat from pollution, eutrophication and water abstraction.

Peatlands that are still capable of peat formation are listed as a priority habitat in Annex I of the EU Habitats Directive and therefore extremely valuable for nature conservation. The Raised Bog PB1 formations add to the biodiversity of the study area as a whole. These areas have been extensively cut over the last centuries, however peat harvesting has largely ceased at these sites. The Raised Bog PB1 in Derryfadda was extensively cut until 1960's with few banks being cut until 1980's. In the depressions of the cutover bog, the annexed habitat, 'depressions on peat substrates of the Rhynchosporion (7150)' has occurred as a sub-habitat of Raised Bog PB1. This area is extensive and worthy of protection either nationally or locally.

Upland Blanket Bogs PB2, due to their exposure to severe climatic conditions at high elevations, are particularly vulnerable to erosion by human activities and extensive areas are currently undergoing active erosion due mainly to overgrazing and afforestation. Intact areas of this habitat type are protected in designated sites within the study area namely Woodcock Hill NHA, however small areas of intact bog are rare in the wider landscape are under threat from peat extraction, reclamation and afforestation. Their long-term survival requires sensitive management.

Semi-natural woods have originated mainly through natural regeneration. These may be broadleaved, or mixed in composition, and are composed predominantly of native species. They tend to have a more 'natural' appearance than plantations, with greater variation in tree age and greater structural diversity. The ecological value of semi-natural woodland, in terms of the diversity of plant communities and species present, is often closely related to woodland age and origin.

The character and ecology of rural and urban landscapes, and opportunities for recreation, are greatly influenced by woodland. Semi-natural woodland is an especially important habitat for native plants and animals. It enhances the biodiversity of farmland, and creates an attractive image for tourism. Good plantation design is vital to watercourse management; to protect against heavy run-off, acidification and erosion, and to maintain the quality of the habitat for fish and other freshwater life.

4.4 SITES OF LOCAL BIODIVERSITY VALUE, ECOLOGICAL CORRIDORS AND BUFFER ZONES

The survey identified areas of biodiversity importance on a local and national level. Some examples of priority habitat protected under the EU Habitats Directive were also identified. Stakeholders including the NPWS and County Council have an obligation under the Habitats Directive to protect, maintain or restore natural habitats, which are of conservation importance as defined in the Directive, at a favourable conservation status.

Many habitats of conservation concern particularly designated sites are linked to the surrounding landscape by natural and manmade features, such as water courses (rivers, streams, canals and drainage ditches), hedgerows, treelines, roads and railways. Therefore, areas of conservation concern must not be considered in isolation, their linkages and buffer zones must also be protected to ensure the continued migration of species and genetic diversity throughout the study area.

Prescribing buffer zone widths to designated sites, areas of conservation concern or ecological corridors is dependant on a number of variables and often a 'one size fits all' approach is not always applicable. The need for maintaining a buffer zone adjacent to conservation sites is well documented; the width, however, is contested.

When prescribing buffer zones the following should be considered;

- Conservation value of feature to be protected;
- Intensity of adjacent land use;
- Tolerance of species and habitat to disturbance,
- Buffer characteristics (e.g. slope, soil type);
- Specific buffer functions,
- Proximity to existing development and lands zoned for development, and
- Area that could be practicable and appropriate from the point of management of the buffer zone.

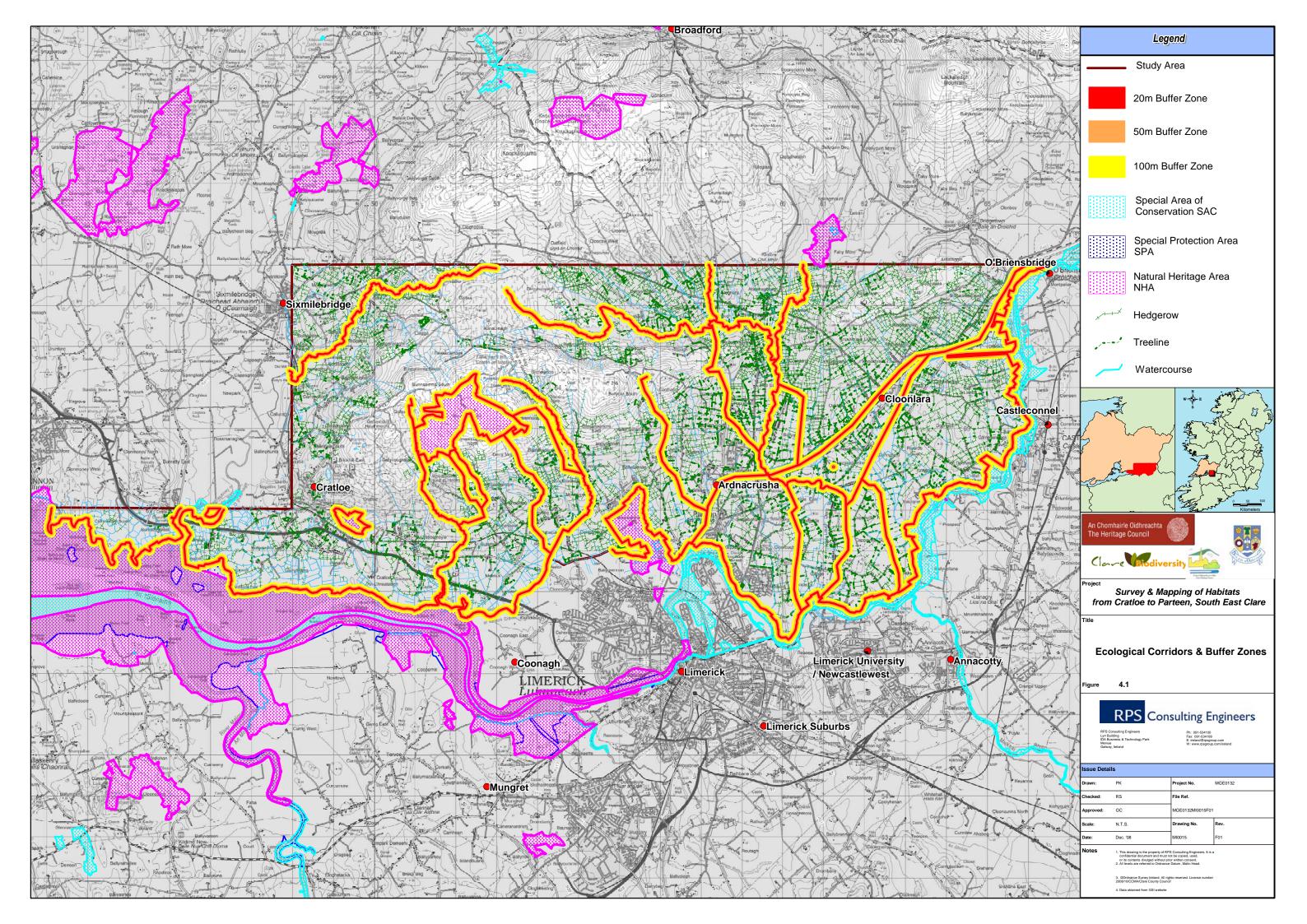
For example, buffer zones have been recommended for Riparian Zone Management in Forestry and are detailed in guidance from the Department of Agriculture Food and the Forest Service. The purpose of these buffer zones is to protect watercourses from forestry activities. Details of recommended buffer zones are provided in Table 4.1 below.

Table 4.1: Buffer Zone widths for Riparian Zone Management in Forestry

Geology –soils – terra	Zone width on	Zone width on each
Average slope leading to aquatic zone	each side of the aquatic zone	side of highly erodable soils
Moderate slope 0- 1in7	10m	15m
Steep 1in7 –1in3	15m	20m
Very steep 1in3 or>	20m	25m

(Source:http://www.westernrbd.ie/PDF/Riparian/RiparianZone_Workshop_Pat_OCallaghan.pdf)

There are no prescribed buffer zones for ecological corridors and designated sites, therefore for illustrative purposes buffer zones of 20m, 50m and 100m have been place around key ecological corridors and designated sites. Drains and hedgerows also provide valuable corridors; these features are illustrated but are not buffered. The buffer zones are illustrated in **Figure 4.1**.



4.4.1 SITES OF LOCAL BIODIVERSITY INTEREST

4.4.1.1 Internationally/Nationally Important Ecological Sites – Highly Sensitive Habitats

These habitats have been chosen due to their links to Annex I habitats as listed in the Habitats Directive. These habitats are considered highly sensitive.

Pentland Habitats

- Raised Bog PB1 also priority habitat under Habitats Directive listed as 'Active Raised Bogs (Code 7110)', and
- Blanket Bog PB2 also priority habitat under Habitats Directive listed as Blanket Bog (Active) (Code 7130).

Woodland Habitats

 Bog Woodland WN7 also priority habitat under Habitats Directive listed as Bog Woodland (Code 91d0).

The area of particular interest on an International and National level is the Raised Bog PB1 in Derryfadda. (See Target note 4623C_TN2). This site supports a number of Annex I and priority habitats. The site also provides refuge and habitat for numerous animal and invertebrate species, including, Badger, Fox, Pine Martin, Smooth Newt, Common Frog, various species of bird including Barn Owl, Sparrow Hawk, Kestrel, Meadow Pipit, Sky Lark, and a variety of beetle, dragon fly and damselfly. This site is worthy of further study and protection. This site is currently under threat from proposed road schemes and the potential development associated with these schemes.

4.4.1.2 Habitats of High Ecological Value in a Local Context – Very Sensitive Habitats

These habitats are considered to be of High Ecological Importance in a Local Level as they contain semi-natural habitat types with high biodiversity in a local context. They also form valuable linkages and function as part of the designated sites, which are found within and border the study area.

Freshwater Habitats

- Acid Oligotrophic Lakes FL2,
- Mesotrophic Lakes FL4,

- Eutrophic Lakes FL5,
- Eroding Upland Rivers FW1,
- Depositing/Lowland Rivers FW2,
- · Reed and Tall Sedge Swamps FS1, and
- Tall Herb Swamps FS2.

Grassland & Marsh Habitats

- Wet Grassland GS4, and
- Marsh GM1.

Heath and Dense Bracken Habitats

- Dry Siliceous Heath HH1, and
- Wet Heath HH3.

Pentland Habitats

- Cutover Bog PB4 linked to the annexed habitat, 'depressions on peat substrates of the Rhynchosporion (7150)',
- Rich Fen and Flush PF1, and
- Poor Fen and Flush PF2.

Woodlands

- Oak-Birch-Holly woodland WN1,
- Oak-Ash-Hazel woodland WN2,
- Wet Pedunculate Oak-Ash Woodland WN4,
- Riparian Woodland WN5, and
- Wet Willow-Alder-Ash Woodland WN6.

4.4.1.3 Habitats of Moderate Ecological Value in a Local Context – Moderately Sensitive Habitats

Sites containing some semi-natural habitat or locally important for wildlife;

Freshwater Habitats

- Eutrophic Lakes FL5,
- · Canals FW3, and

Drainage Ditches FW4.

Grassland & Marsh Habitats

- Dry Calcareous and Neutral Grassland GS1,
- Dry Meadows and Grassy Verges GS2, and
- Dry-humid Acid Grassland GS3.

Woodlands and Scrub

- (Mixed) Broadleaved Woodland WD1,
- Mixed Broadleaved/Conifer Woodland WD2,
- Scrub WS1,
- Immature Woodland WS2,
- · Hedgerows WL1, and
- Treelines WL2.

Exposed Rock and Disturbed Ground

- ER1 Exposed Siliceous Rock
- ER2 Exposed Calcareous Rock

4.4.1.4 Habitats of Low Ecological value in a Local Context – Robust Habitats

Freshwater Habitats

Other Artificial Lakes and Ponds FL8

Grassland & Marsh Habitats

- Improved Agricultural Grassland GA1, and
- Amenity Grassland GA2.

Heath and Dense Bracken Habitats

Dense Bracken HD1

Woodlands

- Conifer Plantation WD4,
- Scattered Trees and Parkland WD5, and
- Recently-Felled Woodland WS5.

Exposed rock and disturbed ground

- Exposed Sand, Gravel or Till ED1
- Spoil and Bare Ground ED2
- Recolonising Bare Ground ED3
- Active Quarries and Mines ED4

Cultivated and built land

- Arable Crops BC1
- Horticultural Land BC2
- Buildings & Artificial Surfaces BL3

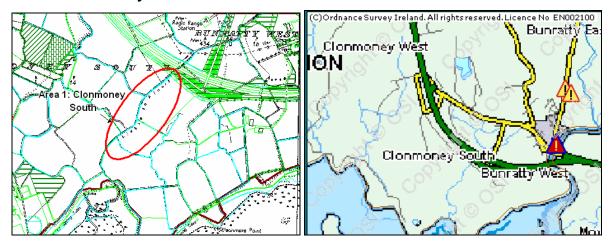
The locations of all of the habitats can be found in **Table 4.2** and in the supporting Habitat Map. Examples of these habitats are provided in the Target Notes in **Appendix A**.

4.5 AREAS LIABLE TO FLOOD

As part of the project brief, there is a requirement to outline and compare existing habitats with areas marked as "areas liable to flood" in the 6 inch Ordnance Survey maps.

A total of six areas were identified, which are scattered throughout the southern region of the study area. These areas were assessed for current habitat types and association with the current OPW flood maps for the area (www.floodmaps.ie). The locations of all of the areas identified as "areas liable to flood" in the 6 inch Ordnance Survey maps are illustrated in **Figure 4.2**.

Area 1: Clonmoney South



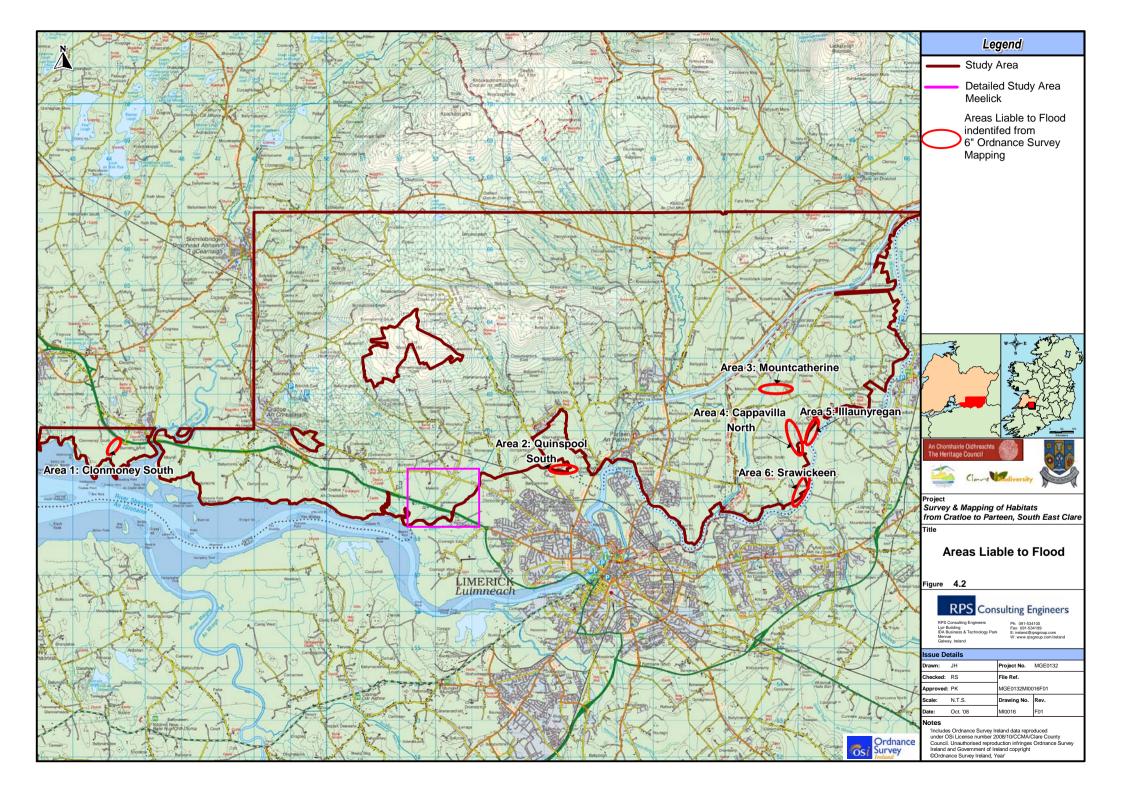
Habitat Map

Extent of Flooding (OPW Flood Map)

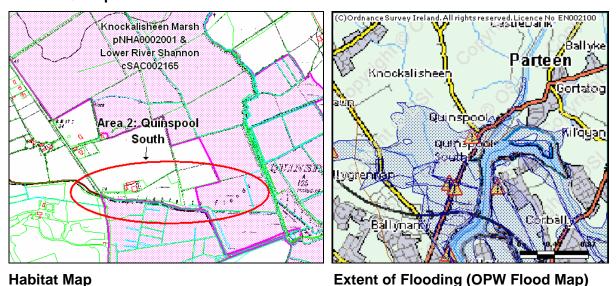
Habitats: The habitats in Clonmoney South comprise Improved Agricultural Grassland GA1 and Drainage Ditches FW4 that in this region of the study area support Reed and Large Sedge Swamp FS1 vegetation. Mixed Broadleaved Woodland WD1 has been planted to screen the Bunratty overbridge of the N18 national primary route.

Watercourses nearby: The watercourse is a minor tributary of the River Shannon, which flows to the south of this area.

OPW Flood maps website: There are no OPW records for recent flooding events at this location. The most recent flood event in the area was recorded in 1995, just north of Bunratty Castle, where the Owenagarney River or Ratty River converges with the River Shannon. Tidal waters overtopped the embankments at this location. Habitats at this location were not recorded as it is outside the study area.



Area 2: Quinspool South

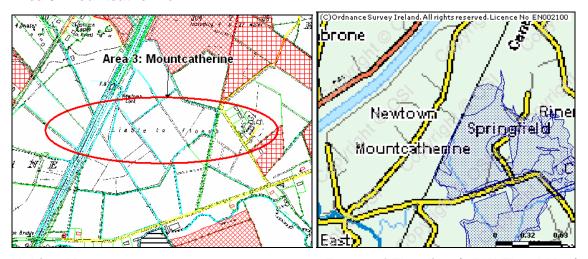


Habitats: The habitats in Quinspool South comprise Improved Agricultural Grassland GA1. This area grades into Knockalisheen Marsh pNHA which is a site is of high ecological value in that it is a good example of unimproved pasture and wetland with good botanical diversity.

Watercourses nearby: This area is located along a tributary of the River Shannon, which 900m east.

OPW Flood maps website: This area has been subject to a number of severe flooding events in 1954, 1994/95 and 1999/2000 as detailed in the OPW flood maps website. The source of the flooding this area was attributed to tidal inundation. This area is no longer prone to flooding as the issue has since been resolved.

Area 3: Mountcatherine



Habitat Map

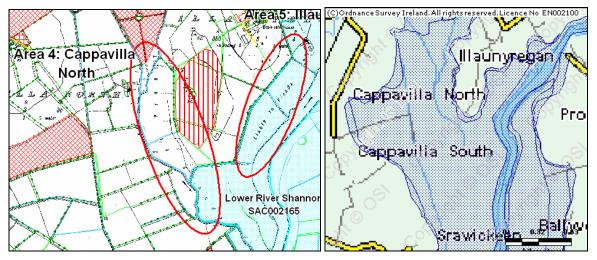
Extent of Flooding (OPW Flood Map)

Habitats: The habitats in Mountcatherine comprise Improved Agricultural Grassland GA1, Drainage Ditches FW4, Hedgerows WL1 and Treelines WL2.

Watercourses nearby: This area is located to the east of the Errina Canal.

OPW Flood maps website: The lands to the east of the disused Errina Canal has been subject to a number of severe flooding events in 1990 and 2006 as detailed in the OPW flood maps website and maybe subject to future flooding events.

Area 4: Cappavilla North



Habitat Map

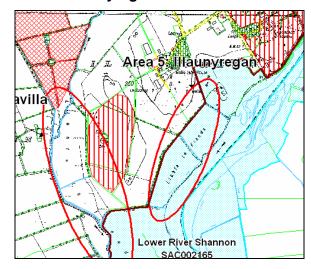
Extent of Flooding (OPW Flood Map)

Habitats: The habitats in Cappavilla North comprise Improved Agricultural Grassland GA1 (a horse-racing track), Amenity Grassland GA2, Wet Grassland GS4, Drainage Ditches FW4, Hedgerows WL1 and Treelines WL2. This area grades into the wetlands that are designated under the Lower River Shannon SAC.

Watercourses nearby: A tributary of the River Shannon flows through this area.

OPW Flood maps website: This area has been subject to a number of severe flooding events in 1990 and 2006 as detailed in the OPW flood maps website and maybe subject to future flooding events.

Area 5: Illaunyregan





Habitat Map

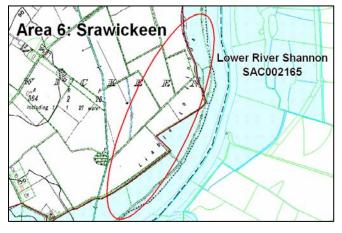
Extent of Flooding (OPW Flood Map)

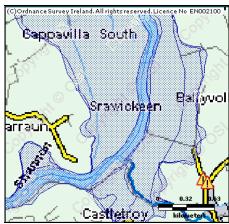
Habitats: This area is located adjacent to the study boundary. The lands with the study boundary comprise Improved Agricultural Grassland GA1, Drainage Ditches FW4, Hedgerows WL1 and Treelines WL2. This area grades into the wetlands that are designated under the Lower River Shannon SAC.

Watercourses nearby: River Shannon flows to the east of this area.

OPW Flood maps website: This area has been subject to a number of severe flooding events in 1990 and 2006 as detailed in the OPW flood maps website and maybe subject to future flooding events.

Area 6: Srawickeen





Habitat Map

Extent of Flooding (OPW Flood Map)

RPS

Habitats: This area is located adjacent to the study boundary. The lands with the study boundary comprise Improved Agricultural Grassland GA1, Drainage Ditches FW4, Hedgerows WL1 and Treelines WL2. This area grades into the wetlands that are designated under the Lower River Shannon SAC.

Watercourses nearby: River Shannon just to the east.

OPW Flood maps website: This area has been subject to a number of severe flooding events in 1990 and 2006 as detailed in the OPW flood maps website and maybe subject to future flooding events.

5 DETAILED STUDY AREA – MEELICK

5.1 INTRODUCTION

A Vulnerable Landscape Survey for the Meelick area was conducted. This study investigated all aspects of the landscape around Meelick within a specified 2km², including archaeology, architecture, cultural heritage and geology. This area was assessed for future land use and development potential, vulnerable issues identified and specific areas identified for possible integrated development.

The following sections are divided up into three; with an introduction to the geology and landform of the detailed study site, followed by a look into the Meelick's past through a review of the archaeology, architecture and cultural heritage, and finally the current landscape setting of Meelick.

5.2 ARCHAEOLOGY, ARCHITECTURAL AND CULTURAL HERITAGE

5.2.1 INTRODUCTION

This section presents the desktop review of the archaeological, architectural and cultural heritage potential of the Meelick area. It addresses the legislative context of archaeology and cultural heritage at a national level and aims to identify the importance and sensitivity of the known, and the potential historical environment of the study area. This was completed through investigation of a number of sources as referenced in the following sections.

5.2.2 LEGISLATIVE CONTEXT

This review takes account of the following legislative procedures;

- National Monuments Acts (1930-2004),
- Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 1999, and
- Local Government (Planning and Development) Acts (2000-2001).

5.2.2.1 National Monuments Acts (1930-2004)

Archaeological heritage is protected primarily under the National Monuments Acts (1930-2004). Under the 1994 Act, provision was made for a Record of Monuments & Places (RMP). The RMP is a revised set of SMR (Sites and Monuments Record) maps, on which newly-discovered sites have been added and locations which proved not to be of antiquity have been de-listed by the National Monuments Service. In effect, the National Monuments Acts 1930-2004 provide a statutory basis for:

- Protection of sites and monuments (RMPs),
- Sites with Preservation Orders,
- Ownership and Guardianship of National Monuments,
- Register of Historic Monuments (pre-dating 1700AD),
- · Licensing of archaeological excavations,
- Licensing of Detection Devices,
- Protection of archaeological objects, and
- Protection of wrecks and underwater heritage (more than 100 years old)

5.2.2.2 Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 1999

Architectural heritage is provided for under the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 1999 and the Planning and Development Acts (2000-2001). Ireland's obligations under Article 2 of the Granada Convention were transposed into Irish law under the former Act. Although the 1999 Act does not automatically grant statutory protection to architectural heritage, it has helped to create a forum for the strengthening of architectural heritage protection as the Act called for the creation of a National Inventory of Architectural Heritage which is used by local authorities for compiling the Record of Protected Structures (RPS), thus providing protection for suitable structures. The provisions in the Act are in addition to, and not a substitution for, provisions of the National Monuments Act (1930-2004). The protection of monuments in the National Monuments Act is extended to the monuments covered by the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999.

5.2.2.3 Local Government (Planning and Development) Acts (2000-2001)

With regard to protection of architectural heritage, the Planning and Development Acts (2000-2001), Part IV, Section 51 (1) states:

"For the purpose of protecting structures, or parts of structures, which form part of the architectural heritage and which are of special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest, every development plan shall include a record of protected structures, and shall include in that record every structure which is, in the opinion of the planning authority, of such interest within its functional area".

5.2.2.4 Industrial Heritage Sites

Industrial archaeology concerns itself with the development of the landscape since the Industrial Revolution (*c.* 1700 AD). There are four main areas of study within industrial archaeology: primary or extractive industries, secondary or manufacturing industries, transports and communications and public utilities. In the 1987 Amendments to the National Monuments Acts the OPW was empowered to use its discretion where post-1700 sites of national importance were involved. In 1994 a further amendment to the National Monuments Acts enabled industrial archaeological sites to be added to the national record of monuments, and thus be afforded a measure of statutory protection. No sites of industrial merit were identified in the study area.

5.2.3 ARCHAEOLOGICAL, ARCHITECTURAL AND CULTURAL HERITAGE RESOURCES

The review was based on a desktop study of a number of documentary and cartographic sources as follows:

- Sites and Monuments Record (SMR) and Record of Monuments and Places (RMP),
- National Inventory of Architectural Heritage,
- Archaeological Inventory of County Clare,
- Clare County Development Plan 2005-2011
- Excavations Bulletin, and
- Cartographic Sources and Letters.

Details of these sources obtained are shown below.

5.2.3.1 Sites and Monuments Record (SMR) and Record of Monuments and Places (RMP)

The Sites & Monuments Record (SMR) consists of Ordnance Survey 6-inch maps with annotated known and suspected archaeological sites that generally pre-date AD 1700. The SMR was collated from documentary sources; various editions of Ordnance Survey maps, aerial photography, historical and archaeological literature, seventeenth century Down Survey and Civil Survey maps, eighteenth century estate maps and folklore/oral traditions. The National Monuments Act (1994) made provision for a Record of Monuments & Places (RMP); all of which are protected under this Act.

There are six recorded monuments within the study area, two were found in County Clare and four in County Limerick. These are shown in **Table 5.1** and illustrated in **Figure 5.1**.

Table 5.1: Site and Monuments Records Results for the Meelick Area

Monument no.	Grid ref	Townland	Description (full description outlined below)
CL062-023	153029/159956	Meelick (Bunratty Lower by)	Enclosure
CL062-037	152895/159945	Bullsfarm	Possible Standing Stone
LI0005-045001	153500/158450	Clondrinagh	Unclassified Castle
LI0005-045002	153490/158440	Clondrinagh	Medieval Settlement Deserted
LI0005-003	153561/158777	Clondrinagh	Redundant Record
LI005-038	154186/159461	Clonconane	Bridge

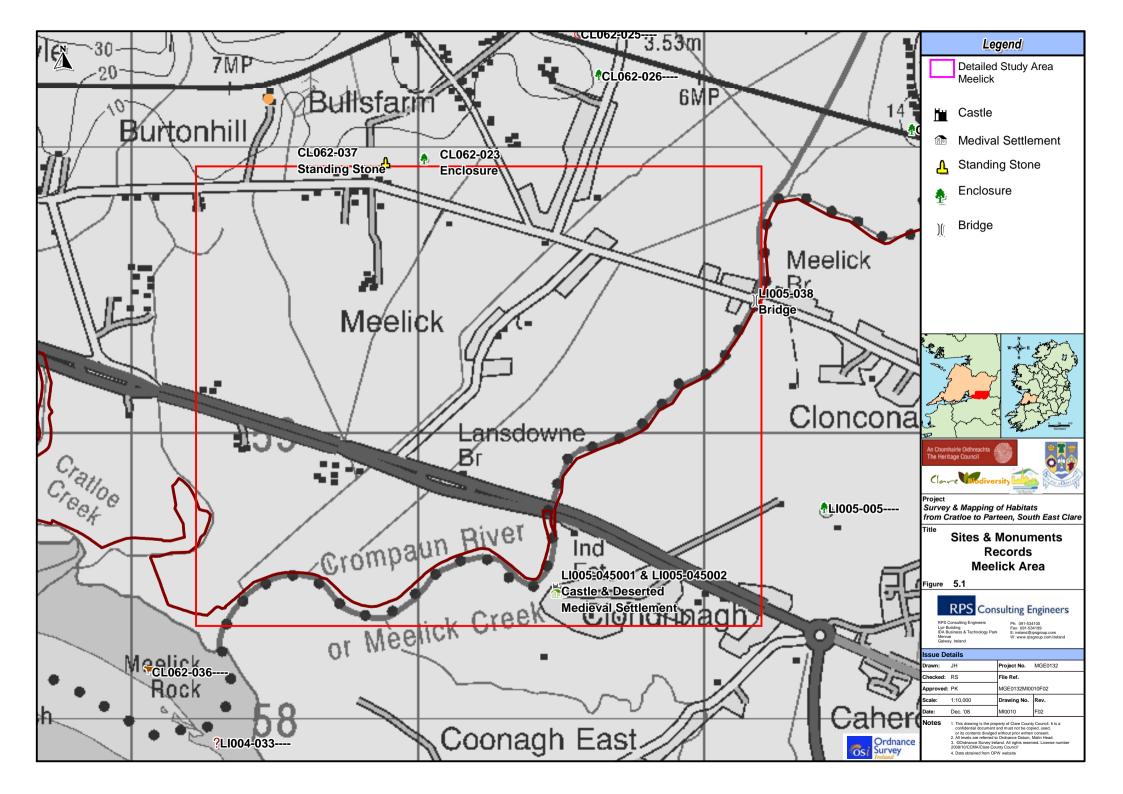
These monuments have been described by the National Monuments Services as follows:

Enclosure

An area defined by an enclosing element and occurring in a variety of shapes and sizes, possessing no diagnostic features which would allow classification within another monument category. These may date to any period from prehistory onwards.

Standing Stone

A stone which has been deliberately set upright in the ground, usually orientated on a north-east-south-west axis, although other orientations do occur, and varying in height from 0.5m up to 6m. They functioned as prehistoric burial markers, commemorative monuments, indicators of routeways or boundaries and date from the Bronze and Iron Ages (c. 2400 BC - AD 500), with some associated with early medieval ecclesiastical and burial contexts (c. 5th-12th centuries).



Castle - Unclassified

A castle that cannot be more precisely classified. They can date from the late 12th to the 16th century AD.

Settlement Deserted – Medieval

An abandoned medieval settlement dating from the 13th century to 1550 AD consisting of a group of houses in close proximity with associated land plots, associated with a parish church and/or castle or tower house, often evident as earthworks.

Redundant Record

Records classed as redundant record are those that fulfil one or more of the following criteria: (1) a record identifying a location where, according to literature or personal communication, a monument existed, but which, on inspection, was found not to be an archaeological monument (e.g. a natural feature); (2) a record classified using a term which is now obsolete (e.g. ecclesiastical remains); (3) a record created in the database for which there is no supporting evidence recorded on file or in the database; (4) an archaeological object (i.e. an artefact), e.g. a quernstone; (5) a record entered as a Shipwreck.

Bridge

A structure of wood, stone, iron, brick or concrete, etc., built to span a river or ravine in order to facilitate the crossing of pedestrians or vehicles. These date from the medieval period (5th - 12th centuries AD) onwards.

5.2.3.2 National Inventory of Architectural Heritage

The National Inventory of Architectural Heritage (NIAH) is a state initiative under the administration of the Department of the Environment, Heritage and Local Government and was established on a statutory basis under the provisions of the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999. Its purpose is to identify, record, and evaluate the post-1700 architectural heritage of Ireland, uniformly and consistently, as an aid in the protection and conservation of the built heritage.

Information concerning the National Inventory of Architectural Heritage with regard to the study area was accessed on www.buildingsofireland.ie.

There were no records of architectural heritage found within the study area.

5.2.3.3 Clare County Development Plan 2005-2011

The Clare County Development Plan 2005-2011 was consulted for schedules of buildings, items of architectural, archaeological, historical, artistic, cultural, scientific, social or technical interest as well as identified areas of archaeological potential and Architectural Heritage Areas (ACAs) which may lie within or adjacent to the study area.

The Local Government (Planning and Development) Act, 1999 which came into force on 1st January 2000, provided for the inclusion of protected structures into the planning authorities' development plans and set out statutory regulations regarding works impacting on such structures (Record of Protected Structures – RPS). All structures listed in the development plans are referred to as *Protected Structures* and are granted statutory protection.

The 1999 Act was replaced by the Planning and Development Act 2000, where the conditions relating to the protection of architectural heritage plan are set out in Part IV of the Act. A *Protected Structure* is defined as any structure or specified part of a structure, which is included in the planning authorities' Record of Protected Structures (RPS).

There are no listed ACA's within the study area. However the RPS does identify a church – No 157- St. John, The Baptist's Church, Meelick which is described as a six-bay, single storey cruciform Catholic church c. 1850.

5.2.3.4 Excavations Bulletin

Excavations is an annual bulletin that contains summary accounts of all excavations carried out annually in Ireland. It can be accessed on the web at www.excavations.ie.

This electronic database contains summary accounts of all the excavations carried out in Ireland – north and south – from 1970 to 2004. It has been compiled from the published Excavations Bulletins from those years.

The database was consulted to see whether any previous archaeological investigations had been undertaken within the study area, in order to highlight areas where archaeological material may remain and/or areas of archaeological potential. The search revealed one result for the townland of Meelick in County Clare, one in the townland of Clonconane and four in the townland of Clondrinagh in County Limerick- these are summarised in **Table 5.2**.

Table 5.2: Excavations of Note in or Close to the Study Area

Excavation	Conclusion	
Clonrush Church, Meelick - Church Site	Excavation of the site, so far, has not yielded any material of archaeological significance but some objects of interest have been found in the graveyard.	
Clondrinagh- Possible Deserted Settlement	Nothing of archaeological interest noted.	
Clondrinagh- Proximity to SMR 5:45	The digging of foundation trenches for two industrial units was monitored because of proximity to SMR 5:45. Nothing of archaeological significance was uncovered in the monitoring of this development.	
Clondrinagh- Enclosure	Monitoring of topsoil-stripping in the vicinity of an enclosure (SMR 5:5) was requested by Dúchas. No archaeological remains were noted.	
Clondrinagh - Cairn	Testing of an 'enclosure' was requested by the developer. The nature of the site and the presence of cremated bone indicate that the monument is a prehistoric burial cairn.	
Clonconane- Possible settlement site.	No evidence of archaeological activity was recorded.	

5.2.3.5 Cartographic Sources and Letters.

The Ordnance Survey was originally established in Britain in 1791, and in 1824 the Survey established its Irish headquarters in Dublin, in order to undertake the mapping and measurement of Irish townlands. The maps were drawn on a scale of 6 inches to one mile and published between 1833 and 1846. The Ordnance Survey Letters contain the correspondence between fieldworkers and the Ordnance Survey Office in Dublin during the compilation of the first Irish Ordnance Survey Maps. The fieldworkers in County Clare included John O'Donovan and Eugene Curry, both Gaelic Scholars. The Clare letters, written in 1839, record a great variety of antiquities for inclusion in the maps as well as commentaries on parish and family histories. There were no available records for the Parish of Killeely, County Clare.

5.3 SOILS, GEOLOGY & HYDROGEOLOGY

5.3.1 INTRODUCTION & METHODOLOGY

This section of the report outlines the soils, geological and hydrogeological environment of the Meelick Area.

The following sources of information were used in order to complete the assessment:

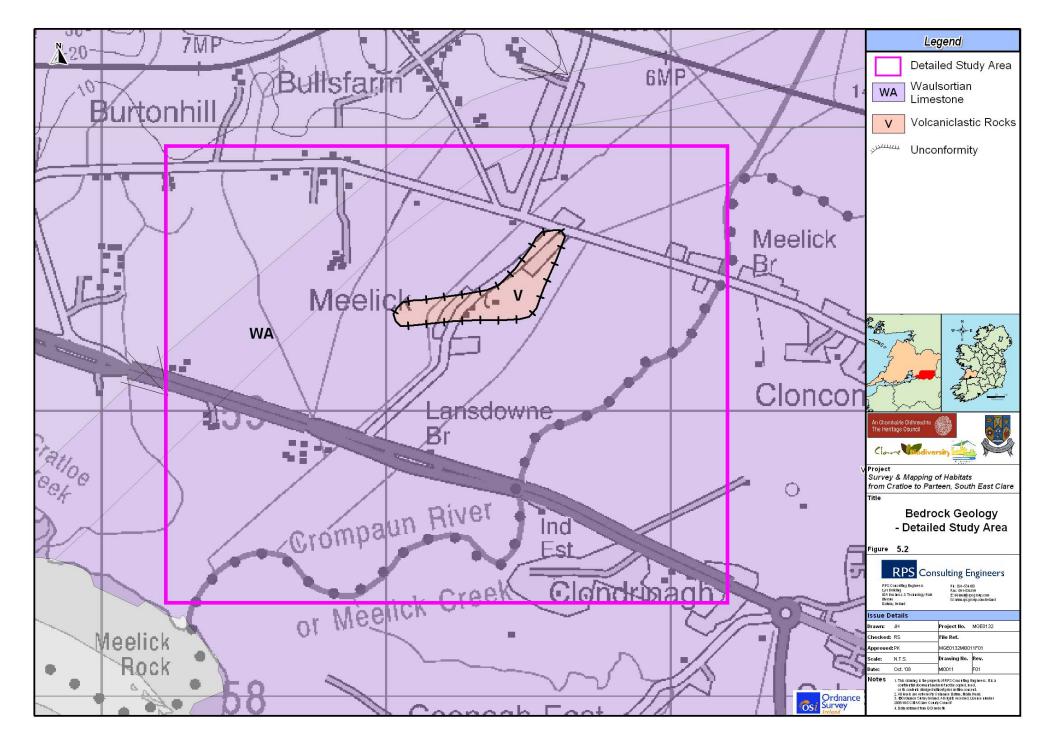
- Geological Survey of Ireland (G.S.I.) 1:100,000 Geology of the Shannon Estuary (Sheet 17) & Geology of Tipperary (Sheet 18),
- Review of online geological data (http://www.gsi.ie),
- G.S.I. Southwestern Vulnerability Data (Interim),
- Teagasc Soils and Subsoils Map (with cooperation of the Forest Service, the EPA and the GSI), and
- Ordnance Survey of Ireland (O.S.I.) 1:50,000 Map Discovery Series.

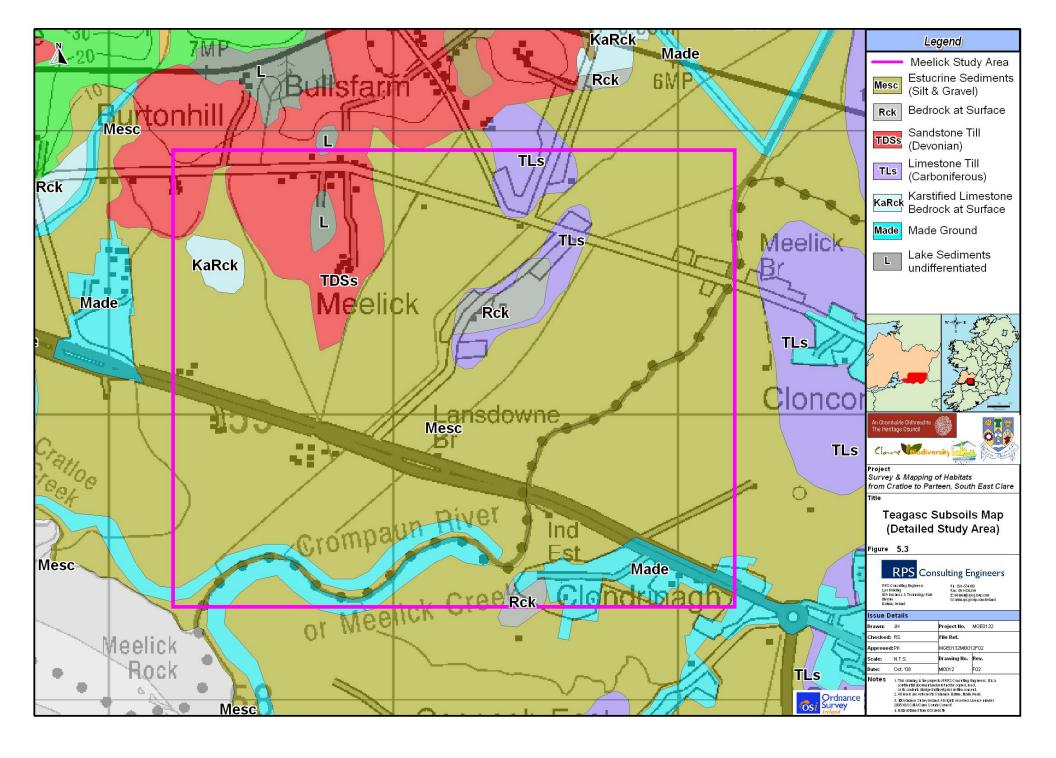
5.3.2 BEDROCK GEOLOGY

The area around Meelick has two major faults running in a southwest-north east direction separating three rock outcrops; unbedded mudstone to the north, cherty crinoidal limestone at the centre and undifferentiated limestone to the south. A small area of basalt and volcanic rock occurs in the centre of the site. The bedrock geology of Meelick is illustrated in **Figure 5.2.**

5.3.3 SUBSOILS

The subsoils of the Meelick area are characterised mainly by estuarine sediments. Small patches of sandstone till, lake sediments, and limestone rock outcrops are present in the northwestern corner with patches of limestone till and blanket peat in the centre. A strip of made ground borders the southern boundary of this area. The Teagasc Subsoils Map of Meelick is illustrated in **Figure 5.3.**





5.3.4 **SOIL**

The special area of interest around Meelick is characterised by estuarine deposits. In the northwest corner deep poorly drained mineral soils are evident with a small outcrop of rock. A belt of shallow well drained soil follows the boundary of the site to the south. An overlay of deeply poor drained and acidic and basic soils is present towards the northeast corner of the study area. The Teagasc Soils Map of Meelick is illustrated in **Figure 5.4.**

5.3.5 HYDROGEOLOGY

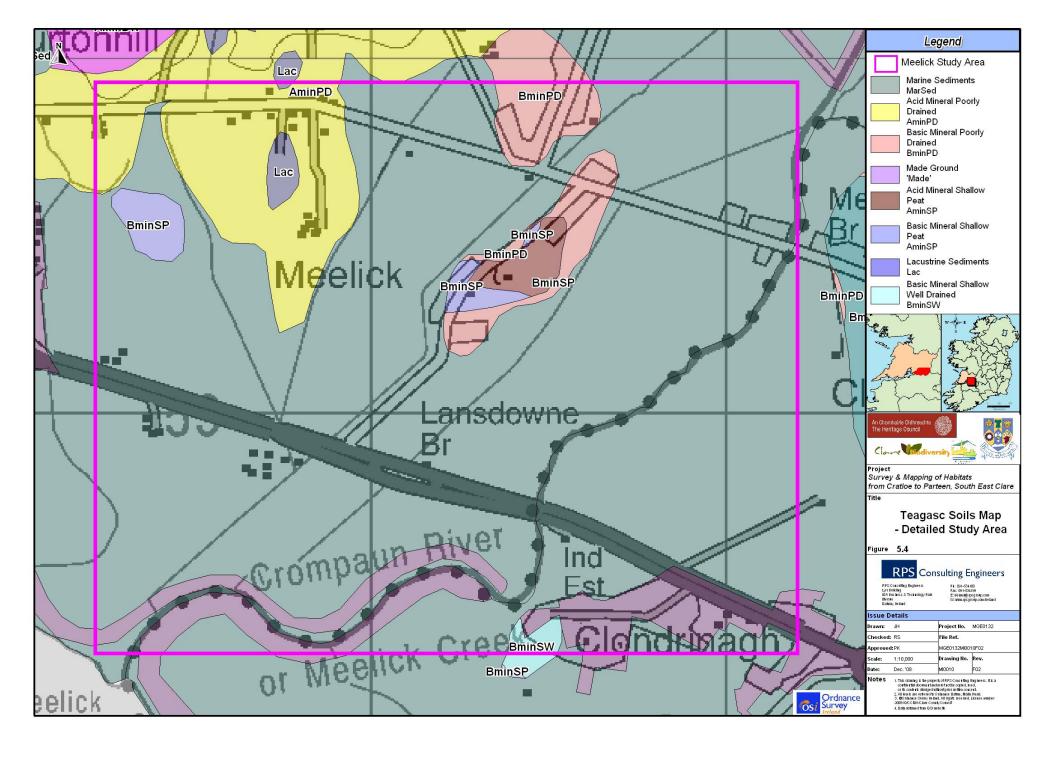
The Meelick study area is classified as a locally important, generally moderately productive aquifer. However, at the northwest corner of this area, this aquifer is bordered by a regionally important karstified diffuse aquifer.

5.4 HABITATS

Meelick is bordered to the east by the Meelick Creek (or Craumpaun River) and the south by the River Shannon. The land is generally low-lying, lying at 1m above sea level at the River Shannon and gradually rising to 10 m above sea level towards the north of the study area.

The landuse is primarily agricultural and Improved Agricultural Grassland GA1 provides the overall character of the lands in the Meelick study area. Land drainage is an issue in the low-lying grassland bordering the two watercourses. The lands here are extensively drained and provide pasture for cattle and horses. Where drainage has been impeded in these areas, Wet Grassland GS4 and Marsh GM1 habitats occur.

Small compartments of Conifer Woodland WD4 occur the north east and south east of the study area. Rocky outcrops occur to the north east and west of the area, which are covered by Scrub WS1 vegetation and Dry Calcareous Neutral Grassland GS1 occurs in the less improved areas. Few mature Hedgerows and Treelines WL2, occur within the study area. However, the Treelines WL2 do contain some good specimens of mature trees and add the biodiversity and ecological value of the habitat.



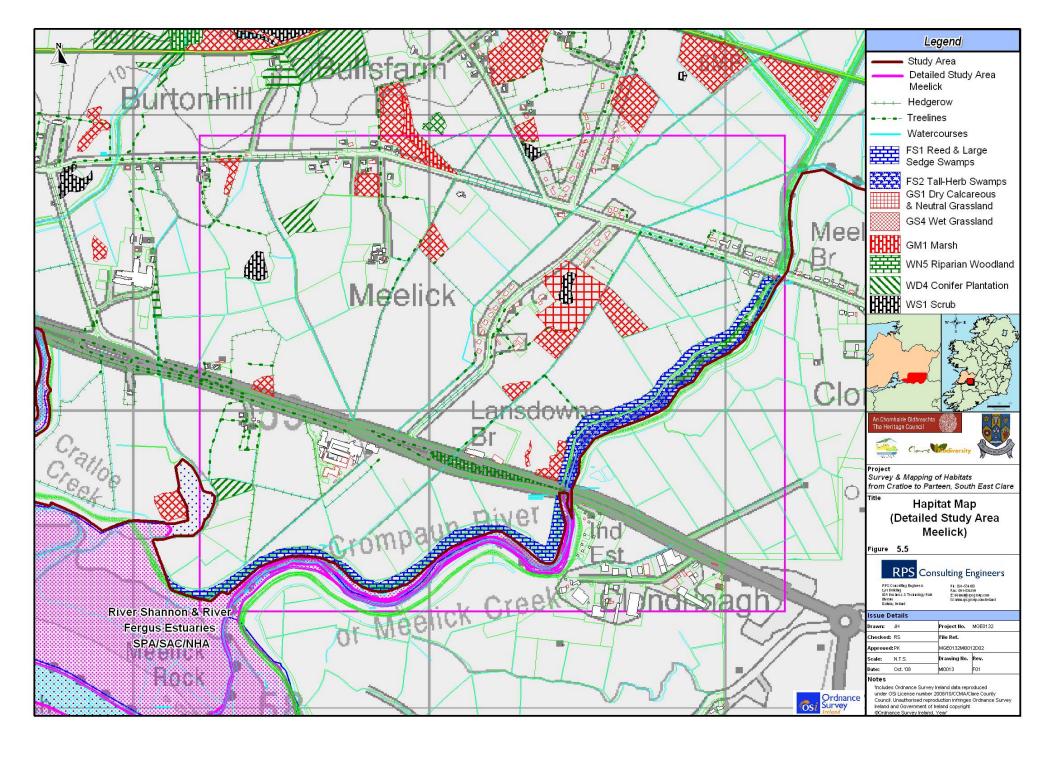
The greatest diversity of habitats and species occurs within the Meelick Creek (or Craumpaun River) River Corridor. The riparian habitats include; Depositing Lowland Rivers FW2, Reed and Large Sedge Swamps FS1, Tall Herb Swamps FS2 and Riparian Woodland WN5. Reed and Large Sedge Swamps FS1 vegetation also occurs in the deep drains that dissect the fields of Improved Agricultural Grassland GA1 that border this river. The very invasive species, Himalayan Balsam (*Impatiens glandulifera*) has encroached throughout this riparian system.



Image 44: Vegetation bordering Meelick Creek

A species rich area of Marsh GM1 and Wet Grassland GS4 occurs to the north of the study area in the direction of Bullsfarm. However this habitat is under threat from advancing development in the area.

The habitats found within the detailed study area around Meelick are illustrated in Figure 5.5.



5.5 LANDSCAPE

5.5.1 INTRODUCTION

This is a review of the landscape character for the study area and its surrounds. The study are covers approximately 2 km² of lands located just outside Limerick City and adjacent to the western side of the Meelick Creek, which forms part of the border between Counties Clare and Limerick. The review should be read in conjunction with the attached **Figure 5.6.**

5.5.2 METHODOLOGY

The assessment methodology was derived from the Landscape and Landscape Assessment: Consultation Draft of Guidelines for Planning Authorities (DOEHLG, July 2000) and Appendices to Landscape Guidelines, issued by the Department of Environment, Heritage, and Local Government (DoEHLG).

The assessment was undertaken through analysis of mapping, aerial photography, relevant development plans and reports in conjunction with site visit carried out on 8th September 2008.

5.5.3 LANDSCAPE ASSESSMENT

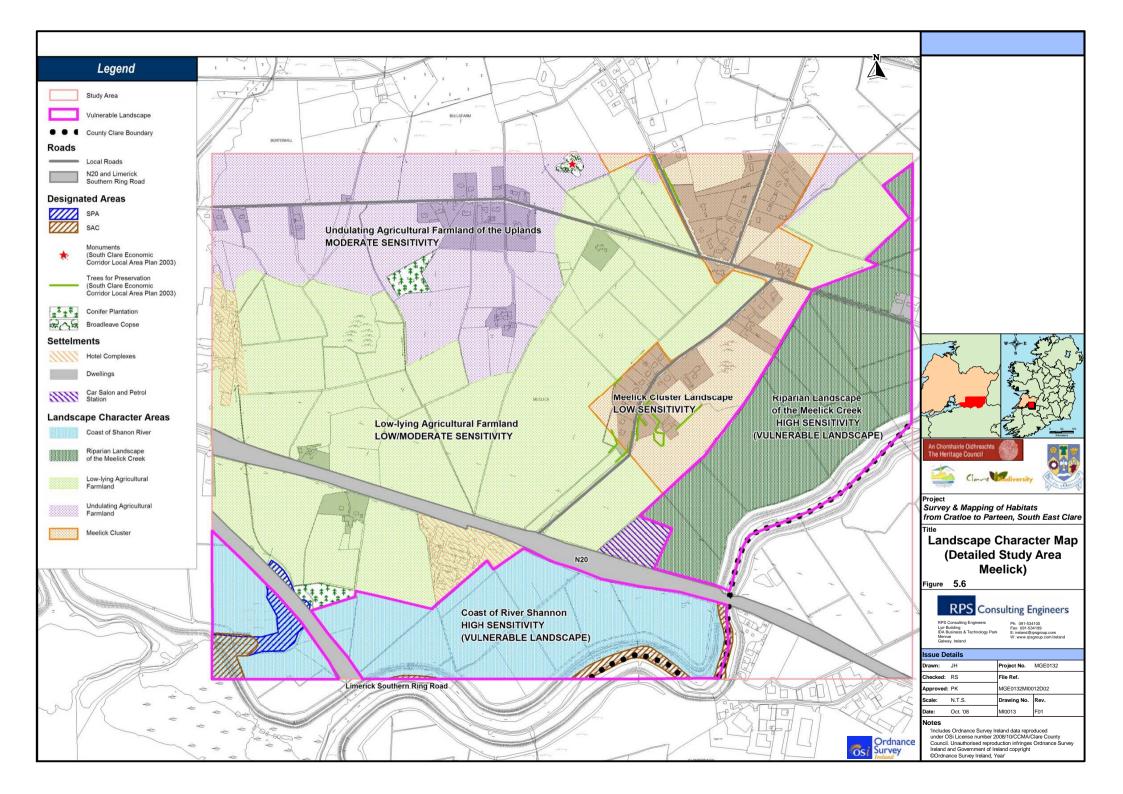
The guidelines establish that classification of the landscape should be undertaken in terms of:

- Character Landscape Character (refer to Section 5.5.3.1),
- Values environmental/cultural benefits captured from the landscape resources (refer to Section 5.5.3.2), and
- Sensitivity the extent that landscape can accommodate change (refer to Section 5.5.3.3).

5.5.3.1 Landscape Character

Identification of landscape character areas involves three stages;

• Establishing Physical Units – this stage identifies physical elements in the environment which are a combination of landform and landcover. An extensive database of knowledge of geology, geomorphology, land use, historical pattern, soils, ecology, habitats, settlements and structures, etc. is required for this stage.



- Establishing Visual Units these are described as areas defined by spatial
 enclosure and pattern. The guidelines highlight that within visually perceived units,
 different kinds of development will take place and their compatibility can be evaluated.
 A visual unit may comprise a number of physical units.
- Establishing Image Units The guidelines state that certain physical features within
 a landscape can act as focal points, creating an image or identity which is distinct
 from that derived simply from physical or visual elements. The assessment criteria for
 the description of image units relate to these features (and their zone of visual
 influence) as well as the image and associations held by society.

The landform within the study area is mostly flat or gently undulating, and the size of the study area is relatively small (ca. $2km^2$). Therefore identification of visual units and image units is not necessary. Visual units are more representative in mountainous area where contours determine visual enclosure. No image units were identified within the study area.

5.5.3.2 Values

The process of identifying landscape value is the second major component as identified in the draft guidelines. Thus, in addition to the character of a landscape, communities or individuals will attach certain values to a landscape. The guidelines highlight that this will often be the result of consensus, national or local, popular or academic opinion. It establishes that these attributes will, in many instances, be the components and image of the landscape already established in the assessment of landscape character. Values attributed to a landscape may be aesthetic, ecological, historical, socio-cultural, religious or mythological. Landscape values may influence development, which involves landscape change.

5.5.3.3 Sensitivity

The process of identifying sensitivity is important in providing a basis for decision making, which is environmentally sustainable. Sensitivity will vary according to landscape character and landscape value. It is a measure of a landscape ability to accommodate change or intervention without the landscape suffering unacceptable effects to its character and values.

There are three key criteria for assessment of landscape sensitivity:

- Importance, which consists of the degree and level of importance (see Table 5.3).
- **Sufficiency**, which consists of vulnerability/threat, which determines whether the area with respect to the value concerned is under threat in quality and/or quantity (robustness) and improvement required, whether the value of a landscape can be enhanced or improved in quality and/or quantity (see **Table 5.4**).
- **Substitutability**, which estimates the possibility of substituting the value with another which provides the same benefits and functions at the same location elsewhere.

Table 5.3: Determination of the Importance of a Value

DEGREE	LEVEL					
	International	National	Regional	Local		
Major Importance	High ←					
Moderate importance						
Minor Importance				Low		

Source: DoEHLG's Landscape and Landscape Assessment (2000)

Table 5.4: Determination of the Sufficiency of a Value

DEGREE	LEVEL				
	High Vulnerability	Moderate Vulnerability	Low Vulnerability		
Much improvement	Low ←				
Moderate improvement					
Low improvement			High		

Source: DoEHLG's Landscape and Landscape Assessment (2000)

A combination of all three key criteria will aid in identifying the sensitivity of the landscape. DoEHLG guideline suggests 5 levels of landscape sensitivity (see **Table 5.5**).

Table 5.5: Landscape Sensitivity Categories

LANDSACPE SENSITIVITY	ACCEPTABILITY TO DEVELOPMENT
LOW SENSITIVITY	All development kinds
MODERATE SENSITIVITY	Many development kinds
HIGH SENSITIVITY	Few development kinds
SPECIAL SENSITIVITY	Acceptable only in accordance with designation recommendations
UNIQUE SENSITIVITY	Negligible alteration

Source: DoEHLG's Landscape and Landscape Assessment (2000)

5.5.4 PLANNING DESIGNATIONS

The following relevant Development Plans and reports were consulted:

- Landscape Character Assessment of County Clare, March 2004,
- South Clare Economic Corridor Local Area Plan 2003, and

Clare County Development Plan 2005-2011.

These documents acknowledge the landscape assets and are identify general objectives for landscape treatment of County Clare.

5.5.4.1 Landscape Character Assessment of County Clare, March 2004 (LCAoCC)

According to the LCAoCC, the study area is confined to Landscape Character Area no 9 (LCA9) - River Shannon Farmlands. The key characteristics of this landscape type are:

- Lowland farming area with the meandering River Shannon providing key focus,
- Small settlements/villages such as Parteen and Cloonlara,
- Agricultural, rural landscape with intact features that are well maintained,
- Framed by undulating lowland farmland with Sliabh Bernagh and Broadford Hills in the distance, and
- O'Briensbridge is an Architectural Conservation Area (ACA).

5.5.4.2 South Clare Economic Corridor Local Area Plan, 2003 as Amended, 2006

The South Clare Economic Corridor Local Area Plan, 2003, document includes landscape character assessment, policies and objectives with regard to the South Clare landscape and also provides a description of the vulnerable landscape in this region. The Plan also identifies trees proposed for preservation and vulnerable landscape as shown on **Figure 5.6.** The document sets out the requirements where development may have an influence on vulnerable landscapes. Policy Env5 sets out these requirements:

'Env5: Protection of vulnerable landscapes;

Proposals for development within the areas designated as Vulnerable Landscapes will normally be permitted only where it can be clearly demonstrated that:

- A. The proposed development does not intervene with views of water from any point within the vulnerable landscape area; or
- B. The view of the skyline is not significantly impinged upon by the proposed development when viewed at a reasonable distance from the ridgeline.
- **8.6.5** The vulnerable landscape designation seeks to protect the following:
 - views afforded of the sea/estuary/water
 - the view to the point where visually land and water join

- views of prominent high ground and particularly the skyline
- views of skylines of significant ridges
- the character, integrity and uniformity of upland areas over 200m
- views of and across exposed limestone areas
- settings and views of sites of archaeological, ecological or historical interest.

8.6.6 The vulnerable landscape designation is defined by considering the following:

- views from public roads/footpaths
- natural contours of the land where it rises to intervene with views of the sea/estuary/water from the public road
- where the land is flat, with extensive views and no public road exists to provide a boundary, a point no further than 500m from the waters edge will be used.'

5.5.4.3 Clare County Development Plan 2005 - 2011

Section 5.5 of Clare County Development Plan 2005-2011 details policies relating to landscape. It sets out the conservation, protection and enhancement of the landscape character of the County as a natural asset in its own right.

Policies for landscape are based upon an objective study of three key documents that provide for the assessment, characterisation and valuation of the landscape of County Clare. These three documents are:

- Criteria for the Evaluation of Landscape Quality 1997 by CAAS,
- Landscape Character Assessment of County Clare, March 2004, and
- Landscape and Landscape Assessment: Consultation Draft of Guidelines for Planning Authorities (July 2000) and Appendices to Landscape Guidelines, issued by the Department of Environment, Heritage, and Local Government (DoEHLG).

The Plan lists key landscape components, as well as sensitivity and overall sensitivity for LCA identified by LCAoCC, refer to **Table 5.6**.

5.5.5 VULNERABLE LANDSCAPE, LANDSCAPE CHARACTER AND POTENTIAL DEVELOPMENT ASSESSMENT

The existing landscape within the study area is for the most part, considered as a rural landscape and as per LCAoCC – River Shannon Farmlands. A more detailed landscape character assessment was carried out focussing on the study area, and consideration was given to the documents as outlined previously. The Landscape Character areas are shown in **Figure 5.6, Image 5.1- 5.5** and are described in the following sections.

5.5.5.1 Low-lying Agricultural Farmland

This landscape is made up of relatively flat, extensive, low productivity agricultural grasslands. It is situated on Marine/Estuarine Sills and Clays, which are layered on top of Dinantian Pure Bedded Limestone. There are occasional features similar to low, gentle rolling, dispersed drumlins. Land cover is predominantly made up of agricultural grasslands with evidence of grass wet species. Plot boundaries are often determined by an extensive drainage system, which is associated with groups of low vegetation such as bramble or by severed hedgerows with randomly scattered trees and severed mature tree-lines. Developments are for the most located adjacent to the road corridors. Dwellings are not common in this landscape type; however two Hotel complexes within this landscape. All of these elements are associated with denser and more organised planting schemes. Roads, including the N20 and Limerick Southern Ring Road are common component in this landscape.

The N20 is a considerable linear element of the landscape and such an element would normally indicate the boundary of a landscape character type. However, similar landscape features are in this instance present beyond the N20 Cork to Limerick Motorway extending to the Limerick Southern Ring Road.

This landscape type is largely considered agricultural and of low local importance, it can be rated has having a rate of **low/moderate** sensitivity.

Proposed developments usually vary in quality and scale and new developments have to be carefully considered. As this landscape is flat in nature it does not provide a significant amount of potential screening. The existence of ribbon development in the area indicates that lands adjacent to the roads are most suitable for the development.

Image 5.1 Landscape Character: Coast of Shannon River (plate shows flat character of the terrain in the vicinity of Meelick Creek).



Image 5.2 Landscape Character: Riparian Landscape of Meelick Creek



Image 5.3 Landscape Character: Low-lying Agricultural Farmland



Image 5.4 Landscape Character: Low-lying Agricultural Farmland in the vicinity of Meelick Cluster



Image 5.5 Undulating Agricultural Farmland



Table 5.6: Evaluation of Landscape Components in the Landscape Character Area 9 identified by Landscape Character Areas of County Clare

	County Clare							_
Landscape Character Area	Landscape Character Areas Description	CAAS Reference Letter	CAAS Classification	Importance	Sufficiency	Substitutability	Sensitivity Weighting	Overall Sensitivity Weighting for LCA
9	Lowland farming area	Q	Normal	Low	High	Yes	Low Sensitivity	3 Moderate Sensitivity
9	Shannon river provides key focus	X	Vulnerable	Moderate	Moderate	No	High Sensitivity	
9	Urban impact of Limerick city	G	Robust	Low	High	Yes	Low Sensitivity	
9	Small settlements such as Parteen, O'Briensbridge and Clonlara	G	Robust	Moderate	High	Yes	Low Sensitivity	
9	More dispersed settlement pattern of single and two-storey farmhouses	I	Robust	Low	Moderate	Yes	Low Sensitivity	
9	Several rivers draining into the Shannon including Ardclooney, Ballyteige and Black	Х	Sensitive	Moderate	Moderate	Yes	High Sensitivity	
9	Pasture grassland with silage production almost completely dominant	L	Normal	Low	High	Yes	Low Sensitivity	
9	Limited areas of transitional woodland scrub	W	Sensitive	Moderate	Moderate	Yes	Moderate Sensitivity	
9	Glenomra Wood; semi-natural deciduous woodland	V	Sensitive	Moderate	Moderate	No	High Sensitivity	
9	NHA and SAC designations	F1	Sensitive	Moderate	Moderate	No	High Sensitivity	
9	Distinct area of enclosed strip fields surrounded by irregular rough ground north of O'Briensbridge - potentially a site of Rundale agriculture	E1	Sensitive	Moderate	Moderate	Yes	High Sensitivity	
9	Megalithic tombs, enclosures and castles	H1	Sensitive	Moderate	Moderate	No	High Sensitivity	
9	Stone bridges are a key landscape feature	I1	Sensitive	Moderate	Moderate	No	High Sensitivity	

9	Folk beliefs strong in relation to white thorn bushes	G1	Sensitive	Moderate	Moderate	No	High Sensitivity	
9	Fields enclosed by hedgerows, hedgebanks and trees, creating an intimate, well wooded landscape		Normal	Moderate	Moderate	Yes	Moderate Sensitivity	

Source: Clare County Development Plan 2005 – 2011

5.5.5.2 Undulating Agricultural Farmland

Undulating agricultural farmland, occupies a small lower part of nearby uplands and hill ranges, located further north in the study area and extends in an east-west direction. The landform is gently undulating, used mostly for agriculture as grassland and arable crops with small clusters of conifer plantations. The study area is situated on top of till derived chiefly from Devonian Sandstones subsoil and bedrock of Dinantian Pure Unbedded Limestones. Ribbon development is a prevalent trend within the area. Main settlement clusters are located along the local road and consist of single and double storey dwellings. Summerhill House farm complex is the only settlement located a significant distance from a local road approximately 300m. A monument (listed in South Clare Economic Corridor Local Area Plan, 2003) is present in the eastern part of this landscape formation. Plot boundaries are mostly established by overgrown ditches, severed hedgerows and short sections of mature tree-lines, especially along the local road. Sections of dry-stone wall appears along the local road.

This landscape is agricultural in nature with small fragments of cultural and biodiversity value. Dependent on the landscape component considered, its importance is low or moderate, sufficiency low to moderate and substitutability is possible with the exception of the area surrounding the monument. This landscape type is rated as **moderate** sensitivity.

New developments have to be carefully considered and must be consistent with emerging trends, such as building types, finishes and alignment. Therefore, ribbon development in the area, determines lands adjacent to the roads as most suitable for development.

5.5.5.3 River Shannon

The River Shannon and its banks are listed as one of the most vulnerable landscape features in County Clare. All relevant development documents rate this landscape type as high.

This landscape type, which forms part of the study area, expands along the River Shannon to the confluence of Shannon River and Meelick Creek, which are designated as SAC and SPA sites.

The character of the area is made up of very flat surfaces with a network of extensive open drainage ditches associated with low and middle size shrubs. Drainage systems and shrubs often establish plots boundaries. Significant components of this landscape include the flood

protection embankments, which are accompanied by copses of riparian woodland including willow spp. etc. Land use is agricultural, comprising grasslands and arable crops.

This landscape type is classified as the vulnerable as vistas towards the River Shannon from Limerick Southern Ring Road (at the time of writing the report, the road was under construction) will be widely available. Also views from a section of the N20 (fragment between Lansdowne Bridge on Meelick Creek and Two Mile Inn Hotel) towards Meelick Creek and the confluence of Meelick Creek and the River Shannon will be afforded. Meelick Creek flow is not visible being situated between flood protection embankments. Such embankments are a common symbol and represent a recognisable component of riverine character of the area.

This landscape is high in culture and environmental values, as scenery, bio-diversity, recreation etc. and form a major component of it. The sensitivity of this landscape is moderately important, of moderate sufficiency and substitution is not a viable consideration. As a result this landscape is rated as having **high** sensitivity.

Any development in this area needs to be considered under all criteria's listed in the relevant development plans.

5.5.5.4 Riparian Landscape of the Meelick Creek

This landscape comprises mainly flat, low-lying areas adjacent to the Meelick Creek. The landscape type extends from the N20 (Lansdowne Bridge on Meelick Creek) in a northerly direction. The subsoils comprise marine/estuarine sills and clays layered on top of dinantian pure bedded limestones. Land use is a mixture of agricultural grassland and arable crops. A settlement is located to the west and on the north adjacent to the local road. Flood protection embankments and plot boundaries are associated with a riparian type of planting. Boundary planting comprised severed hedgerows with random scattered single trees and good quality mature tree-lines are present between Meelick Cluster and the river. Some plot boundaries in the southern part of this landscape are not planted. The northern section is made up mostly of thorny, low-medium size shrubs with random mature trees.

According to the objectives of South Clare Economic Corridor Local Area Plan, 2003, this landscape is vulnerable landscape, as views to the river can be observed.

The Riparian landscape of the Meelick Creek has environmental related values including biodiversity, scenery and recreation. The importance of the landscape components in this unit vary between low and moderate, sufficiency varies between high and moderate and it is possible to substitute all components. However, due to the riparian environment, sensitivity is rated as **high**.

Any development in this area needs to be considered under all criteria for vulnerable landscapes as listed in the relevant development plans.

5.5.5.5 Meelick Cluster Landscape

Meelick Cluster is a settlement designated in the South Clare Economic Corridor Local Area Plan 2003. The southern part of this settlement is located on the gently rolling hills which are made up of volcanic rocks, including basalt. This volcanic intrusion is a geologic alien form in the surrounding landscape. Dense build-up area comprises of single and double storey houses. Ribbon development is a prevalent trend in the area. There are trees identified for preservation within this landscape type.

Meelick Cluster Landscape has values associated with socio-economic activity i.e. housing. It generally has low importance, high sufficiency and substitution of this landscape would be possible. This results in the value of this landscape being of low sensitivity.

There is large development potential in this is area. However as proposed developments usually vary in quality and scale, new developments have to be carefully reconsidered and must be consistent with emerging trends such as building type, finishes and alignment. Building architecture should reflect the local style. Ribbon development in the area determines land adjacent to the roads as most suitable for the development.

5.5.6 CONCLUSION

The study area is located in County Clare, just west of the western outskirts of the Limerick City. The approximate size of the area is 2km². The Meelick study area has been assessed in relation to landscape character and its sensitivities. Following that, land development potential for particular landscape types was determined.

A review of the archaeological, architectural and cultural heritage of the study area was undertaken. A range of sources were consulted in completing the review and it was found that there are six monuments in the study area that have been named under the Sites and Monuments Records (SMR) and therefore are afforded national protection under the National Monuments Acts (1930-2004). Two of the six monuments listed were found in County Clare. A cairn in Clondrinagh and St. John the Baptists Church in Meelick, which is also listed in the Clare County Development Plan 2005-2011 under the Record of Protected Structures (RPS) and is also, afforded statutory protection. Several excavations have taken place in and around the study area, the majority concluding that there was no evidence of archaeology. One excavation in the townland of Clondrinagh, Co. Limerick revealed the presence of cremated bone, indicates that the monument is a prehistoric burial cairn.

The Meelick study area is classified as a locally important, generally moderately productive aquifer.

Five main landscape character types were recognised during the classification process. These are listed along with their sensitivity below.

- Low-lying Agricultural Farmland of low/moderate sensitivity,
- Undulating Agricultural Farmland of the Uplands of moderate sensitivity,
- River Shannon of high sensitivity,
- Riparian Landscape of the Meelick Creek of high sensitivity, and
- Meelick Cluster Landscape of low sensitivity.

Two of the character types, namely the River Shannon and Riparian Landscape of the Meelick Creek, belong to vulnerable landscape, as specification in the South Clare Economic Corridor Local Area Plan, 2003.

The potential for development of the Meelick area should be based on various factors. From the landscape perspective, it is determined by the ability of the landscape to accommodate the proposed development. This usually depends on the landscape properties and also on the scale and the quality of the proposed development.

As different developments vary in scale and quality, only general guidelines can be established regarding landscape constraints for any proposed development of the area.

General landscape constraints or guidelines for new developments in the Meelick area:

- As developments usually vary in quality and size, any proposed development needs to be assessed on a case-by-case base,
- The proposed developments should be located adjacent to or in close proximity to existing developments,
- Developments should form sustainable complexes, however these complexes should not be overly compacted and should not dominate the visual landscape,
- Buildings and structures of similar size should be grouped together. It would be
 preferable to have two or three small to medium sized structures rather than one
 dominant large structure. This will allow for better integration into the environment and
 will also increase the screening possibilities for the proposal,
- When breaking up of larger buildings/units is not an option, to avoid a bulky effect of solid structures, an appropriate colour scheme should be apply to the structures,
- In flat areas, any proposed development should not be higher than existing buildings, in the area. Typically buildings in the Meelick area are single or two-storey,
- In general, the developments higher than two stories should be allowed only in the
 locations of undulating landscape, where natural screening may be provided by
 elevation of the terrain and existing landcover. The proposals should not be placed on
 the top of the hills or other exposed locations, to avoid exaggeration of the landscape
 and visual impact,
- Proposed development should not obscure long-range views towards the uplands ridges and towards River Shanon,
- The proposed development will be well screened by the green buffer of native plants. It is advised to use the existing vegetation, especially larger trees, as part of the

screening for new developments. Where use of the existing vegetation is not an option, proposal should be equipped with a well designed landscaping scheme, to integrate the proposal with the existing landscape. In both conditions, landscape master plan should be designed by the landscape architect,

- Design of the buildings architectural style should match existing or emerging trends in the area. A local and regional architecture style should be encouraged,
- Materials and finishes of the structures should not cause a shimmering effect,
- Proposed colours for any development should be based on the colours present in the
 existing environment and will not be limited only to dark green or grey. Inappropriate,
 eye catching colours should be avoided,
- Any trees marked for preservation in the relevant development plans should not be removed,
- Preservation of the mature trees within the study area should be prioritised before removal (excluding commercial plantations),
- Areas in the vicinity of potential archaeological and tourists interest should only consider appropriate developments, which do not alter identity of the place,
- Any development within the vulnerable landscape needs to consider all criteria listed in the South Clare Economic Corridor Local Area Plan, 2003 as Amended, 2006 and any other relevant document, which are applicable to vulnerable landscape, and
- Any signage shall be of reasonable size and well designed.

6 OVERALL CONCLUSIONS AND RECOMMENDATIONS

There are 117 habitat types classified in Ireland (Fossitt, 2000), 89 of these habitat types are terrestrial and 28 of these are marine habitat. Of the 89 terrestrial habitat types, 50 different types of habitats occur within the study area. Of the 50 different habitat types, 8 are classified under cultivated and built land and the remaining 42 habitats are described in detail throughout the report.

Within these habitats, the study revealed 14 habitat types are considered rare, not only in Clare, but also in Ireland and the rest of Europe. These important and vulnerable habitats cover 16% (2,060ha) of the rural lands of the study area.

The habitats found within the study area are evaluated based on their naturalness, value and vulnerability. Habitats that are assessed to be good examples of Annex I priority habitats are considered to be of International or National importance. Semi-natural habitats with high biodiversity in a local context and that are vulnerable, are considered to be of High Ecological value in a local context. Habitats that are considered semi-natural habitat or locally important for wildlife are considered to be of Moderate Ecological value in a local context, and robust habitats that have been highly modified are considered to be of Low Ecological value in a local context.

The habitat inventory and supporting biodiversity evaluation of the lands in South East Clare has important implications for spatial planning in the area. This information also establishes a forum for education and further research into the biodiversity value of study area.

6.1 RECOMMENDATIONS FOR SPATIAL PLANNING

Strategic planning should recognise the sensitivity of the certain habitats to development, in particular water dependant habitats, where disruptions in the hydrological regime of an area can have significant impacts on these sensitive habitats. Projects such as quarrying, road building and large industrial and residential developments can cause irreversible consequences to these habitats.

Linkages and buffer zones should be maintained and incorporated into Development Plans. The removal of these linkages leads to habitat fragmentation and isolation. These corridors ensure the continued vitality of designated sites and protected habitats.

Specific policies should be developed to take into consideration habitats categorised in Section 4.4 Sites of Local Biodiversity Interest. Development should be avoided in habitats classified as Highly Sensitive and Very Sensitive and minimised in habitats classified as Moderately Sensitive. At least 70% of the study area is covered by habitats categorised as Robust and development should be considered in these areas.

Where development is considered in habitats listed categorised as Highly Sensitive and Very Sensitive, policies may contain requirements for developers to evaluate and assess the impacts of the proposals on sensitive habitats. Impacts to Annexed habitats and species may require screening and Appropriate Assessment under the Habitats Directive 92/43/EEC, Article 6(3) and (4), Assessment of Plans and projects Significantly Affecting Natura 2000 Sites.

Where developments are required for the socio-economic improvement of an area, these developments should be evaluated against the wider area at a strategic level. The assessment must include the direct, indirect and cumulative impacts of such developments, and the evaluation of any possible environmental impacts to specific sensitive habitats against the impact of the habitat coverage within the locality and area as a whole. Where such developments require it, this information should be assessed through a Strategic Environmental Assessment (SEA) Process.

6.2 LOCAL AREA PLANS

The information contained in this report may be used in conjunction with the South Clare Local Area Plan 2009. All information pertaining to this study is provided digitally in a GIS system and is access is available to all planners in Clare County Council and to the general public. This information is provided to facilitate a sustainable approach to planning and to identify opportunities to incorporate and manage sensitive habitats in local and regional scale.

6.3 STAKEHOLDER ENGAGEMENT

The positive engagement and co-operation of land owners and their representative bodies can contribute significantly to the success of the protection of local sites of ecological value. The management of these sites should also reflect the broad interests of landowners on to and identify mechanisms which will allow effective input.

The availability of digital information at County Council Offices, Teagasc, IFA and civic centres will assist in the dissemination of information to landowners, developers and agencies that advice on landuse and development.

Hardcopies of the Habitat Map and report will also be made available at these centres.

6.4 OPPORTUNITIES FOR FURTHER RESEARCH

Further studies should be conducted at sites identified as Internationally, Nationally Important Ecological Sites and also sites identified as being of High Ecological Value in a Local Context as per **Table 4.1 Section 4.1.** Some of these sites may meet the criteria for designation under European or Irish legislation. Other sites that do not meet the criteria for legal designation but contain habitats of conservation value may be designated as Sites of Local Nature Conservation Interest (SLNCI) and a strategic context for the designation of these sites may be incorporated into Local Area Plans.

This approach to the designation of local sites has been adopted in the UK and Northern Ireland, and Guidance for the Identification and Selection of Local Sites has been developed by the Department for the Environment Food and Rural Affairs (DEFRA). The evaluation and selection criterion for the local conservation sites is based on the 'Ratcliffe Criterion' as set out in the Nature Conservation Review 1977.

The site has been evaluated using the Ratcliffe Criterion (1977), which is generally acknowledged as being the most appropriate methodology. A synopses of the Ratcliffe criterion is provided in Table 6.1

Table 6.1 Ratcliffe criterion

Criteria	Description
Size	A habitat's importance for nature conservation generally increases with its size.
Diversity	Variety is better than uniformity, species or habitat richness is generally better than a poor species or habitat complement.
Naturalness	Sites, which have remained relatively unaltered by man, tend to be the most valuable. Furthermore, sites which are considered most natural are generally those which are hardest to recreate.
Fragility	A habitat that is fragile is one that is sensitive to changing influences. Habitats, which are liable to such influences, are likely to be of higher value than those which are not.
Typicalness	Those habitats which are representative or typical of good examples of their type are considered of higher value than those which are not.
Rarity	A site where rare or protected species or habitats exist is considered of higher value.
Position in an ecological or geographical unit	Sites, and their associated habitats, which are contiguous with other similar sites tend to be more valuable than those sites, which are situated in isolation.
Potential Value	Habitats, which, through an adjustment of current influences, have the potential to be, of a higher nature conservation value than they are currently, have additional value
Intrinsic Value	This criterion is based upon the value humans' place on a feature of ecology as opposed to its actual nature conservation value.

APPENDIX A

TARGET NOTES



TARGET NOTES						
Survey Title: South East Clare Habitat Mapping Survey date: 23/07/08						
Surveyor: Jean Hamilton/Paula K	County name: Clare					
1:2,500 Sheet no: 4623-c	Townland: Derryfadda	Grid Ref: 160857, 161064				
Target note no.: TN2	Area: 47	7.9ha				

Ecological Interest: This area is considered to be of **National/International** Ecological Interest. The habitats in this area are Linked to Annex I Habitats under Habitats Directive - Northern Atlantic Wet Heaths with *Erica tetralix* (Code 4010), Active Raised Bogs (Code 7110), Bog Woodland (Code 91d0) and 'depressions on peat substrates of the *Rhyncosporion* (7150)'

Habitat code PB1 / PB4 / HH3 / WN7/ WD2

This site is located to the west of the Errina Canal and to the south of Ardnacrusha headrace canal, in the townland of Derryfadda. This area represents a significant area of cut over Raised Bog PB1. The original Raised Bog PB1 habitat covered and area in excess of 50 ha; however most of it has been depleted through peat extraction over the last hundred years. The dome shape of these bogs form which its name is derived is still evident in the central area of this site. Peat harvesting ceased at this site in the late 1980's. The cut banks and ramparts have now colonised with Wet Heath (HH3) vegetation. The edges of the bog have been planted with Mixed Broadleaved Conifer Woodland WD2. Bog Woodland (WN7) comprising largely of Downy Birch (Betula pubescens) has also developed on the cutover margins. Wetter areas and pools containing large patches of Sphagnum are interspersed across the bog with Cladonia Lichen (Cladonia spp.) on the drier hummocks. The species found and their abundance are listed below.

Species List: Raised Bog (PB1)/Cutover Bog PB4

Species (Latin name)	Species (common	DAFOR Scale
	name)	
Andromeda polifolia	Bog Rosemary	Occasional
Carex spp.	Sedge spp.	Occasional
Calluna vulgaris	Ling Heather	Abundant
Cladonia sp.	Lichen	Frequent
Erica tetralix	Cross-leaved Heath	Abundant
Eriophorum angustifolium	Common Cotton Grass	Frequent
Eriophorum vaginatum	Hare's tail Cotton Grass	Frequent
Juncus spp.	Rush spp.	Occasional
Molinia caerulea	Purple moor grass	Frequent
Myrica gale	Bog Myrtle	Occasional
Narthecium ossifragum	Bog Asphodel	Occasional
Rhynchospora alba	White-beaked Sedge	Frequent
Sphagnum spp.	Sphagnum moss	Abundant
Trichophorum cespitosum	Deer Grass	Frequent
Vaccinium myrtillus	Billberry	Occasional

Wet Heath HH3 vegetation occurs through out the site, with a vegetation assemblage typical of this habitat type, including the dominant Ling and Crossed-leaved Heath with abundant Purple Moor Grass, Gorse and Bracken. Wetter areas are characterised by reduced cover of Ling, with an abundance of Purple Moor Grass, Common Cottongrass, scattered Downy Birch and pools of *Sphagnum spp.* There is a notable absence of Black Bog Rush, distinguishes this habitat from Lowland Blanket Bog (PB3). The species found and their abundance are listed below.



Species (<i>Latin</i> name)	Species (common	DAFOR Scale
	name)	
Calluna vulgaris	Ling Heather	Dominant
Erica tetralix	Cross-leaved Heath	Abundant
Eriophorum angustifolium	Common Cotton Grass	Frequent
Juncus spp.	Rush spp.	Occasional
Molinia caerulea	Purple Moor Grass	Abundant
Potentilla erecta	Tormentil	Occasional
Pteridium aquilinum	Bracken	Abundant
Sphagnum spp.	Sphagnum moss	Frequent
Ulex europaeus	Common Gorse	Occasional

Ecological interest: Raised bogs correspond to the priority habitat, '*active raised bogs (7110)' if they are still capable of peat formation, or if peat formation has temporarily ceased. 'Degraded raised bogs still capable of natural regeneration (7120)' are also listed as an annexed habitat. These are damaged bogs where it is judged that the peatforming capability can be restored within 30 years. The annexed habitat, 'depressions on peat substrates of the Rhynchosporion (7150)' occurs in pockets as a sub-habitat of raised bog.

Habitat Map



Photographic Record



Plate 1: Area of Cutover Bog with pools of bog moss Sphagnum species and *Rhyncospora alba*. Dense Bracken and woodland in background.



Plate 2: Lawns of Sphagnum in Cutover Bog





Plate 3: Peat profile at Raised Bog/Cutover Bog interface



Plate 4: Area of Wet Heath with bracken invading.



TARGET NOTES						
Survey Title: South East Clare Habitat Mapping Survey date: 23/07/08						
Surveyor: Jean Hamilton			County name: Clare			
1:2,500 Sheet no: 4623-c Townland: Cappavilla South			Grid Ref: 161539, 160129			
Target note no. (Sheet No + 1,2,3, etc.): TN1		Area: 0.17ha				

Ecological Interest: This area is considered to be of **High** Ecological value in a local context, under threat from invasion of Giant Hogweed (*Heracleum mantegazzianum*).

Habitat code

WN4

This small pocket of Wet Pedunculate Oak Ash woodland (WN4) is located in depression near River Blackwater in the townland of Cappavilla South. This area has a species diverse ground flora but is under threat from invasion by Giant Hogweed (Heracleum mantegazzianum). This plant originates from Caucasus, Central Asia and was introduced into Ireland's gardens and estates as an ornamental plant in the late nineteenth century. The plant has since spread throughout Ireland and can be found particularly on river banks and canal corridors. The plant is potentially harmful to humans as the sap can cause burns. Giant Hogweed out-competes native flora in its habitat and as it dies back in the winter, river banks are often left open to erosion. This leads to the alteration of freshwater systems with an increase in nitrates and phosphates that leads to an increase in aquatic plant growth posing a risk to fish life, in particular, spawning salmon.

Species List Wet Pedunculate Oak Ash woodland WN4

Species (Latin name)	Species (common
	name)
Alnus glutinosa	Alder
Cirsium palustre	Marsh Thistle
Crataegus monogyna	Hawthorn
Epilobium obscurum	Short-fruited Willowherb
Galium aparine	Cleavers
Geranium robertianum	Herb Robert
Hedera helix	lvy
Holcus lanatus	Yorkshire Fog
Filipendula ulmaria	Meadowsweet
Fraxinus excelsior	Ash
Lolium perenne	Perennial Ryegrass
Poa spp.	Meadowgrasses
Prunella vulgaris	Blackthorn
Pteridium aquilinum	Bracken
Quercus robur.	Pedunculate Oak
Rubus fruticosus	Bramble
Rumex obtusifolius	Broad Dock
Salix spp.	Willows
Scutellaria minor	Lesser Skullcap
Urtica dioeca	Nettle



Photographic Record



Plate 1: View of woodland from adjacent field



Plate 2: Field layer



TARGET NOTES						
Survey Title: South East Clare Habitat Mapping Survey date: 23/07/08						
Surveyor: Jon Kearney			County name: Clare			
1:2,500 Sheet no: 4623-b	Townland: Newtown		Grid Ref: 162363, 162841			
Target note no.: TN1		Area: 3.8ha				

Ecological Importance: This area is considered to be of **High** Ecological value in a local context.

Habitat code

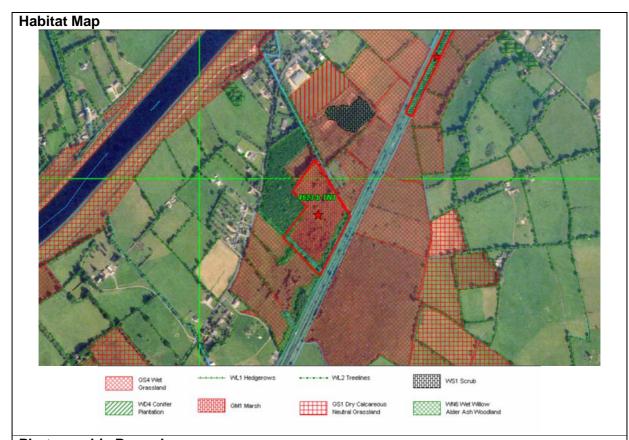
GM1/WN6

This habitat is located between the Errina Canal and the headrace canal of Ardnacrusha power station. This habitat comprises a species-diverse Marsh GM1 which gradually grades into Wet Willow-Alder-Ash WN6 woodland. The terrain is very wet with some standing water. A Common Frog (*Rana temporaria*) and several invertebrate species including dragonfly and damselfly were spotted on the site.

Species list for Marsh GM1

Species (Latin name)	Species (common name)	DAFOR Scale
Angelica sylvestris	Wild Angelica	Abundant
Anthoxanthum odoratum	Sweet Vernal	Rare
Epilobium palustre	Marsh Willowherb	Frequent
Equisetum spp.	Horsetails	Dominant
Filipendula ulmaria	Meadowsweet	Dominant
Holcus lanatus	Yorkshire Fog	Rare
Iris pseudoacorus	Yellow Iris	Occasional
Juncus articulatus	Jointed Rush	Frequent
Juncus effusus	Soft Rush	Frequent
Lotus corniculatus	Bird's-foot-trefoil	Rare
Lythrum salicaria	Purple Loosestrife	Abundant
Mentha aquatica	Watermint	Abundant
Ranunculus flammula	Lesser Spearwort	Frequent
Ranunculus repens	Creeping Buttercup	Rare





Photographic Record



Plate 1: Marsh GM1 with Wet Willow Alder Ash Woodland WN6 in background.



Plate 2: Close-up of Marsh vegetation



TARGET NOTES				
Survey Title: South East Clare Habitat Mapping			Survey date: 22/07/08	
Surveyor: Jon Kearney			County name: Clare	
1:2,500 Sheet no: 4623-a	Townland: Newtown		Grid Ref: 161374, 162267	
Target note no.: TN3		Area: 0.4ha		

Ecological Importance: This area is considered to be of High Ecological value in a local context

Habitat code

WN6/GS4

Wet Willow Alder Ash Woodland WN6 on the edge of Wet Grassland GS4 field. The woodland is dominated by Willows (*Salix* spp.) with clusters of young Elder trees (*Sambucus nigra*). A drain/stream runs along the boundary of the GS4 field within the woodland.

Species List for Wet Willow Alder Ash Woodland WN6

Species (Latin name)	Species (common name)
Crataegus monogyna	Hawthorn
Fraxinus excelsior	Ash
Galium aparine	Cleavers
Geranium robertianum	Herb Robert
Hedera helix	lvy
Holcus Lanatus	Yorkshire Fog
Ilex aquifolium	Holly
Mentha aquatica	Water Mint
Prunella vulgaris	Selfheal
Ranunculus repens	Creeping Buttercup
Rubus fruticosus	Bramble
Rumex obtusifolius	Broad Dock
Salix spp.	Willows
Sambucus nigra	Elder
Sorbus acuparia	Rowan



Photographic Record



Plate: View of Wet Willow Alder Ash Woodland WN6 from adjacent Wet Grassland Field GS4



TARGET NOTES			
Survey Title: South East Clare Habitat Mapping Survey date:			Survey date:
Surveyor: Paula Kearney		County name: Clare	
1:2,500 Sheet no: 4623-a	Townland: Mountcatherine		Grid Ref: 160673, 162056
Target note no.: TN2 Area: 10.9ha			

Ecological Interest: This area is considered to be of **Moderate** Ecological value in a local context.

Habitat code

WD2/WL2

Mature stand of Mixed Broadleaved and Conifer Woodland WD2, and mature Treeline WL2, surrounding a homestead and fringing the banks of the River Blackwater. This habitat comprises the following species; Pedunculate Oak (*Quercus robur*), Ash (*Fraxinus excelsior*), Scots Pine (*Pinus sylvatica*), Sycamore (*Acer pseudoplatanus*), Beech (*Fagus sylvatica*) and Horse Chestnut (*Aesculus hippocastanum*).









TARGET NOTES			
Survey Title: South East Clare Habitat Mapping Survey date: 14/07/08			Survey date: 14/07/08
Surveyor: Paula Kearney		County name: Clare	
1:2,500 Sheet no: 4623-a	Townland: Mountcatherine		Grid Ref: 161177, 161566
Target note no.: TN1 Area: 1.2ha			

Ecological Interest: This area is considered to be of **Moderate** Ecological value in a local context.

Habitat code

WL2/GS4

This narrow strip of woodland is classified as Treeline WL2 on bank of River Blackwater. The area supports species rich Wet Grassland GS4. The ground is heavily poached on the southern bank as a result of heavy grazing. This area is also under threat from invasion by Giant Hogweed (*Heracleum mantegazzianum*). This plant originates from Caucasus, Central Asia and was introduced into Ireland's gardens and estates as an ornamental plant in the late nineteenth century. The plant has since spread throughout Ireland and can be found particularly on river banks and canal corridors. The plant is potentially harmful to humans as the sap can cause burns. Giant Hogweed out-competes native flora in its habitat and as it dies back in the winter, river banks are often left open to erosion. This leads to the alteration of freshwater systems with an increase in nitrates and phosphates that leads to an increase in aquatic plant growth posing a risk to fish life, in particular, spawning salmon.

Species List for Treeline WL2 and Wet Grassland GS4

Species (Latin name)	Species (common
	name)
Fraxinus excelsior	Ash
Acer pseudoplatanus	Sycamore
Quercus robur	Oak
Fagus sylvatica	Beech
Alnus glutinosa	Alder
Geranium robertianum	Herb Robert
Leontodon autumnalis	Autumn Hawkbit
Ranunculus bulbosa	Bulbous Buttercup
Galium aparine	Cleavers
Pteridium aquilinum	Bracken
Ranunculus flammula	Lesser Spearwort
Veronica chamaedrys	Germander Speedwell
Glechoma hederacea	Ground Ivy
llex aquifolium	Holly









TARGET NOTES			
Survey Title: South East Clare Habitat Mapping Survey date: 25/07/08			Survey date: 25/07/08
Surveyor: Jean Hamilton		County name: Clare	
1:2,500 Sheet no: 4622-d	Townland: Shannakyle		Grid Ref: 159880, 160797
Target note no.: TN1 Area: 7.2ha			

Ecological Importance: This area is considered to be of **Moderate** Ecological value in a local context.

Habitat code

ED3

Area of Recolonising bare ground (ED3) with a wide variety of species. Area quite wet so many wetland species present. The area was previously used as a greyhound racing track but is currently not in use.

Species List:

Species (Latin name) Species (common		DAFOR Scale
	name)	
Agrostis spp.	Bents	Abundant
Dactylis glomerata	Cocksfoot	Frequent
Dipsacus fullonum	Teasel	Occasional
Epilobium montanum	Broad-leaved Willowherb	Occasional
Festuca spp.	Fescues	Abundant
Holcus lanatus	Yorkshire Fog	Dominant
Juncus spp.	Rushes	Frequent
Leucanthemum vulgare	Ox-eye Daisy	Occasional
Lotus corniculatus	Bird's-foot-trefoil	Frequent
Lythrum salicaria	Purple Loosestrife	Frequent
Persicaria maculosa	Redshank	Frequent
Phleum pratense	Timothy	Frequent
Poa spp.	Meadow Grasses	Abundant
Potentilla anserina	Silverweed	Frequent
Rumex obtusifolius	Broad-leaved Dock	Frequent
Scutellaria minor	Lesser Skullcap	Occasional
Senecio jacobaea	Common Ragwort	Frequent
Trifolium pratense	Red Clover	Occasional
Trifolium repens	White Clover	Occasional







Plate 1: Wild Teasel, Ragwort and Willowherb





Plate 2: Recolonising vegetation including Yorkshire Fog, Ox-eye Daisy, Silverweed, Willowherb and Clovers



TARGET NOTES			
Survey Title: South East Clare Habitat Mapping Survey date: 20/09/08			Survey date: 20/09/08
Surveyor: Jean Hamilton		County name: Clare	
1:2,500 Sheet no: 4621-b	Townland: Cappateemore West		Grid Ref: 154834, 162388
Target note no.: TN2 Area: 35.6h		Area: 35.6ha	1

Ecological Importance: This area is considered to be of **High** Ecological value in a local context. Oak Birch Holly Woodland corresponds to the annexed habitat 'old sessile oak woods with *Ilex* and *Blechnum* in the British Isles'.

Habitat code

WN1

Oak Birch Holly Woodland (WN1) running alongside river containing mainly native tree species; however some non-native tree species also occur. The field layer is quite sparse, comprising mainly of decayed vegetation, mosses and ferns.

Species List for Oak Birch Holly Woodland (WN1)

Species (<i>Latin</i> name)	Species (common name)
Acer pseudoplatanus	Sycamore
Aesculus hippocastanum	Horse Chestnut
Betula pubescens	Downy Birch
Crataegus monogyna	Hawthorn
Fagus sylvatica	Beech
Fraxinus excelsior	Ash
Hedera helix	lvy
Phyllitis (Asplenium) scolopendria	Hartstongue Fern
Pteridium aquilinum	Bracken
Prunus laurocerasus	Laurel
Quercus petraea	Sessile Oak







Plate 1: River with surrounding woodland vegetation.





Plate 2: Close-up of field layer.



TARGET NOTES			
Survey Title: South East Clare Habitat Mapping Survey date: 18/09/08			
Surveyor: Jean Hamilton		County name: Clare	
1:2,500 Sheet no: 4621-b/4622-a	Townland: Cappateemore		Grid Ref: 155962, 162155
Target note no.: TN1	Area: 10.6ha		

Ecological Importance: This area is considered to be of High Ecological value in a local context

Habitat code

WN6

This woodland comprises mostly of Ash (*Fraxinus* excelsior) with some Willows (*Salix* spp.), Blackthorn (*Prunella vulgaris*) and Hawthorn (*Crataegus monogyna*) and is classified Wet Willow Alder Ash Woodland WN6. Ground flora of comprises Remote Sedge (*Carex remota*), rushes (*Juncus*), mosses, lvy (*Hedera helix*), Bramble (*Rubus fruticosus*), Bracken (*Pteridium aquilinum*), Marsh Thistle (*Cirsium palustre*), Creeping Buttercup (*Ranunculus repens*), Wood-sorrel (*Oxalis acetosella*) and Hartstongue Fern (*Phyllitis* (*Asplenium*) *scolopendrium*). There is a small stream flowing through the woodland.

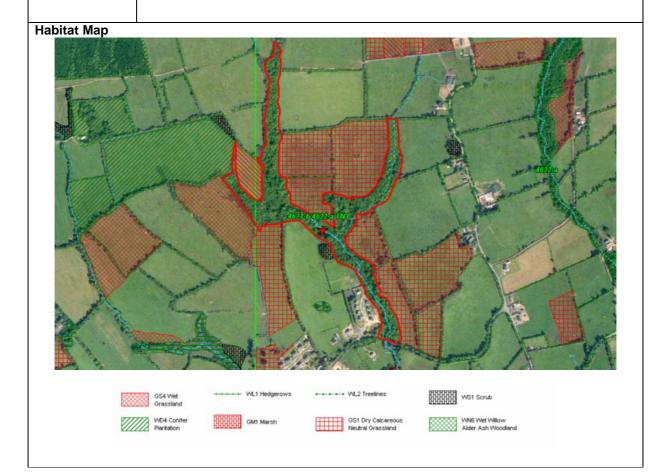




Plate 1: Showing Willows, Ash and ground flora.



Plate 2: Ground flora and small stream flowing in woodland



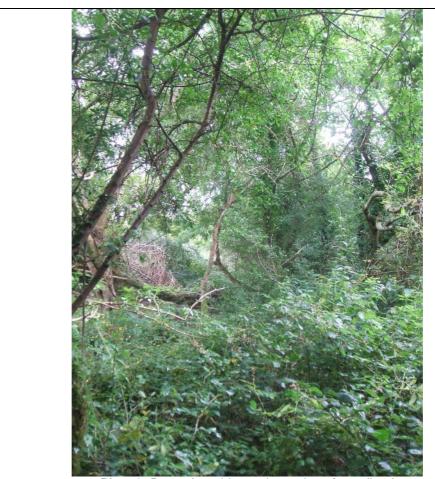


Plate 3: Dense bramble scrub at edge of woodland



TARGET NOTES			
Survey Title: South East Clare Habitat Mapping Survey date: 24/07/08			Survey date: 24/07/08
Surveyor: Jean Hamilton		County name: Clare	
(Cratice) – Lough Gorteen		Grid Ref: 148873, 161897	
Target note no. (Sheet No + 1,2,3, etc.): TN1		Area: 3.5ha (inc	cluding open water)

Ecological Importance: This area is considered to be of **High** Ecological value in a local context. This habitat corresponds to the Annex I habitat 'Alkaline Fens (7230)'.

Habitat code

PF1/WN6

This habitat is uncommon within the study site, and is best represented in the lake margins of Lough Gorteen in Cratloe Woods. The shallow peaty waters of the lake margins have given rise to this habitat. This habitat supports species such as Bogbean (*Menyanthes trifoliata*), Purple Moor-grass (*Molinia caerulea*), Common Cottongrass (*Eriophorum angustifolium*), Velvet Bent (*Agrostis canina*), Yorkshire-fog (*Holcus lanatus*) and broadleaved herbs such as Marsh Violet (*Viola palustris*), Heath Bedstraw (*Galium saxatile*), Tormentil (*Potentilla erecta*) and Marsh Cinquefoil (*Potentilla palustris*) also occur. Extensive carpets of mosses are characteristic. This habitat occurs in close association with Alder Carr and Wet Willow-Alder-Ash woodland WN6.

Habitat Map

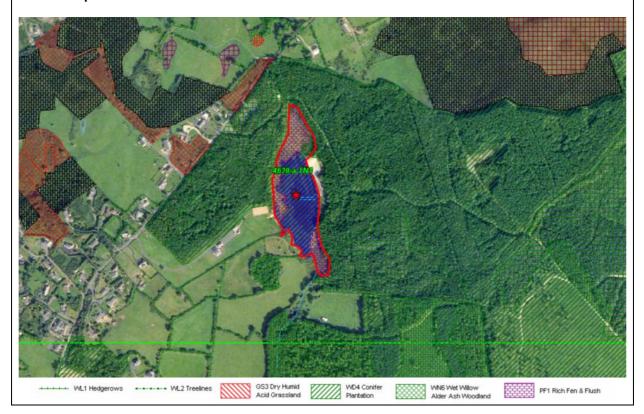




Plate 1: Species Rich Fen and Flush in the margins of Lough Gorteen, Cratloe



TARGET NOTES			
Survey Title: South East Clare Habitat Mapping			Survey date: 12/08/08
Surveyor: Jean Hamilton		County name: Clare	
1:2,500 Sheet no: 4565-a	Townland: Errina		Grid Ref: 162647, 163218
Target note no.: TN1	Area: 2.2ha		

Ecological Importance: This area is considered to be of **Moderate** Ecological value in a local context. Dry-humid Acid Grassland corresponds to priority habitat 'species-rich *Nardus* grasslands on siliceous substrates in mountain areas (6320)'.

Habitat code

GS3

This site is located south of the Errina Canal and Ardnacrusha headrace canal. This site is a good example of Acid grassland (GS3) and lies adjacent to Conifer Plantation WD4, Wet Grassland GS4 and Scrub WS1. The site is dominated by fescues (*Festuca*) spp., bents (*Agrostis*) spp., Matt Grass (*Nardus stricta*) and rushes (*Juncus*) spp. Other prominent species are Devils Bit Scabious (*Succisa pratensis*), Tormentil (*Potentilla* erecta) and Improved Agricultural Grassland (GA1) herbs such as Clovers (*Trifolium* spp.) and Buttercups (*Ranunculus* spp.), indicating that the field has been improved in the past. Ling heather (*Calluna* vulgaris) and Bog mosses (*Sphagnum* spp.) are present in wetter areas throughout the site.

Habitat Map







Plate 1: Devil's Bit Scabious (Succisa pratensis)



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TARGET NOTES			
Survey Title: South East Clare Habitat Mapping Survey date: 25/07/08			Survey date: 25/07/08
Surveyor: Jean Hamilton		County name: Clare	
1:2,500 Sheet no: 4564-d	Townland: Cloon	lara	Grid Ref: 162745, 163384
Target note no.: TN1		Area: 1ha	

Ecological Importance: This area is considered to be of **High** Ecological value in a local context.

Habitat code

WN5/GM1

Good example of Riparian Woodland WN5 on either side of disused Errina Canal. Dominated by Willow (*Salix*) spp. Marsh GM1 also occurs alongside the river with Meadowsweet (*Filipendula ulmaria*), Greater Reedmace (*Typha latifolia*) and other marsh species.

Species (Latin name)	Species (common name)
Alnus glutinosa	Alder
Holcus lanatus	Yorkshire Fog
Filipendula ulmaria	Meadowsweet
Fraxinus excelsior	Ash
Lolium perenne	Perennial Ryegrass
Typha latifolia	Greater Reedmace
Prunella vulgaris	Blackthorn
Rubus fruticosus	Bramble
Rumex obtusifolius	Broad Dock
Salix spp.	Willows
Scutellaria minor	Lesser Skullcap
Urtica dioeca	Nettle





Photographic Record The state of the state

Plate 1: Showing interface between Riparian Woodland and Marsh GM1 adjacent to Errina Canal



TARGET NOTES			
Survey Title: South East Clare Habitat Mapping		Survey date: 20/08/08	
Surveyor: Jon Kearney			County name: Clare
1:2,500 Sheet no: 4563-c	Townland: Glenlon North		Grid Ref: 157744, 163578
Target note no.: TN1		Area: 11.2ha	

Ecological Importance: This area is considered to be of **Moderate** Ecological value in a local context.

Habitat code

GS3 / GS4/ WN6/ WN5/ HD1/ WS1 The underlying geology in this area is Waulsortian Limestone and some rocky outcrops occur. However, the area is dominated by species-rich Humid Acid Grassland (GS3) with patches of very short sward with mosses, Matt Grass (*Nardus stricta*), with scattered shrubs including Gorse (*Ulex europaea*) and Ling Heather (*Calluna vulgaris*). This habitat extends west into very wet terrain with tall sward comprising typical Wet Grassland (GS4) and a Wet Willow Alder Ash Woodland WN6 comprising of species such as Willow (*Salix spp.*), Rowan (*Sorbus acuparia*), Ash (*Fraxinus excelsior*).

Species List for Habitat Mosaic

Species (Latin name)	Species (common name)
Agrostis spp.	Bents
Alnus glutinosa	Alder
Anthoxanthum odoratum	Sweet Vernal
Calluna vulgaris	Ling
Carex spp.	Sedge spp.
Cirsium palustre	Marsh Thistle
Euphrasia nemorosa	Common Eyebright
Festuca spp.	Fescue spp.
Fraxinus excelsior	Ash
Holcus lanatus	Yorkshire Fog
Juncus spp.	Rush spp.
Lolium perenne	Perennial Ryegrass
Lythrum salicaria	Purple Loosestrife
Molinia caerulea	Purple Moor-grass
Nardus stricta	Matt Grass
Plantago lanceolata	Ribwort Plantain
Potentilla erecta	Tormentil
Ranunculus flammula	Lesser Spearwort
Salix spp.	Willows
Sorbus acuparia	Rowan
Sphagnum spp.	Sphagnum spp.
Succisa pratensis	Devil's Bit Scabious
Trifolium repens	White Clover
Ulex europaea	Gorse



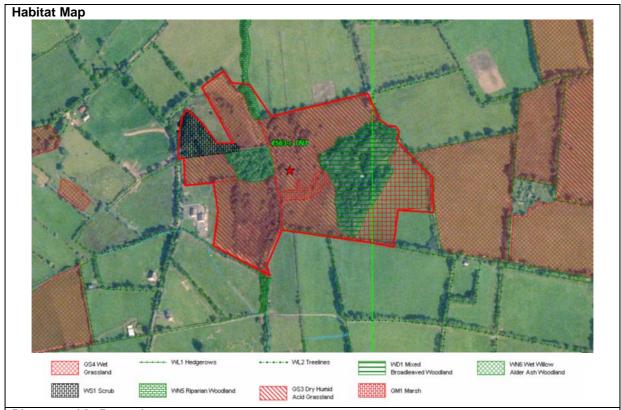




Plate 1: Acid Grassland with scattered Ling and Willow / Rowan / Ash wooded area in background.



Plate 2: Common Eyebright (Euphrasia nemorosa) growing on rocky outcrop.



TARGET NOTES			
Survey Title: South East Clare Habitat Mapping		Survey date: 20/09/08	
Surveyor: Jean Hamilton		County name: Clare	
1:2,500 Sheet no: 4563-a	Townland: Kilmoculla		Grid Ref: 156102, 165220
Target note no.: TN1		Area: 13ha	

Ecological Importance: This area is considered to be of **High** Ecological value in a local context. The Wet Grassland GS4 habitat at this site corresponds to the EU Habitats Directive Annex I Habitat: '*Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)' (6410).

Habitat code

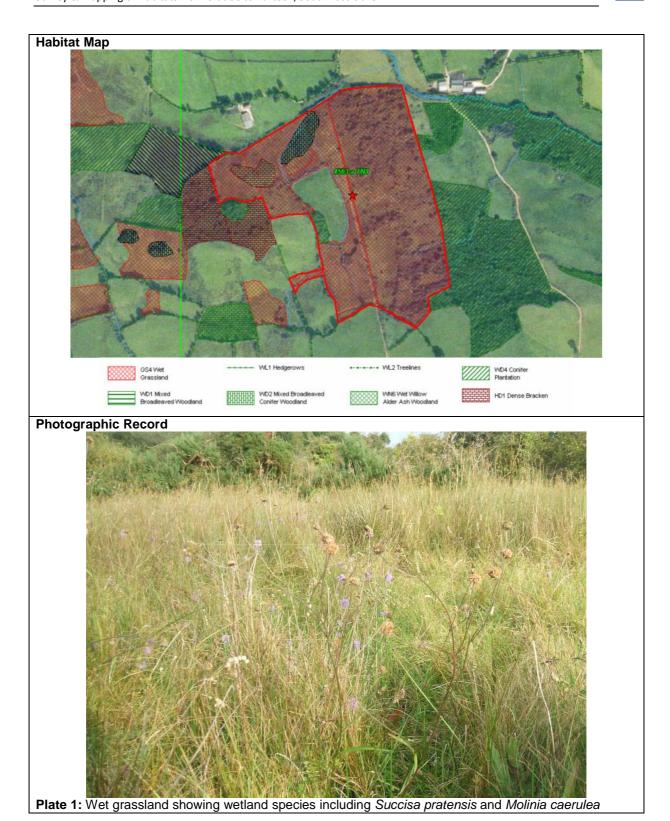
GS4 / GS3 / HH3 / WN6

Species-rich wet grassland (GS4) dominated by Purple Moor-grass (*Molinea caerulea*) with a wide array of wet grassland and Acid grassland (GS3) / Wet Heath (HH3) species. To the south of the site on a hillside lies an area of Mixed broadleaved woodland (WN6) dominated by Willows (*Salix* spp.), Rowan (*Sorbus acuparia*), some Hawthorn (*Crataegus monogyna*) and Hazel (*Corylus avellana*). Ground flora of Bracken (*Pteridium aquilinum*), Wood Sorrel (*Oxalis acetosella*), Ivy (*Hedera helix*), Bramble (*Rubus fruticosus*), mosses, Perennial Ryegrass (*Lolium perenne*) and Creeping Buttercup (*Ranunculus repens*).

Species List Wet Grassland

Species (Latin name)	Species (common	DAFOR Scale	
	name)		
Anthoxanthum odoratum	Sweet Vernal	Occasional	
Carex spp.	Sedge spp.	Frequent	
Calluna vulgaris	Ling Heather	Occasional	
Eriophorum	Common Cotton Grass	Occasional	
angustifolium			
Filipendula ulmaria	Meadowsweet	Frequent	
Juncus articulatus	Jointed Rush	Frequent	
Mentha aquatica	Watermint	Frequent	
Molinia caerulea	Purple Moor-grass	Dominant	
Narthecium ossifragum	Bog Asphodel	Occasional	
Polygala serpyllifolia	Heath Milkwort	Occasional	
Potentilla anserina	Silverweed	Occasional	
Potentilla erecta	Tormentil	Frequent	
Rhinanthus minor	Yellow-rattle	Occasional	
Salix spp.	Willows	Rare	
Sphagnum spp.	Sphagnum moss	Rare	
Succisa pratensis	Devil's Bit Scabious	Abundant	







TARGET NOTES			
Survey Title: South East Clare Habitat Mapping		Survey date: 17/09/08	
Surveyor: Jean Hamilton		County name: Clare	
1:2,500 Sheet no: 4562-b	Townland: Ballycar North		Grid Ref: 155124, 164595
Target note no.: TN2		Area: 1.6ha	

Ecological Importance: This area is considered to be of **High** Ecological value in a local context. Linked to Annex Habitat under Habitats Directive - European Dry Heaths (Code 4030) and Dry-humid Acid Grassland corresponds to the priority habitat 'species-rich *Nardus* grasslands on siliceous substrates in mountain areas (6320)'.

Habitat code

HH1 / GS3 Mosaic

Upland area adjacent to conifer plantation containing a mosaic of Dry siliceous heath HH1 and Dry-humid acid grassland GS3. Ling (*Calluna vulgaris*) and Bell Heather (*Erica cinerea*) dominate the Dry Siliceous Heath habitat while the Dry-humid acid grassland GS3 habitat is composed mainly of low-growing grasses such as Matt Grass (*Nardus stricta*), bents (*Poa spp.*), fescues (*Festuca spp.*) and Sweet Vernal (*Anthoxanthum odoratum*). Rushes (*Juncus spp.*) are also abundant. Broadleaved herbs include Tormentil (*Potentilla erecta*), Devil's Bit Scabious (*Succisa pratensis*), Heath Milkwort (*Polygala serphyllifolia*) and Common Cottongrass (*Eriophorum angustifolium*). An orchid species was also found on the site - given the habitat it is likely to be Heath Spotted-Orchid (*Dactylorhiza maculata*) – see image below.

Habitat Map

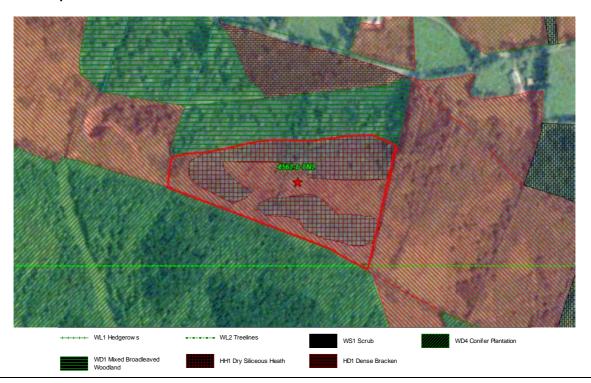




Plate 1: Typical Acid Grassland GS3 vegetation



Plate 2: Close up of Dry Siliceous Heath vegetation with dominated by Ling with rushes and Tormentil.







TARGET NOTES			
Survey Title: South East Clare Habitat Mapping		Survey date: 28/08/08	
Surveyor: Jean Hamilton		County name: Clare	
1:2,500 Sheet no: 4562-b	Townland: Ballycar North		Grid Ref: 155478, 165557
Target note no.: TN1		Area: 0.2ha	
Ecological Importance: This area is considered to be of Moderate Ecological value in a local context.			

Habitat code

WN6

Woodland area dominated by Ash (*Fraxinus excelsior*) with some Hawthorn (*Crataegus monogyna*) and Willows (*Salix* spp.). Ground flora of Nettle (*Urtica dioeca*), Bramble (*Rubus fruticosus*), Meadowsweet (*Filipendula ulmaria*), Herb Robert (*Geranium robertianum*), Creeping Buttercup (*Ranunculus repens*), mosses, ferns, False-oat-grass (*Arrhenatherum elatius*), Broad-leaved Dock (*Rumex obtusifolia*), Ivy (*Hedera helix*). Surrounded by Sycamore (*Acer pseudoplatanus*) treeline.



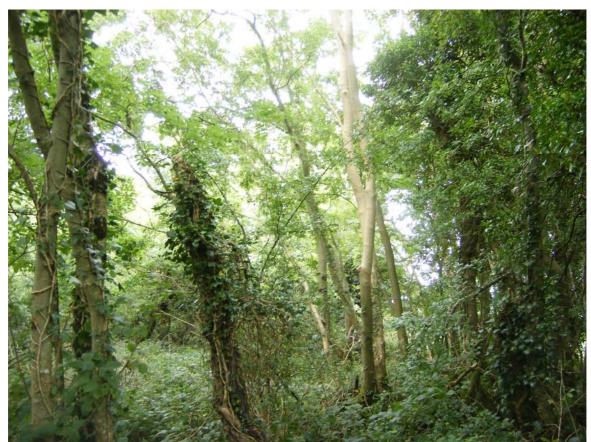


Plate 1: View of woodland with Ash (*Fraxinus excelsior*), Ivy (*Hedera helix*), and Bramble (*Rubus fruticosus*)





Plate 2: Woodland canopy





Plate 3: Field layer



TARGET NOTES			
Survey Title: South East Clare Habitat Mapping		Survey date: 10/10/08	
Surveyor: Jean Hamilton		County name: Clare	
1:2,500 Sheet no: 4561-c	Townland: Heathmount		Grid Ref: 149830, 163088
Target note no.: TN1		Area: 27.7ha	ì

Ecological Importance: This area is considered to be of **High** Ecological value in a local context. Linked to Annex Habitat under Habitats Directive - Northern Atlantic Wet Heaths with *Erica tetralix* (Code 4010) and Dry Dwarf Scrub Heath is affiliated with 'European dry heaths (4030)'.

Habitat code

HH3/HH1

Very good example of a Wet Heath habitat HH3, quite species diverse. Small areas of Dry Siliceous Heath HH1 occur on the thin soils at the higher altitudes of the site and also to the south of the site. Purple Moor Grass (*Molinia caerulea*) and Deergrass (*Trichophorum cespitosum*) are absent at these locations. Dry Neutral Acid Grassland GS3 occurs in the margins of the site with Wet grassland GS4 and Heath habitats occurring to the north and west of the site. Conifer Plantations WD4 are a prominent feature in the surrounding landscape. A good variety of invertebrates were recorded at the site, including springtails, moths and spiders. Deer are known to be present in the area and Meadow Pipits (*Anthus pratensis*) were sighted during the survey.

Species List for Wet Heath HH3

Species (Latin name)	Species (common	DAFOR Scale	
	name)		
Calluna vulgaris	Ling Heather	Dominant	
Cladonia sp.	Cladonia lichen	Frequent	
Erica cinerea	Bell Heather	Occasional (frequent on	
		lower slopes)	
Erica tetralix	Cross-leaved Heath	Abundant	
Juncus squarrosus	Heath Rush	Frequent	
Molinia caerulea	Purple Moor Grass	Frequent	
Potentilla erecta	Tormentil	Occasional	
Sphagnum spp.	Sphagnum moss	Frequent	
Trichophorum cespitosum	Deergrass	Abundant	
Ulex europaeus	Common Gorse	Occasional	



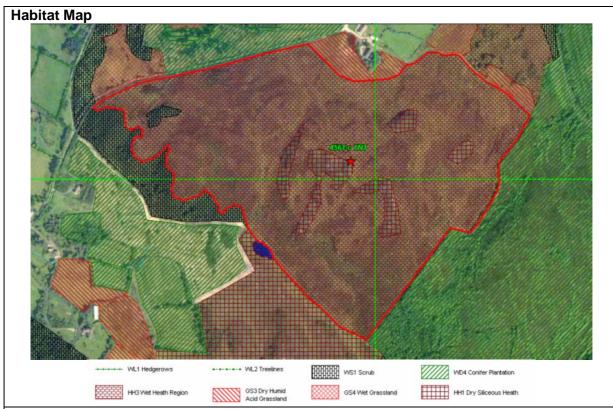




Plate 1: Overview of Wet Heath





Plate 2: Close-up of Wet Heath vegetation – showing *Sphagnum spp.*, Reindeer Lichen *Cladonia* sp., Ling Heather *Calluna vulgaris*, Deergrass *Trichophorum cespitosum*



Plate 3: Gorse scrub encroachment in Wet Heath HH3 habitat



TARGET NOTES			
Survey Title: South East Clare Habitat Mapping Survey date: 28/08/08			
Surveyor: Jean Hamilton		County name: Clare	
1:2,500 Sheet no: 4505-c	Townland: Ardataggle		Grid Ref: 165499, 166952
Target note no.: TN2	Area: 2.5ha		

Ecological Importance: This area is considered to be of **High** Ecological value in a local context. Linked to Annex Habitat under Habitats Directive - Oligotrophic to Mesotrophic Standing Waters (Code 3130)

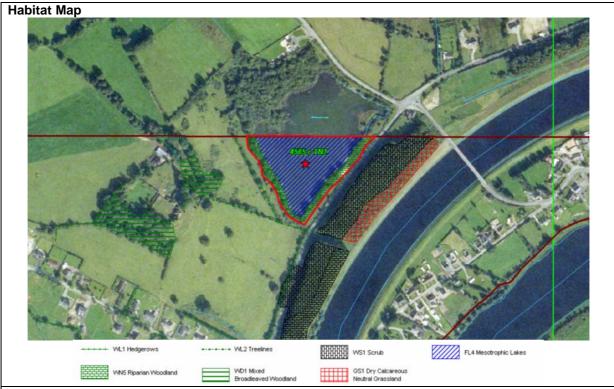
Habitat code

FL4 /WD1 / WN5

Mesotrophic Lake (FL4) surrounded by Riparian woodland / Mature Treeline. Stoneworts (*Chara* spp.) and Water-plantain (*Alisma plantago-aquatica*) were observed growing in the lake. The surrounding shoreline is host to a wide variety of wetland species and mature woodland surrounds the entire lake. This woodland is classified as Riparian Woodland (WN5). Some areas within the woodland are dominated by willows and ground flora comprises mosses and wetland species. Nonnatives species such as Sycamore (*Acer pseudoplatanus*) also occur, particularly to the north of the lake and this area may be considered under Mixed broadleaved woodland (WD1). A path surrounds the lake, indicating that this area is an important local amenity.

Species (Latin name)	Species (common name)
Acer pseudoplatanus	Sycamore
Agrostis stolonifera	Creeping Bent
Alisma plantago-aquatica	Water-plantain
Chara spp.	Stoneworts
Crataegus monogyna	Hawthorn
Filipendula ulmaria	Meadowsweet
Juncus spp.	Rush spp.
Lolium perenne	Perennial Ryegrass
Lythrum salicaria	Purple-loosestrife
Mentha aquatica	Watermint
Oxalis acetosella	Wood-sorrel
Phyllitis scopendrium	Hart's-tongue Fern
Poa spp.	Meadowgrasses
Potentilla anserina	Silverweed
Quercus robur	Pedunculate Oak
Ranunculus flammula	Lesser Spearwort
Rubus fruticosus	Bramble
Salix spp.	Willows
Senecio jacobaea	Common Ragwort
Urtica dioeca	Nettle





Photographic Record



Plate 1: View of lake from southwestern corner.



Plate 2: Woodland surrounding lake



Plate 3: Water-plantain (Alisma plantago-aquatica)





Plate 4: Riparian vegetation along lake shore



Plate 5: Wetland species growing on lake shore



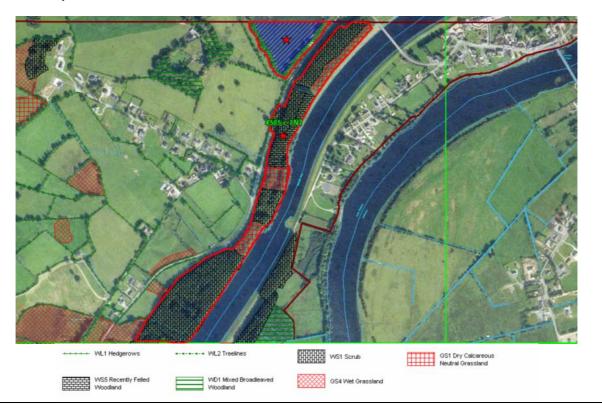
TARGET NOTES			
Survey Title: South East Clare Habitat Mapping			Survey date: 28/08/08
Surveyor: Jean Hamilton		County name: Clare	
1:2,500 Sheet no: 4505-c	Townland: Drummeen		Grid Ref: 165188, 166118
Target note no.: TN1 Area: 10.2ha		Area: 10.2ha	

Ecological Importance: This area is considered to be of **Moderate** Ecological value in a local context.

Habitat code

WS1 / WS5 / GS1 This area comprises an interesting mosaic of habitats. An area of clear–felled plantation occurs along the western bank of Ardnacrusha Headrace Canal. The site has evidently been cleared for a number of years as a significant amount of scrub encroachment is taking place and is starting to replace the Recently-felled woodland habitat (WS5). Some areas are still typical of the WS5 Habitat type with species such as Ferns (mainly Bracken (*Pteridium aquilinum*), Rosebay Willowherb (*Epilobium angustifolium*), Herb Robert (*Geranium robertianum*) and Foxglove (*Digitalis purpurea*) dominant. However, most of the area is covered in Bramble (*Rubus fruticosus*) with some Hazel (*Corylus avellana*), Ash (*Fraxinus excelsior*) and regenerating Oak (*Quercus robur*), and this is may be classified as Scrub (WS1). There are some grassy patches creeping up from the bank of the canal with typical Dry calcareous and Neutral Grassland (GS1) vegetation including bents (*Agrostis* spp.), meadow grasses (*Poa* spp.), Yorkshire Fog (*Holcus lanatus*) and False-oat-grass (*Arrhenatherum elatius*).

Habitat Map



Photographic Record



Plate 1: Path through clear-felled area



Plate 2: Typical WS5 vegetation including Foxgloves and ferns. Area of scrub in background.



Plate 3: Overview of site showing cleared vegetation, scrubby area and patches of grassland. Some remaining conifers can be seen to the right of the image.



Plate 4: Bramble scrub.



TARGET NOTES				
Survey Title: South East Clare Habitat Mapping			Survey date: 15/08/08	
Surveyor: Paula Kearney		County name: Clare		
1:2,500 Sheet no: 4504-c	Townland: Aharinaghmore		Grid Ref: 160905, 166701	
Target note no.: TN3		Area: 2.1ha		

Ecological Importance: This area is considered to be of **High** Ecological value in a local context. Linked to Priority Annex Habitat under Habitats Directive – Acid grassland corresponds to 'Species-Rich Nardus Grasslands, on Siliceous Substrates in Mountain Areas (Code 6230)' and Wet heath corresponds to the Annex 1 habitat 'northern Atlantic wet heaths with *Erica tetralix* (4010)'.

Habitat code

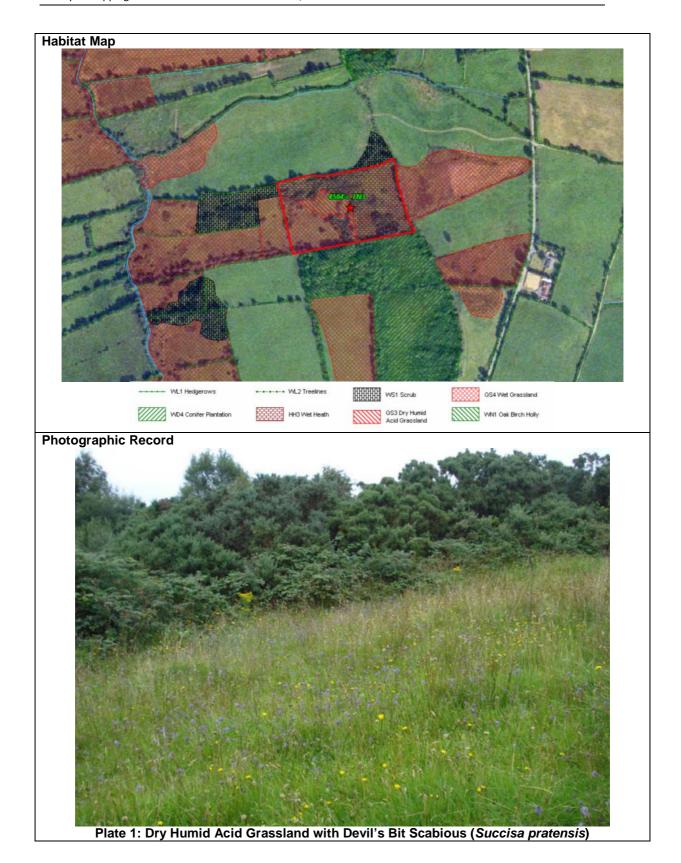
GS4 / GS3 / HH3

This habitat comprises Wet Grassland GS4, Dry Humid Acid Grassland GS3 in the dry elevated areas in association with sandstone outcropping, which grades in to Wet Heath (HH3) to the north and west. The site is currently grazed by horses. There are some signs of agricultural improvement but this has evidently not been carried out in recent years. Species present on the site include Devil's Bit Scabious (Succisa pratensis), Sweet Vernal (Anthoxanthum odoratum), Bird's-foot-trefoil (Lotus corniculatus) and rushes (Juncus spp.) in the wetter areas. The site is under threat from Gorse (Ulex europaea), Bramble (Rubus fruticosus) and Bracken (Pteridium aquilinum) encroachment. Several butterfly species were recorded on site.

Species List for Dry Humid Acid Grassland GS3 and Wet Heath HH3

Species (<i>Latin</i> name)	Species (common name)
Agrostis spp.	Bents
Anthoxanthum odoratum	Sweet Vernal
Calluna vulgaris	Ling
Carex spp.	Sedges
Empetrum nigrum	Crowberry
Erica cinerea	Bell Heather
Erica Tetralix	Cross-leaved Heath
Juncus squarrosus	Heath Rush
Molinia caerulea	Purple Moor-grass
Narthecium ossifragum	Bog Asphodel
Potentilla erecta	Tormentil
Sphagnum spp.	Sphagnum spp.
Succisa pratensis	Devil's Bit Scabious
Trichophorum cespitosum	Deergrass
Vaccinium myrtillus	Bilberry











TARGET NOTES				
Survey Title: South East Clare Habitat Mapping			Survey date: 15/08/08	
Surveyor: Paula Kearney		County name: Clare		
1:2,500 Sheet no: 4504-c Townland: Ballybrack		Grid Ref: 161779, 166269		
Target note no.: TN2 Area: 1.9ha		Area: 1.9ha		

Ecological Importance: This area is considered to be of **Moderate** Ecological value in a local context. This habitat corresponds to EU Habitats Directive Annex I Habitat: Dry-humid Acid Grassland includes the priority habitat 'species-rich *Nardus* grasslands on siliceous substrates in mountain areas (6320)'.

Habitat code

GS3

Area of Dry Humid Acid Grassland (GS3) which is currently grazed by cattle. This site valuable to local wildlife.

Species List for Dry Humid Acid Grassland GS3

Species (Latin name)	Species (common
	name)
Agrostis spp.	Bents
Anthoxanthum odoratum	Sweet Vernal
Lotus corniculatus	Bird's-foot-trefoil
Melampyrum pratense	Cow Wheat
Molinia caerulea	Purple Moor-grass
Nardus stricta	Matt Grass
Plantago lanceolata	Ribwort Plantain
Potentilla erecta	Tormentil
Prunella vulgaris	Selfheal
Succisa pratensis	Devil's Bit Scabious









Plate 1: Dry Humid Acid Grassland GS3



TARGET NOTES			
Survey Title: South East Clare Habitat Mapping Survey date: 15/08/08			
Surveyor: Paula Kearney		County name: Clare	
1:2,500 Sheet no: 4504-c	Townland: Ballybrack		Grid Ref: 161645, 166574
Target note no.: TN1	note no.: TN1 Area: 6.7ha		

Ecological Importance: This area is considered to be of **High** Ecological value in a local context. Linked to Annex I Habitats under Habitats Directive - Northern Atlantic Wet Heaths with *Erica tetralix* (Code 4010), Active Raised Bogs (Code 7110), Bog Woodland (Code 91d0) and 'depressions on peat substrates of the *Rhyncosporion* (7150)'

Habitat code

PB1/ PB4/ HH32 /GS4/ GS3/ WN7

This area was formerly an area of Raised Bog PB1 which has been extensively cut and drained and is under threat from encroachment of Birch (*Betula pubescens*), Gorse (*Ulex europaea*) and Bracken (*Pteridium aquilinum*). Areas of Cutover bog have developed luxuriant Wet Heath (HH3) vegetation and the wetter areas support lawns of Bog moss (*Sphagnum spp.*) and White-beaked Sedge (*Rhynchospora alba*). Wet Heath HH3 habitat forms the overall character of the site and forms intimate mosaics with Wet Grassland (GS4) with an abundance of rushes and grasses such as Purple Moor-grass (*Molinia caerulea*), bents (*Agrostis* spp.), Sweet Vernal (*Anthoxanthum odoratum*), and Yorkshire Fog (*Holcus lanatus*). Upper areas of the site grade into well drained Acid Grassland (GS3) vegetation. Bog Woodland WN7 and Wet Grassland GS4 occurs to the northeast with species such as; Crack Willow (*Salix fragilis*), Rowan (*Sorbus acuparia*), Downy Birch (*Betula pubescens*), Gorse (*Ulex europaea*) and Bracken (*Pteridium aquilinum*). A Smooth Crested Newt (*Triturus vulgaris*) was recorded at this site.

Wet Heath Species List:

Species (<i>Latin</i> name)	Species (common
	name)
Betula pubescens	Downy Birch
Calluna vulgaris	Ling
Cladonia sp.	Cladonia Lichen
Erica Tetralix	Cross-leaved Heath
Eriophorum vaginatum	Hare's-tail Cottongrass
Juncus effusus	Soft Rush
Juncus inflexus	Hard Rush
Juncus squarrosus	Heath Rush
Molinia caerulea	Purple Moor-grass
Narthecium ossifragum	Bog Asphodel
Potentilla erecta	Tormentil
Pteridium aquilinum	Bracken
Rhynchospora alba	White-beaked Sedge
Trichophorum cespitosum	Deergrass
Ulex europaea	Gorse



Acid Grassland Species List:

Species (Latin name)	Species (common	
	name)	
Anthoxanthum odoratum	Sweet Vernal	
Festuca spp.	Fescue spp.	
Juncus squarrosus	Heath Rush	
Luzula sp.	Wood-rush sp.	
Molinia caerulea	Purple Moor-grass	
Nardus stricta	Matt Grass	
Succisa pratensis	Devil's Bit Scabious	





Photographic Record The state of the state

Plate 1: Bog Asphodel Narthecium ossifragum



Plate 2: Cutover Bog PB4 with Wet Heath HH3 vegetation and pools of White-beaked Sedge Rhynchospora alba



TARGET NOTES			
Survey Title: South East Clare Habitat Mapping Survey date: 20/09/08			
Surveyor: Jean Hamilton		County name: Clare	
1:2,500 Sheet no: 4503-c/4503-d	Townland: Cloonsheerea		Grid Ref: 157988, 166348
Target note no.: TN2	-	Area : 4.7ha	

Ecological Importance: This area is considered to be of **Moderate to High** Ecological value in a local context. Links to EU Habitats Directive Annex I Habitat: Dry-humid Acid Grassland includes the priority habitat 'species-rich *Nardus* grasslands on siliceous substrates in mountain areas (6320)'.

Habitat code

GS3 / GS4 / GM1

Humid Acid Grassland (GS3) grading into Wet Grassland (GS4) and Marsh GM1. Fairly high sward with rushes and tall sedges dominant. Some patches of short sward with Matt Grass (*Nardus stricta*), Fescues (*Festuca spp.*) and mosses dominate.

Species (Latin name)	Species (common name)	DAFOR Scale
Agrostis spp.	Bent spp.	Abundant
Anthoxanthum odoratum	Sweet Vernal Grass	Abundant
Carex spp.	Sedge spp.	Dominant
Cirsium palustre	Marsh Thistle	Frequent
Festuca spp.	Fescue spp.	Abundant
Filipendula ulmaria	Meadowsweet	Abundant
Holcus lanatus	Yorkshire Fog	Frequent
Juncus spp.	Rush spp.	Dominant
Mentha aquatica	Watermint	Occasional
Nardus stricta	Matt Grass	Frequent
Poa spp.	Meadowgrasses	Abundant
Potentilla erecta	Tormentil	Frequent
Rhinanthus minor	Yellow-rattle	Occasional
Succisa pratensis	Devil's Bit Scabious	Frequent







Plate 1: Dry Humid Acid Grassland GS3 and Wet Grassland GS4



TARGET NOTES				
Survey Title: South East Clare Habitat Mapping		Survey date: 20/09/08		
Surveyor: Jean Hamilton		County name: Clare		
1:2,500 Sheet no: 4503-c	Townland: Cloonsheerea		Grid Ref: 157813, 166586	
Target note no.: TN1		Area: 3.1ha		

This area is considered to be of **Moderate** Ecological value in a local context

Habitat code

GS4 / GM1 / WS1/ WD1

Good example of Humid Acid Grassland (GS3), grading gradually into Marsh (GM1) and Mixed Broadleaved Woodland WD1. Some Scrub WS1 encroachment from the east.

Species (Latin name)	Species (common	DAFOR Scale
	name)	
Anthoxanthum odoratum	Sweet Vernal	Abundant
Carex spp.	Sedge spp.	Dominant
Cirsium palustre	Marsh Thistle	Occasional
Festuca spp.	Fescue spp.	Frequent
Filipendula ulmaria	Meadowsweet	Dominant
Juncus spp.	Rush spp.	Abundant
Mentha aquatica	Watermint	Frequent
Poa spp.	Meadowgrasses	Abundant
Potentilla erecta	Tormentil	Abundant
Rhinanthus minor	Yellow-rattle	Occasional
Succisa pratensis	Devil's Bit Scabious	Abundant



Photographic Record



Plate 1: Humid Acid Grassland (GS3) / Wet Grassland (GS4) vegetation.



Plate 2: Marsh Thistle (*Cirsium palustre*), Devil's Bit Scabious (*Succisa pratensis*) and other wetland vegetation with Gorse (*Ulex europaea*) scrub in background.



Plate 3: Orchid species found on site.



TARGET NOTES					
Survey Title: South East Clare Habitat Mapping		Survey date: 24/07/08			
Surveyor: Jean Hamilton			County name: Clare		
1:2,500 Sheet no: 4683-a	Townland: Garraun		Grid Ref: 161378, 159396		
Target note no. (Sheet No + 1,2,3, etc.): TN1		Area: 5ha			

Ecological Importance: This area is considered to be of **High** Ecological value in a local context. This habitat corresponds to the Annex I priority habitats 'alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) 91E0'

Habitat code

WN4/WL2

This habitat is located on the banks of the River Blackwater where it converges with the River Shannon in Garraun. This habitat comprises a Wet Pedunculate Oak Ash Woodland WN4 and Treelines WL2 that are located on either bank of the River Blackwater. Species include Ash (*Fraxinus excelsior*), Sycamore (*Acer pseudoplatanus*), Beech (*Fagus sylvatica*), Hawthorn (*Crataegus monogyna*), Oak (*Quercus robu*) and *Alder (Alnus glutinosa*)

Species list for Wet Pedunculate Oak Ash Woodland WN4 and WL2

Species (Latin name)	Species (common name)
Acer pseudoplatanus	Sycamore
Alnus glutinosa	Alder
Cirsium palustre	Marsh Thistle
Crataegus monogyna	Hawthorn
Holcus lanatus	Yorkshire Fog
Fagus sylvatica	Beech
Filipendula ulmaria	Meadowsweet
Fraxinus excelsior	Ash
Poa spp.	Meadowgrasses
Quercus robur.	Pedunculate Oak
Rubus fruticosus	Bramble
Rumex obtusifolius	Broad Dock
Salix spp.	Willows





